



State of play & policy developments regarding BECCU in Finland

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The Bioenergy Association of Finland

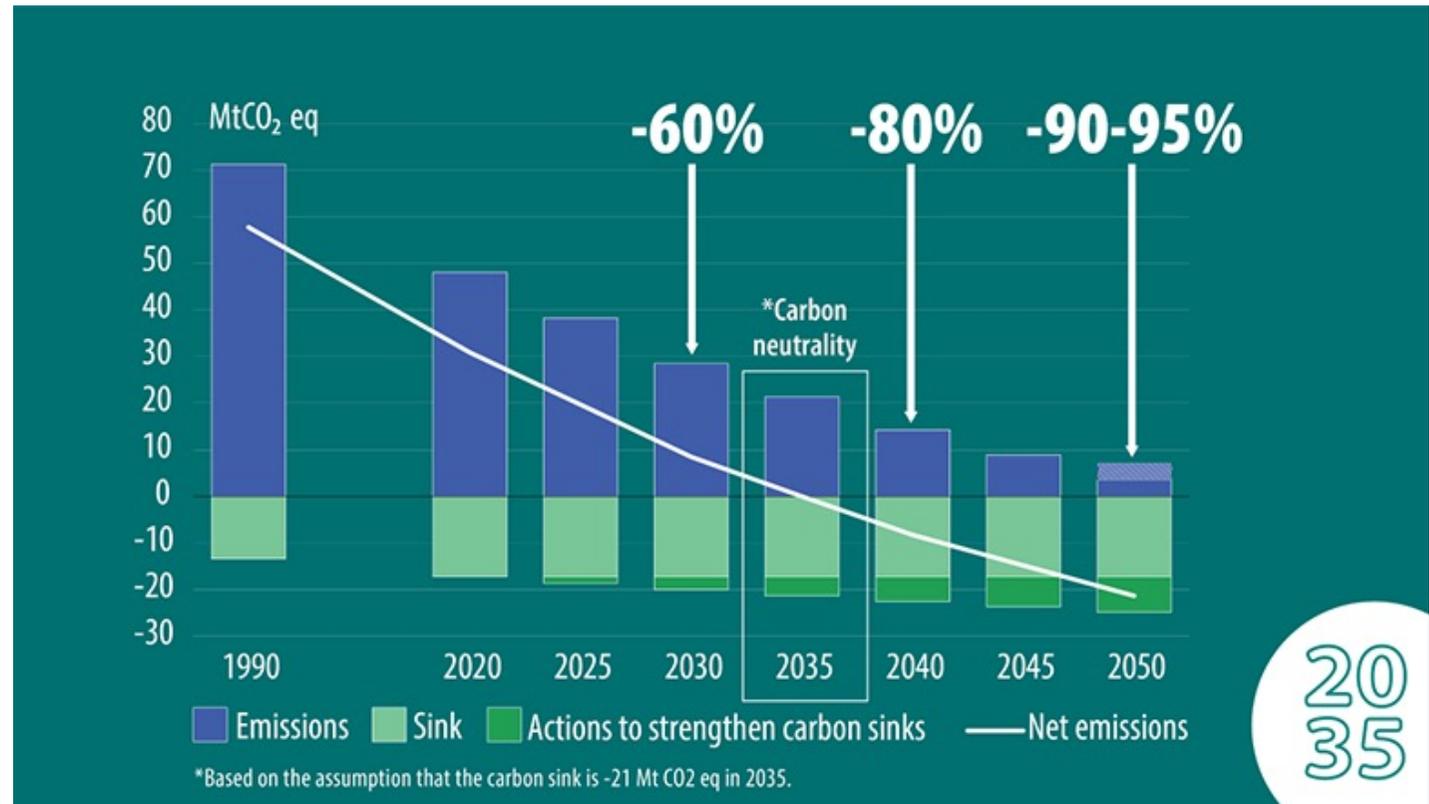
- Over 250 member organisations.
- We represents the entire bioenergy sector from land ownership to forest and energy companies, as well as technology and research in the field.
- Our goal: Finland is the best place in the world to create sustainable, bio-based & carbon negative solutions!
- Carbon removal and CCUS – committee + biochar network facilitates development.





Finland's key climate policy targets

- Climate neutrality by 2035 (The Climate Act). Specific emissions reduction targets for 2030, 2040 and 2050.
- Assumption that LULUCF sector remains a carbon sink of 21 Mt → uncertainties regarding the future development & achieving the target!
- Currently no targets for technological sinks or carbon capture.

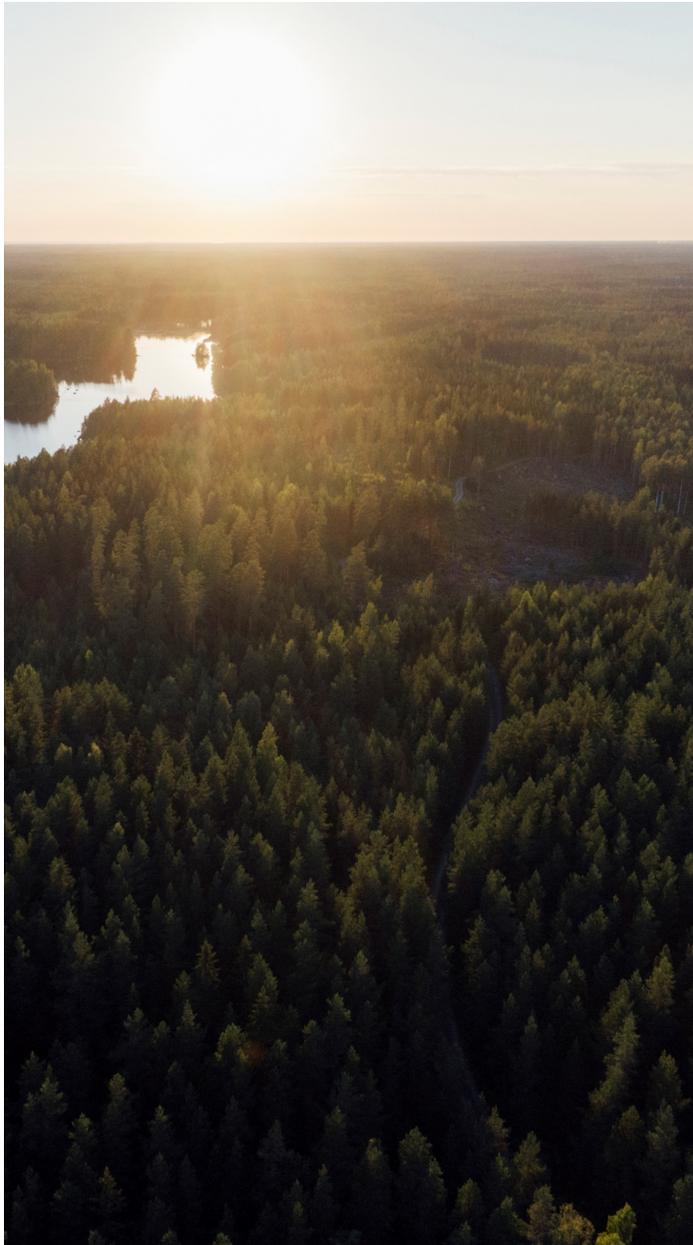


Source: Ministry of the Environment



National policy & CCUS developments

- The Government adopted a [resolution](#) on hydrogen in February 2023. Finland aims to become the European leader in the hydrogen economy in the entire value chain. Finland has the capacity to produce at least 10 % of the EU's clean hydrogen in 2030.
 - The Sustainable Growth Programme for Finland allocated EUR 150 million to hydrogen and carbon capture and utilisation projects (RRF funding).
- Finland's NECP ([Draft submitted](#) in June 2023): "The **utilisation of captured CO2 is a focus area**, and several projects that combine CO2 mainly from biological origin with clean hydrogen to make synthetic methane for the transport sector are becoming operational from 2024. There are also projects, supported by the State, to produce synthetic methanol and ammonia."
- [Priority treatment](#) of projects that promote investments in the green transition in permit procedures (Environmental Protection Act/Water Act) 2023-2026, includes CCUS. Urgent status also in the administrative courts.
- RFNBOs recently integrated in the distribution mandate in the transport sector. The level for advanced biofuels, biogas and RFNBOs is at 2% (2021–2023), 4% in 2025 and will increase to 10% by 2030.
- Investment aid granted for projects in carbon capture and synthetic fuels.





“Finland to lead the way in carbon capture”

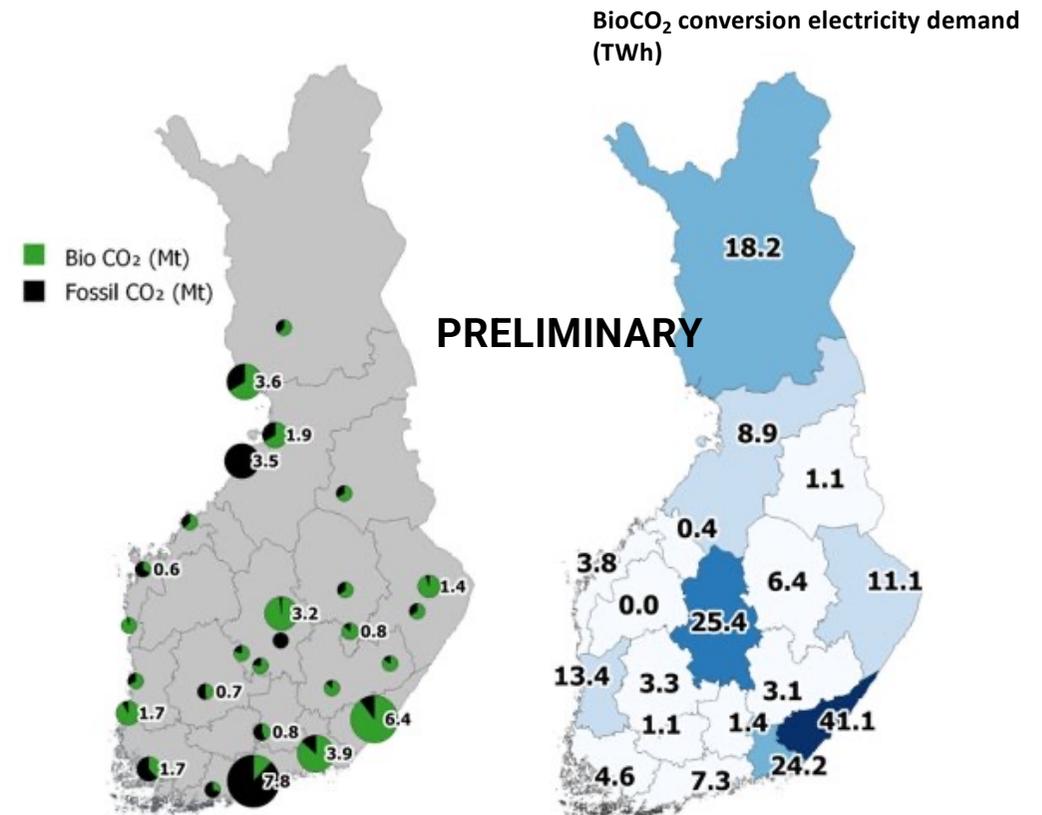
- New strategic opening in the [Government's programme](#): CCUS solutions as one of the key priorities in the Finnish climate policy.
- Government's take: **competitive advantage in BioCCU**.
- BioCCU combined with increased hydrogen production will create a platform for producing fuels, chemicals and materials from a sustainable carbon source and will reduce dependence on fossil raw materials.
- The programme emphasises aim to develop incentive scheme during the mandate: “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.
- 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 28 Mt/a of biogenic CO₂.
 - Forest industry 19,6 Mt
 - Energy industry 8 Mt
 - WtE 0,6 Mt→ Huge potential for CCUS!
- About half of the point sources in the coast.
- Regional mismatch for CCU: renewable power vs CO₂.
- No geological storage sites have been identified in Finland. → Partners and international co-operation a must!
- CCU allows projects to get started without having to wait for storage projects to come available.



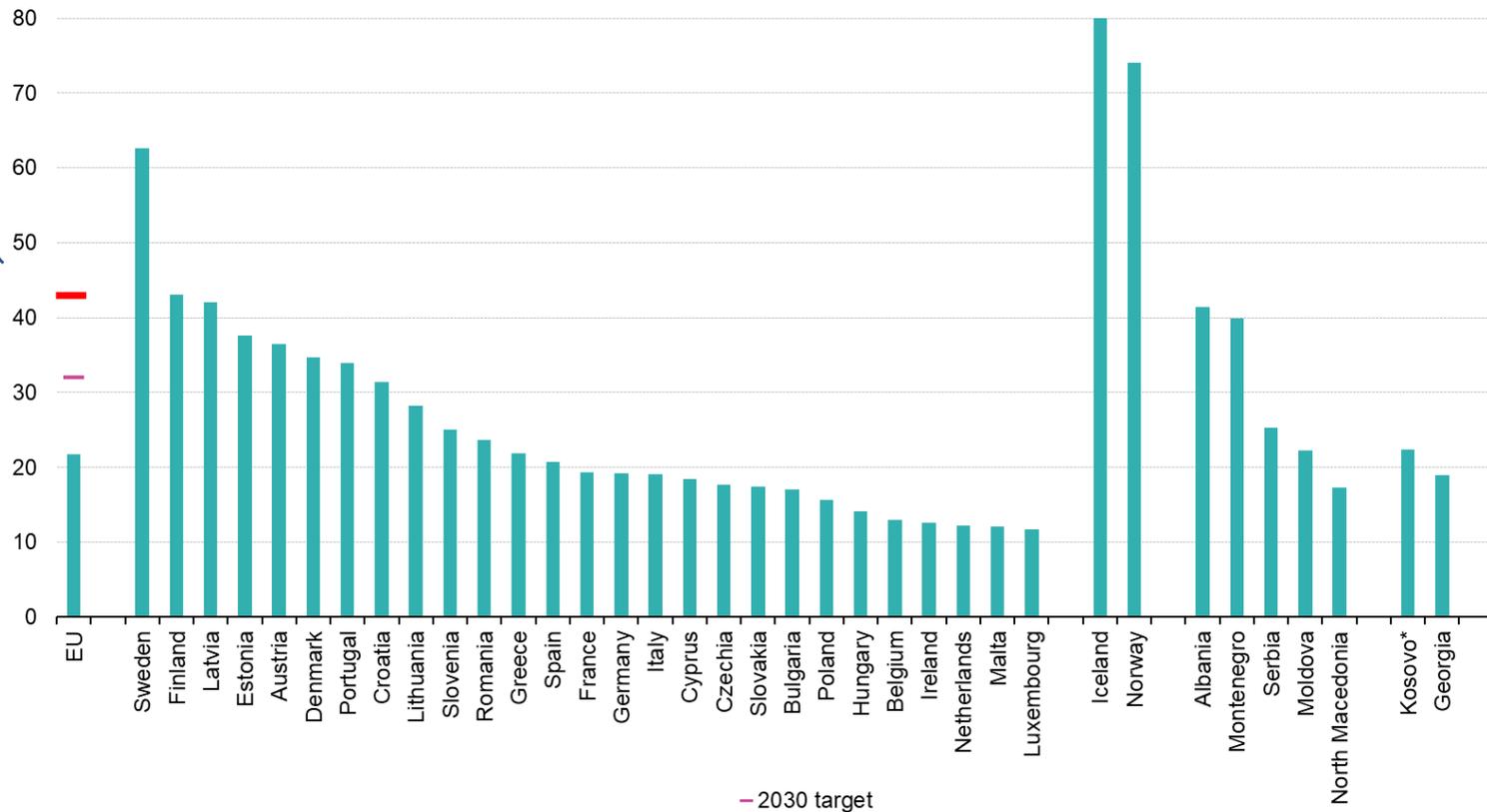
Source: Hannu Karjunen, LUT, [Hygcel-project](#)

Finland is No 2 in the EU on Renewable Energy



Share of energy from renewable sources, 2021
(% of gross final energy consumption)

New Goal for 2030 agreed:
42.5 %



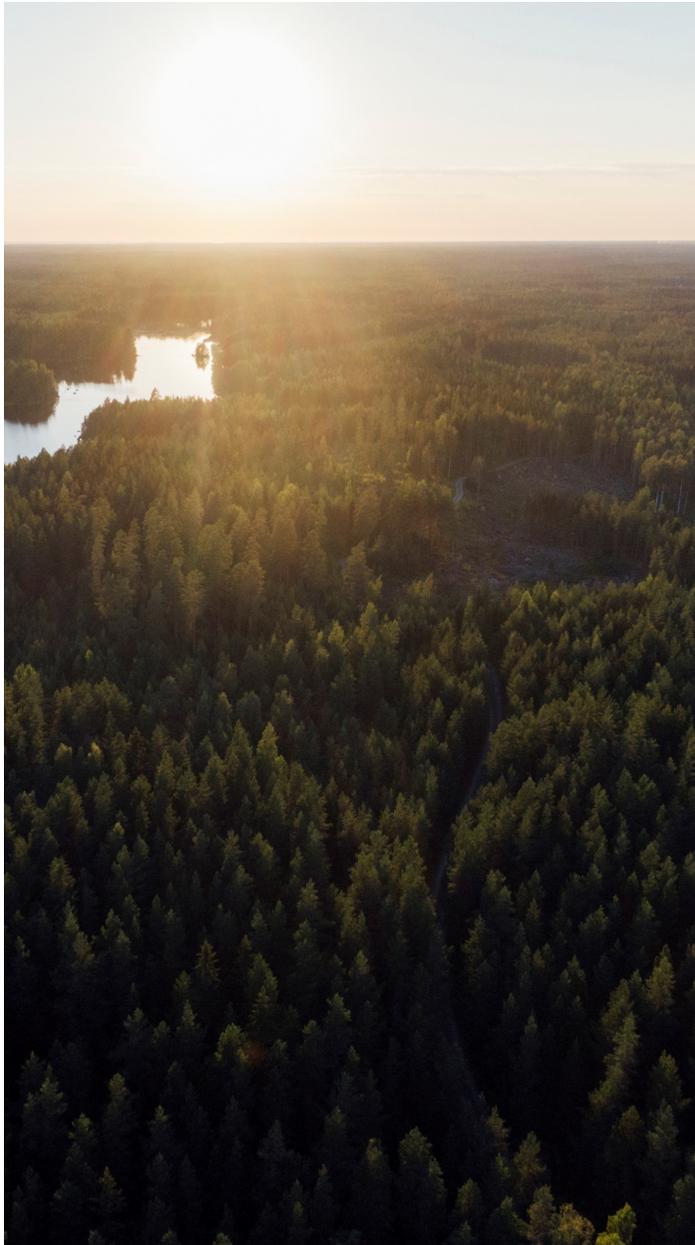
* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Eurostat (online data code: nrg_ind_ren)



Finnish advantages in PtX & BECCU

- A robust and clean electricity system.
- Cost-competitive renewable generation potential.
- Lots of clean water, required for electrolysis.
- Abundant natural resources in forestry & biogenic CO₂.
- Strong technical expertise and know-how of Finnish professionals.
- Predictability of the operating environment, seamless permit procedures and land use planning. Supportive government.





Research & projects in Finland

- CCS has been studied extensively in Finland 2010-2015 (CCSP-project), focusing on fossil-CCS. Recently research has been focused most on biogenic carbon capture and utilisation (bioCCU). Ongoing research for P2X hubs, biogenic CO₂ value chains, CO₂ storage in minerals in the soil or in products, such as concrete.
- Why CCU?
 - Finland doesn't have suitable geology for storage.
 - High amount of low carbon electricity and outlook for more to come have paved the way for interest to invest on green hydrogen and therefore to produce e-fuels and chemicals using biogenic CO₂.
 - Business case more visible and clear synergies with transport biofuels activities, where FI is strong.



Examples of recent & ongoing research projects

- [Government's report: Hydrogen economy: opportunities and limitations \(2022\)](#)
- Hydrogen and carbon value chains in green electrification, [HYGCEL](#).
- [Bio-CCU](#): targets to support markets and value chains for different CO₂ capture, production and utilization applications.



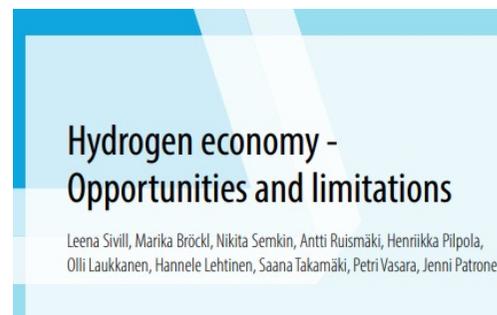
HYGCEL research identifies new value chains arising from the development of a new market and studies how the supporting electricity- and hydrogen infrastructure could be built in an optimal way in Finland.

Rate change mitigation actions and the rapid technology development enable the transition from fossil fuels to green energy. The most significant driver of change will be the production of green electricity and hydrogen. This change is driven by regulation of the economy and requires changes in infrastructure.

Implementing the change requires proactive action in a timely manner. The project Hydrogen and Carbon Value Chains in Green Electrification, HYGCEL, investigates this transition at the system level.

**BUSINESS
FINLAND**

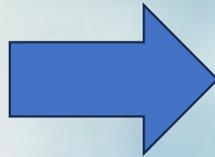
Project funding
Business Finland
Project period
1.8.2021 – 31.5.2024



Sample of announced biofuels & synthetic fuels projects



about 1,1 Mt
bio-CO₂/a



- [Pori](#): 63 000 m³ bioethanol, 22 000 t biomethane, 70 000 t lignin
- [Pori](#): Power-to-Gas plant 20 MW, 20 000 t CCU **CCU**
- [Haapavesi](#): 65 000 t bioethanol ja 11 000 t biomethane, 100–200 000 t/a synt. methanol **CCU**
- [Kokkola](#): 400 000 (?) t/a synthetic methanol **CCU**
- [Ranua](#): 100 000 t /a synthetic methanol **CCU**
- [Hamina](#): 130 000 t renewable pine diesel (in operation since 2022)
- [Kerava](#): 12 000 t synthetic methane (start of operation 2027?) **CCU**
- [Lahti](#): 35 000 t synthetic methane (start 2024?) **CCU**
- [Tampere](#): : 12 000–35 000 t synthetic methane (start 2024?) **CCU**
- [Mikkeli](#): 12 000 t synthetic methane (start of the project 2024) **CCU**
- [Vaasa](#): 15 000 t synthetic methane (start of the project 2024) **CCU**
- [Kotka](#): 35 000 t synthetic methane (start of the project 2024) **CCU**
- [Äänekoski](#): 12 000 t biomethane, ethanol, fertilizers (in operation 2024)
- [Joensuu](#): 30–50 MW production of hydrogen together with bio-CHP. **CCU**
- [Vantaa](#): 80 000 MWh synthetic methane **CCU**
- [St1, Lappeenranta](#): 25 000 synthetic methanol (study) **CCU (fossil)**
- [Metsä Group – Fortum](#): Bio-**CCU** – pre-feasibility study
- [Porvoo](#): 120 MW green hydrogen (start 2026?) **CCU**



Also other Finnish CCU(s) applications out there



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Carbonaide raises EUR 1.8 million to make manufacturing concrete carbon negative

Solar Foods raises €8M Series B to develop food from air

Solar Foods has developed a proprietary microbe that feeds on CO₂ and hydrogen to grow a high-protein food ingredient called Solein.

In Summary



Finland has huge potential for BECCU & BECCS and can become a massive force in reducing emissions & producing negative emissions.

National measures are not enough to create a market. Clearer vision and strategic commitment regarding CCU needed at the EU-level to ensure path towards circular economy.



Thank you!

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