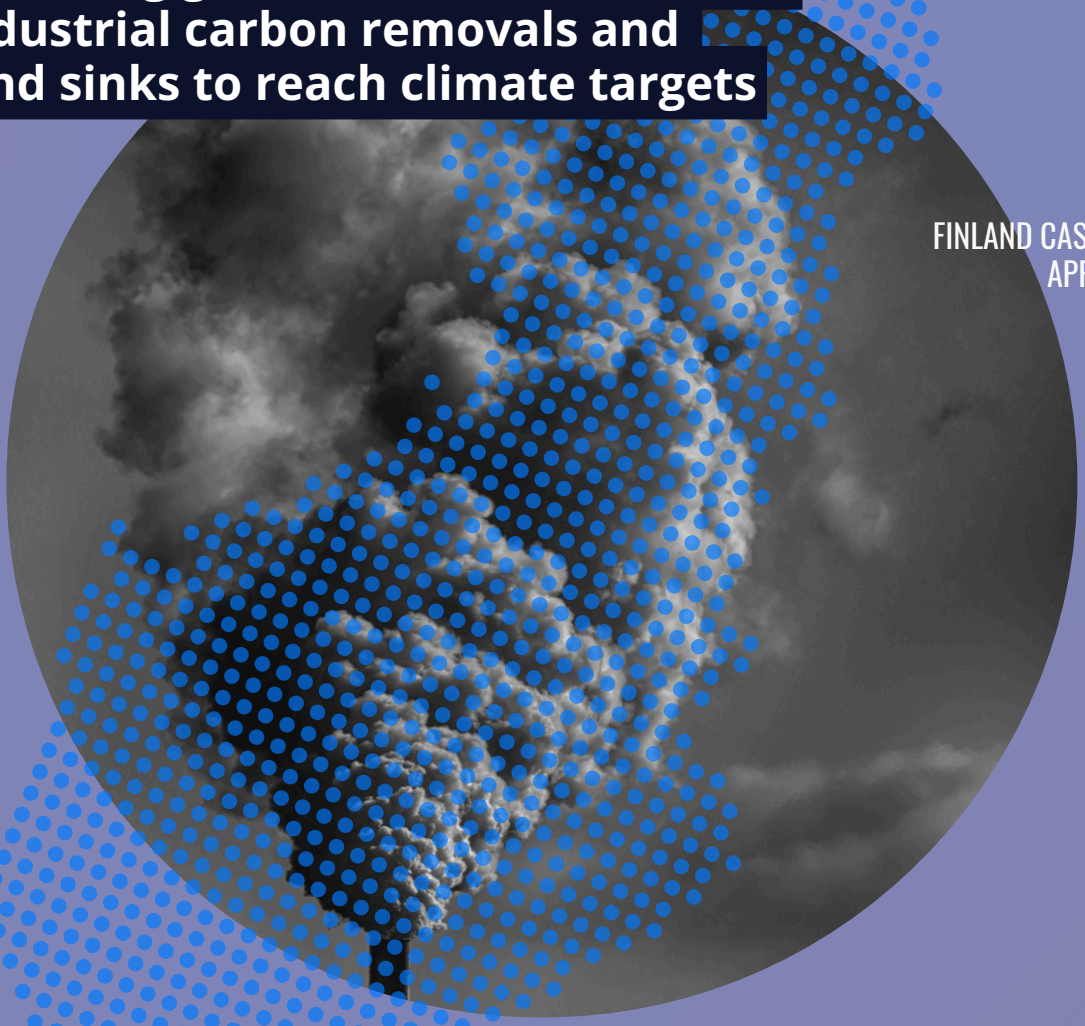
Leaning on Uncertainty

Assessing governments' reliance on industrial carbon removals and land sinks to reach climate targets



FINLAND CASE STUDY
APRIL 2026

CARBON MARKET WATCH

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At a glance...

For more information on carbon dioxide removals and a glossary, click here.

Finland relies on Bioenergy with Carbon Capture and Storage (BECCS) and biochar to reach climate targets, but lacks adequate roadmaps, impact assessments, and accountability mechanisms. At the same time, the Finnish land sink is in decline, and the government dismisses the necessary measures outlined by the Finnish Climate Change Panel, the country's independent scientific advisory body on climate policy.

The Finnish government envisions a significant contribution from the land sink to reach its 2035 target, while the Finnish land-use sector currently shows rising net emissions. The Finnish government is falling short in identifying and implementing measures to incentivise increased land sink capacity. Separate targets for the land sink beyond 2030 are currently missing, as are targets for expected permanent removal volumes. The Finnish Climate Change Panel recommended in its 2025 Carbon Neutrality Path report that logging levels should be moderated to allow the land sink to recover. However, these recommendations have not been considered in the government's climate planning documents, published months after the panel's report.

Finland relies on engineered removals from Bioenergy with Carbon Capture and Storage (BECCS) and biochar to achieve its 2030 and 2040 GHG emission reduction targets, as well as its 2035 carbon neutrality target, set in the Finnish Climate Change Act. Albeit, no impact assessments of biomass availability and sources have been conducted, which further puts the recovery of the land sink at risk. For BECCS, Finland intends to rely on international transport and storage of captured CO2 volumes, since no domestic storage sites were identified in assessments, and current legislation prohibits domestic geological storage of CO2.

A 2023 report from the Finnish Climate Change Panel highlights long deployment timelines for the international transport and storage of CO2 as a crucial obstacle that may lead to delivery risks for expected removal volumes through BECCS. The Finnish Climate Change panel has since reduced its expectations for BECCS removal volumes due to the weak state of incentives to drive necessary developments. The Finnish government mirrors this reduced expectation of BECCS deployment by 2035. To address these concerns, it is taking initial regulatory steps and forming partnerships with other countries that have available storage sites. Assessments of financing show that significant investments are needed to achieve the BECCS volumes on which Finnish climate plans rely. Even though first investment mechanisms have recently been established, finance is still lagging behind projected investment needs.

The early reliance on BECCS, while key assessments and supporting policy are missing, and the lack of alignment of land sink policy with scientific expert advice in Finland's climate strategy, puts the achievement of its climate targets at unnecessary risk.

FINLAND

TARGET SETTING	REMOVALS POLICY	TRANSPARENCY	FEASIBILITY
residual emissions definition	industrial removals	land use & sequestration rates	land use & sequestration rates
residual emissions quantification	land sink	technology & energy	technology & energy
general transparency	financing	transport & storage	transport & storage
reliance on international offsets	depth of assessments	biomass	biomass

Table 1: Traffic light graph; cell colours represent the level of transparency, depth, and plausibility of made assessments and plans; green = overall relatively transparent and plausible, yellow = partly lacking transparency or depth, red = severe transparency gaps or identified delivery risks. The classification is meant to provide an overview of key issues and best practices and is relative to the other reviewed countries.

Methodology Note

The case study was developed by reviewing publicly available policy and assessment documents, supplemented by transparency requests to national ministries and agencies. Data on 17 themes, including residual emissions, technology assumptions, and biomass sources, were analysed to identify gaps and best practices in countries' industrial CDR and land sink strategies. From the identified themes, 12 indicators were selected, as visible in Table 1. The collected information was clustered into themes, and key issues were broken down and underscored by references to authoritative documents in the detailed analysis section.

The scope of the analysis was limited to documents created by or on behalf of government ministries and agencies, with supplementary documents included where necessary. Detailed information on the methodology is available in the accompanying report. All reviewed documents and supplementary sources are either directly linked in the text or can be found in the list of sources at the bottom of this document.

Detailed Analysis

Target setting

● Residual emissions and removal targets

Finland has an ambitious climate-neutrality target for 2035 and net emission-reduction targets until 2050.

For 2035, the Finnish Climate Change Act mandates that anthropogenic greenhouse gas emissions must not exceed removals (Section 2.1). The law also sets emission-reduction targets for 2030, 2040 and 2050. These targets cover "anthropogenic greenhouse gas emissions to the atmosphere from the effort sharing and emissions trading sectors" (Section 2.2). Relative to 1990 baseline levels, emissions in these sectors must decrease by at least 60% by 2030, 80% by 2040, and 90% aiming towards 95% by 2050. Notably, separate targets for the land-use, land-use change, and forestry (LULUCF) sector, responsible for about 26% of Finland's total net emissions in 2024 (see Annual Climate Report 2025), are missing. Projections in Finland's 2025 Annual Climate Report clarify that engineered removals are included in the emission reduction targets, interpreting them as net targets (pp34-35).

Emission projections for the 2035 net-zero target indicate that significant emission volumes remain, which are intended to be offset by removals.

For 2035, the Annual Climate Report 2025 estimates emissions from non-LULUCF sectors at 18.5 Mt CO_2eq, corresponding to about a 74% decrease from 1990 levels. This reduction would include the use of 'carbon capture solutions' that are not further specified. Without them, emissions would stand at 21.4 Mt CO_2eq, corresponding to a reduction of about 70 % (p44). Unexplained 'carbon capture solutions' are therefore expected to decrease emissions equivalent to 4% of 1990 emission levels between 2025 and 2035.

The national scientific expert panel on climate planning, the Finnish Climate Change Panel, provides projections in its Climate Neutrality Path report that yield very similar outcomes for 2035 to those of the Finnish government. The panel estimates 18.3 Mt CO_2 as the remaining emissions in non-LULUCF sectors in 2035, with the majority originating from effort-sharing sectors (including road transport, buildings and agriculture). These remaining emissions are supposed to be offset by about -15 Mt CO_2eq of removals from the land sink and about -3 Mt CO_2eq from technological carbon sinks (p. iv).

Despite the high expectations for the land sink to deliver removals in 2035, no adequate national targets or measures have been set to achieve expected levels.

The Finnish Climate Change Panel's 2025 Climate Neutrality Path projects net removals of -14.9 Mt CO_2eq from the land use sector by 2035. This would require a transformation from the current 12 Mt CO_2eq net emitter status, achievable only by reducing logging levels from 73 million m^3/year to a maximum of 61-64 million m^3/year (pp. iv, 10). Under the EU LULUCF Regulation, which sets goals for the land sinks of member states, the Finnish land-use sector is required to achieve a net removal level of -3.8 Mt CO_2eq by 2030. The Finnish Annual Climate Report 2025 acknowledges that without significant additional measures in the LULUCF sector, Finland will likely fail to meet its commitments under the EU's LULUCF Regulation (p12). The estimated deficit for 2021-2025 would be 110-115 Mt CO_2eq, or 83-88 Mt CO_2eq if flexibilities with other sectors are applied. This deficit could potentially be covered by acquiring LULUCF units from other Member States, though their availability and prices remain uncertain. (p12)

Beyond 2030, no separate targets or adequate policies for the land-use sector have been set, raising the question of how expected land sink levels should materialise. The latest estimate from Finland's 2025 Annual Climate Report indicates that the degradation of the land sink is still ongoing, with LULUCF sector net emissions standing at 13.5 Mt CO_2eq in 2024 (p22), increasing from 11.8 Mt CO_2eq in 2023. The Finnish Climate Change Panel outlined plans to reach necessary net-removal levels in its 2025 Carbon Neutrality Path report. However, these were not adequately considered in the current government's climate plans. The dynamics behind this lack of consideration are further outlined in the section 'Share of CDR technologies & measures applied' below. The insufficient action to reduce emissions and restore the Finnish land sink shifts the problem towards engineered removals in Finland's climate plans.

Finland currently has no binding target for engineered removals, even though it relies on them in projections to reach its climate targets.

To achieve the 2035 net-zero target, Finland expects significant volumes of engineered removals. The Finnish Climate Change Panel's 2025 Climate Neutrality Path projects a contribution of -3.4 Mt CO_2eq from technological sinks by 2035 (p. iv). The Finnish government picks up this estimate in its Annual Climate Report 2025 (p37). Projections factoring in all currently planned measures and so-called 'With Additional Measures'- or WAM-projections, provide more information (p35). They show that Finland's climate planning relies on 'carbon capture technologies', here referring to 'the capture of fossil,

waste-based and bio-based carbon and the use of carbon dioxide', therefore including technological carbon sinks to reach its climate targets (p35). The Ministry of Environment is clear in its Annual Climate Report 2025 about relying on the delivery of these technologies to reach climate targets: "[...] if carbon capture technologies are taken into account, both the 2030 and 2040 targets will be met. If they are not taken into account, the 2030 target is missed by 0.3 Mt CO_2eq. and the 2040 target is missed by 2.8 Mt CO_2eq." (p34).

● General transparency

Finland's projections and assessments are highly transparent, but the government's plans and implementation strategies remain opaque and fragmented.

Finland's underlying analyses show relatively high transparency, with scenarios clearly defined in the Annual Climate Report 2025 and LULUCF modelling assumptions detailed in the KEITO[1] report annex (p242). Regardless, governmental CDR strategy and policy plans lack clarity, particularly following the 2023 government transition. It remains unclear which initiatives will continue or receive funding. While technical sinks are deemed necessary for net emission reduction and net-zero goals, the implementation strategy is scattered across multiple documents, and land sink targets lack clear implementation pathways despite projected shortfalls.

The Medium-Term Climate Plan 2025 draft exemplifies high transparency on stakeholder consultations and how they are taken into account.

The Medium-Term Climate Plan, mandated under the Finnish Climate Act, outlines the required actions in the effort-sharing sectors to achieve the 2030 and 2035 targets. The draft document mentions that multiple stakeholder consultations and opinion polls were conducted to inform the plan. These participatory efforts were organised for the early stages of the scheme's design, but the final drafts of the document have not been scrutinised by such processes. The description of the process further clearly outlines where the drafting of climate strategies and modelling consultations were taken into account. Public consultation processes included a hearing for the Sámi Parliament, the elected representative body of the Sámi people in Finland.

[1]The KEITO project (New measures and scenarios for national energy and climate policy) is a major research effort by Finnish institutes (Syke, VTT, GTK, Luke) to support Finland's goals of becoming climate neutral by 2035. It provides data on energy transition and emission reduction strategies.

● Reliance on international offsets

The Finnish government is considering using international credits, despite the Finnish Climate Change Panel's advice against their use.

A memorandum from the Finnish Climate Change Panel, dated March 2025, mentions that the idea of using carbon credits under the Paris Agreement was discussed (p3). It does not clarify who raised this or in which context. The Finnish Climate Change Panel advises that any decision should be preceded by a careful review of the climate impacts of their use, alongside legal, fairness, and economic considerations (Ibid.). Additionally, the statement argues that the goal of carbon neutrality by 2035 is legitimate and achievable, and that taking climate action in Finland would yield domestic economic and employment benefits (p3).

The Finnish government's position from September 2025, supports the European Commission's 2040 target proposal to allow the use of international credits to reach EU climate targets. It states: "The Government approves the Commission's proposal concerning the use of high-quality carbon credits under Article 6 of the Paris Agreement. However, the Government considers that the credits should not be used to fulfil the obligations under the EU's emissions trading scheme in order that the EU ETS will guide to emission reductions and use of new technologies such as technical sinks to achieve these within the EU." The included caveat to protect the functioning of the EU ETS is a step in the right direction, as it prioritises decarbonisation efforts in domestic energy-intensive industries. At the time of writing this report, the Finnish government is conducting a review of its climate targets in the Climate Act. Whether decision-making will be based on the best available science and careful consideration, as recommended by the Finnish Climate Change Panel, remains to be seen. If the government decides to use carbon credits of undefined 'high quality' that lack impact assessments to reach climate targets, the Finnish government may contradict the advice of its Climate Change Panel.

Removals policy

● Specific plans and foreseen measures

Finland's Climate Change Panel sees the deployment of permanent industrial removals as a long-term goal, while land-based sinks will have to carry the burden in the near term.

The Finnish Climate Change Panel's memorandum from March 2023 establishes that achieving carbon negativity requires greenhouse gases to be stored permanently and sufficiently out of the carbon cycle, "[...] for example through technological carbon sinks." Conversely, the panel acknowledges that, since technological carbon sinks are not yet available at scale, strengthening the sink in the Land Use, Land-Use Change and Forestry (LULUCF) sector will be necessary in the interim (p4).

The government overlooks the Finnish Climate Change Panel's advice to moderately reduce logging levels. Instead, it focuses on alternative measures that show no enhancement of the land-sink in modelling.

The Finnish Climate Change Panel outlines possible actions to expand the land sink of forest land with an overall potential impact of -27.2 Mt CO_2eq in its Climate Neutrality Path report from January 2025. They emphasise that significant emission reductions from the land use sector "can only be achieved by moderating the level of logging, as enhancing forest sinks through other forest management activities and emissions reduction measures in the land use sector are not sufficient." (p18) It explicitly recommends reducing logging from recent levels of 73 million m^3/year to a maximum of 61-64 million m^3/year, depending on the effectiveness of other forest management measures (p18). This action would result in an additional -15.3 Mt CO_2eq by 2035 (p12). Actions in other land use accounting categories could deliver an estimated -4.7 Mt CO_2eq by 2035 (pp14-15).

The Ministry of Agriculture and Forestry fails to pick up these recommendations, and instead proposes measures to enhance carbon sinks without reducing logging levels in its March 2025 'Forest growth and carbon sinks package'. Modelling in the KEITO report, which is a crucial basis for Finland's Annual Climate Report 2025, mentions that these measures were "[...] not included in the WAM calculations for the land use sector, as additional measures did not lead to improved forest growth." (p181). The 2025 Draft Energy and Climate Strategy discusses this in detail, stating that the reason for the exclusion seems to be that when these policy measures were modelled, they "did not produce the intended climate impacts." (p42). The document explains that the prior impact assessment of the measure package by the Finnish Natural Resources Institute (LUKE) found potential for significant climate impacts. However, the WAM scenario in the KEITO report applies different foundational assumptions, therefore projecting smaller climate impacts. No explanation was found in the reviewed documents for why the government chose not to consider moderated logging levels to achieve climate targets in the land-use sector.

The Finnish government's draft Medium-Term Climate Plan, also from July 2025, includes afforestation measures in its list of 'policy measures and other possible actions'. An increase of 9,000 ha in forest area between 2025 and 2029 is envisaged in the WEM scenario, and 12,000 ha for the WAM scenario. However, the document states that "[...] no emission or sink impact has yet been estimated." (p110). The plan is unclear whether the measure will be implemented or if it is merely under consideration.

Similarly, the steps taken by Finland's government in the country's land-use sector might constitute a lack of consideration of the best available science. The Finnish Climate Change Panel clearly presented the need for moderated logging to achieve necessary emission reductions in the land-use sector. The government's disregard for this recommended measure could put the achievement of Finland's climate target under the EU LULUCF Regulation and the national climate-neutrality target for 2035 at risk.

The progression of estimated BECCS contributions to Finland's net-zero target shows that expectations are being revised from 20 Mt to 3 Mt, as assumed deployment timelines are delayed.

In 2023, the Finnish government's Carbon Dioxide Use and Removal report identified a theoretical industrial carbon dioxide removal potential of 5-20 Mt CO_2eq per year, but it did not state a timeframe (p41). Two years later, the Climate Panel, in its 2025 Climate Neutrality Pathway report, projected a BECCS potential of -3 MtCO_2eq in 2035 if economic incentives and rapid project planning are implemented. This figure has already been downgraded in Climate Panel recommendations from -5 Mt CO_2eq (as projected in the 2023 report on opportunities through technological carbon sinks (p. vi)), due to the absence of incentives (p16). Biochar is estimated to contribute an additional -0.4 Mt CO_2eq in 2035 (p16). Finland's Annual Climate Report 2025 mirrors these reduced expectations, and also estimates that technological carbon sinks could provide around -3 Mt CO_2eq by 2035 from BECCS, as Direct Air Carbon Capture and Storage (DACCS) is deemed too expensive (p37).

● Associated financial cost and source of financing

Estimates of the cost of DACCS vary significantly, and high prices are considered a decisive obstacle.

The Carbon Dioxide Use and Removal report, published by the Finnish government in March 2023, includes cost estimates for different CDR methods for 2023 and 2030. They often cite a single source for the data provided. In 2030, the cost of DACCS is estimated to be €110-330 per tonne CO_2eq if technical development, energy efficiency, and scale-up are achieved (p67). These required developments are not defined further, raising questions about the reliability of the estimation.

The Finnish Climate Change Panel, in its 2025 Carbon Neutrality Path report (p16) and the KEITO report (p158), include DACCS cost estimates for 2035 that are much higher than the Finnish government's estimates for 2030. The reports both cite 2025 cost assessments by the European Scientific Advisory Board on Climate Change, the EU-level expert panel, for DACCS, estimated at around €500-1000 per tonne CO_2eq in 2035. Since this price is considered very high, removals from DACCS are excluded from the projections in the 2025 Carbon Neutrality Path Report (p16). The Ministry of Climate & Environment includes these estimates in its Annual Climate Report 2025, but does not elaborate on the costs for DACCS (p37). This mirrors the absence of plans for DACCS in the Finnish Climate Ministry's Annual Climate Report 2025, suggesting a strong focus on BECCS to achieve expected volumes of CDR.

The first steps to assess the volume of required investments for BECCS deployment and the associated implementation timelines have been taken.

The Finnish government's 2023 Carbon Dioxide Use and Removal report estimated BECCS costs at €30-350 per tonne CO_2 (p71), but the report does not clarify which parts of the value chain are included in the estimate. Over time, only slight decreases in costs due to technological developments are expected (p71). The Climate Change Panel's report titled 'Opportunities Provided by Technological Carbon Sinks and the Means for their Advancement in Finland' estimates that funding a technological carbon sink of 5 Mt CO_2eq through BECCS, including capture, compression, transport and storage, would require €605-705million per year (p. vi). The report notes that cost estimates are intended to be indicative, as they involve uncertainties (p39).

The panel, in the same report, outlines a hypothetical implementation schedule (pp31-32). It notes that planning and implementation take time, and the suggested scenario would lead to a delivery of 5 Mt CO_2eq from BECCS in 2035. The timeline assumes a two-year planning period for a subsidy system and a first BECCS auction at the end of 2026. The 2025 Carbon Neutrality Path report already reduces this estimation of achievable volumes due to the lack of incentives for this development.

Finland is beginning to invest in industrial removals, though the allocated funds are small compared to estimated financing needs.

The Finnish Climate Change Panel, in its March 2025 memorandum on possibilities to still achieve the 2035 carbon neutrality goal, states: "If technological sinks are to be implemented in significant quantities by 2035, investment planning must start no later than now." (p3). In its report titled 'Opportunities provided by Technological Carbon Sinks and the Means for their Advancement', the panel notes that in 2023, Finland had not yet implemented any financial incentives for producing technological carbon sinks other than the Voluntary Carbon Market (p. v).

The Ministry of Employment and the Economy's 'Draft Energy and Climate Strategy' of July 2025 includes an assessment of how to achieve carbon neutrality by 2035. It states that the included carbon neutrality pathway is 'particularly sensitive to BECCS investments'. The policy measures needed to incentivise negative emissions development include both BECCS and CCS, which are intended to first manifest as direct government support and, at a later stage, through ETS incentives. (p58)

The strategy mentions an investment volume of 140 million euros, included in the budget for pilot funding to promote negative emissions through BECCS and CCS projects (p50). This makes it clear that BECCS is seen as a viable option for Finland. However, the same strategy indicates a need for caution, noting that "[t]he carbon neutrality assessment is particularly sensitive to BECCS investments, the implementation of which is subject to considerable uncertainties in terms of costs, necessary governance, and international agreements and rules on transport and storage." (p46). The strategy does not provide information on a financing timeline for BECCS deployment, making it difficult to estimate how much of the financial demand reported by the Climate Change Panel would be covered by allocated funding. Thus, the conflated presentation of financing volumes of $140 million for BECCS and CCS deployment, without separating them by technology, represents a transparency gap.

Furthermore, even if spent solely on BECCS, this budget is far short of the estimated needs. To achieve a 5 Mt deployment by 2035, as set out in the Climate Panel's 'Opportunities provided by Technological Carbon Sinks' report (p. vi), the allocation would need to be of around €605-705 million. The allocated budget also does not come close to the share of finance that the reduced expectations of 3 Mt BECCS volume, as set out in the 2025 Annual Climate Report (p35), would need following this assessment. This raises questions about the feasibility of the plans and the contribution of expected BECCS volumes to the achievement of the 2035 target.

In December 2025, the Finnish government translated the plans into action by opening a call for projects to construct BECCS infrastructure. The efforts will be financed with €90 million from the government, covering 30 per cent of project costs, allocated between 2026 and 2032, and 70 per cent shouldered by the private sector. The estimated total investment would therefore be €300 million. Still, this sum would only cover less than half of the minimum financial needs to achieve the envisioned 5 Mt deployment of BECCS by 2035. Therefore, it would also fall short of the financial needs for the reduced 3 Mt deployment.

Finnish Ministries doubt that additional government funding will be available for measures in the medium to long-term, potentially affecting BECCS deployment plans.

Following a request for additional information to the Finnish Ministry of Environment, the minutes of a general discussion on the KEITO report, held among multiple Finnish ministries in March 2025, on emission reduction measures and policies were shared. The document, which outlines discussions on measures to be included in medium- and long-term modelling, contained the following observation: "[...] the amount of unallocated money in the budget is very small, so large sums of money for new measures are unlikely." (p2). While it is not clear which measures it refers to, it is likely that this would apply to measures for BECCS deployment, which still lack key assessments, legal frameworks, and complete financing plans. Given that the currently foreseen investment sums for industrial removals are smaller than the needs estimated by the Climate Change Panel, and that budgetary constraints are likely to remain, there is a clear delivery risk for expected removal volumes. Consequently, climate targets for 2035 and 2040 may be in jeopardy if no other measures to reduce emissions are introduced.

Constraints and risks

● Land use and sequestration rates

No assessment of land-use conflicts, impacts on the land sink, or climate-change-driven fluctuations in sequestration rates was conducted for land-sink and BECCS measures.

No assessments were found of potential competition from land use pressures and effects on the land sink for the planned deployment of BECCS, nor of measures to stabilise the land sink. Likewise, no considerations of changes in sequestration rates in the land sink

due to climate change were included in the reviewed documents. Requests for additional information to the Finnish Ministry of the Environment and the Ministry of Economic Affairs and Employment also yielded no further documentation of any efforts undertaken or planned. The absence of assessments in Finland's climate plans, given the potential high impacts from trade-offs between BECCS, the land sink, and other sectors requiring land (e.g., more extensive agriculture), raises significant feasibility concerns for the proposed removal measures.

A request for additional information was submitted to the Finnish Ministry of Economic Affairs and Employment, soliciting documents related to the identified uncertainties of BECCS technology, including costs, administration, international agreements and transport & storage regulations. The Ministry's notes in its reply that it "[...] has not prepared any documents regarding the [...] requests [...]". This response further supports the assumption that the reviewed documents constitute the latest stage of planning for removals in Finland.

The sudden appearance of afforestation measures in the 2030 and 2035 strategies, without prior assessment, undermines the credibility of the government's climate plans.

The Finnish government's 2025 Medium-Term Climate Plan mentions the intention to increase the national forest area (p110). It aims to identify measures to meet both national and EU-level targets for 2030, 2035 and 2040 (p95). The document describes an increase of 9,000 ha in forest area between 2025 and 2029 in the included WEM scenario and 12,000 ha in the WAM scenario. Moreover, the government's report clearly states that "[...] No emission or sink impact [for this measure] has yet been estimated." (p110).

The suggestion is made following the government's inclusion of ideas for accounting for eventual BECCS climate benefits in the LULUCF sector in its 2023 program (p169). The deployment of BECCS and its related biomass demands could affect the land carbon sink, exacerbate land use pressures, and compete with the planned afforestation measure for land. However, this potential conflict is not acknowledged or assessed in the Finnish climate plans.

The absence of assessments raises questions about the evidence base underpinning the afforestation measure. No clear information is provided on how eventual climate benefits or emissions from the measure would be accounted for, representing a significant transparency gap. By outlining the afforestation measure in the report, it signals the willingness to account for its potential climate benefits under the effort-sharing sector, but gives no indication of how it plans to account for the eventual climate benefits of this

measure. By integrating poorly assessed removal measures to offset shortfalls in emission reductions, Finland's sectoral climate plans risk reduced transparency, delayed emission-reduction efforts, and introduce unnecessary uncertainty about achieving national climate targets.

● Technology and energy

Considerations of DACCS's high energy use and cost led to current public climate plans not relying on the technology.

The Finnish government's 'Carbon Dioxide Use and Removal' report from 2023 already acknowledged the necessity of energy efficiency developments to decrease DACCS prices (p71). The KEITO report from July 2025 then included DACCS as a possible future measure to invest in (p24), but refrained from including it in scenarios because it would be too expensive to deploy by 2035 (p158). As a consequence, no DACCS volumes are foreseen in the Finnish Ministry of Environment's 2025 Annual Climate Report, due to high expected costs and low market readiness (p37).

Energy consumption of BECCS is included in the modelling, but no information on the underlying energy demand assumptions is provided.

The KEITO impact assessment report, which models possible medium and long-term climate action for Finland, includes higher energy consumption due to carbon capture technology in its assumptions. It notes that "[...] carbon capture will increase energy consumption, which will be reflected in the scenario results, in particular in the long-term increase in bioenergy use as BECCS investments progress. These impacts are reflected as part of the scenario calculations [...] but cannot be broken down by activity" (p179). No further information on the assumptions used and the effects of BECCS volumes or other deployed carbon capture technologies on energy consumption levels could be found in the reviewed documents.

● Transport and geological storage of CO_2

Finland plans to export captured CO_2 because it lacks suitable storage sites, and it currently does not allow domestic underground storage.

According to the Finnish CCS Act, the geological storage of carbon dioxide is banned in Finland. Additionally, the 2025 KEITO report notes that "[...] no geological formations suitable for carbon dioxide storage can be found in Finland." (p25). The government's 2023 Carbon Dioxide Utilisation and Removals analysis already noted that implementing BECCS or DACCS in Finland will require international collaboration, with potential storage locations identified in the North Sea or Southern Baltic Sea (p72). In the short-to-medium term, captured CO_2 would need to be exported by ship from Finland, preferably from coastal areas with harbour infrastructure (p40).

Being dependent on foreign carbon storage means competing with fossil CO_2 storage and with other countries for limited storage capacity. This results in a significant bottleneck that can affect the deployment of the planned industrial carbon removals.

The Finnish government's Carbon Dioxide Utilisation and Removals analysis notes that the limited availability of permitted and operational storage capacity constrains near-term deployment (p42). Estimates of operational storage capacity in Northern Europe are mentioned in the Climate Change Panel's report 'Opportunities provided by Technological Carbon Sinks and the Means for their Advancement in Finland', published in 2023 (p35). This study estimates that the annual CO_2 storage capacity available for open competition with other countries, between 2030 and 2035, is approximately 10 Mt CO_2 (p40). Most of this capacity is located in the UK, Norway, and Denmark and is primarily designated for the storage of fossil CO_2 rather than for carbon removals. Additionally, the report notes that according to current project activity, most of the available capacity would be taken up by industries of other European countries (p40). Therefore, the uncertain availability of geological storage casts doubt on the credibility and achievability of the expected removal volumes for 2035.

Finland is working to close the gap between the country's expectations for industrial removal deployments and the current state of assessments, planning and policies for transport and storage, which are lagging behind.

In September 2025, Finland signed two memoranda of understanding with Norway and Denmark to facilitate the transport of CO_2 for geological storage. According to the Climate Ministries Annual Climate Plan 2025, the Finnish government has prepared a "legal framework for the transboundary transport of CO_2 for permanent geological storage under the seabed" (p38). The alternative of developing DAC (Direct Air Capture) plants in countries with available storage sites is also mentioned. The 2025 KEITO report highlights "[...] considerable uncertainty about the realisation of investments [...]" due to the lack of

carbon transport and storage outside of Finland (p25). Nevertheless, the WAM scenario in the document assumes the transport of 0.6 Mt of CO_2 to geological repositories in the Norwegian Sea before 2035. Consequently, the risks persist that the international storage and transport infrastructure will not be available in time.

Biomass supply

Finland is acknowledging existing biomass tradeoffs, but crucial assessments of the impact of envisioned removals are missing.

Tensions between the use of biomass for industrial removals and measures to expand the forest carbon sink are acknowledged in the government's Carbon Dioxide Use and Removal analysis (p41 & P108) and in modelling done in the KEITO project (p157). Despite that, no quantified limits on biomass availability were mentioned in either document. Regarding biochar, the government's 2023 Carbon Dioxide Use and Storage analysis notes that information on feedstock availability is limited. Previous studies estimated the capacity from forest industry side streams (bark, woodchips, sawdust, etc.) to be 9.1 Mm^3, possibly resulting in 4.5 Mt stored CO_2. The same report mentions several possible sources of feedstock for biochar, including wood waste, sludges, animal and vegetable waste, and paper and cardboard waste (pp42-43). Using only waste streams is a good practice, as it could potentially limit trade-offs between biochar deployment and the land sink. However, possible incentivisation for the forestry industry and the resulting additional pressure on the LULUCF sink have not yet been assessed. Considerations of biomass availability and sources are scarce, especially given the high expected volumes of BECCS in Finland's climate plans. Without an assessment of the limits and potential impacts of biomass use for engineered removals, Finland risks shifting the burden of biomass pressures onto other sectors, or, in the worst case, failing to deliver the removal volumes on which it relies, thereby overshooting its climate targets.

Key issues

While Finland's climate targets explicitly depend on carbon removals, the government has yet to conduct crucial assessments, connect target-setting with implementation and establish a national policy framework that safeguards emission reductions from removals. Four critical deficiencies stand out:

1. Finland lacks political targets to drive the implementation of policies towards the reliable deployment of realistic removal volumes. The Finnish Ministry of Environment's 2025 Annual Climate Report shows that current plans depend on engineered removals to meet all targets out to 2040. It also relies on net removals from the land-sink to achieve its 2035 net-zero target. However, the absence of land-sink targets beyond 2030 and specific targets for engineered removals means that the accountability mechanisms to track progress and incentivise implementation are weak. This gap between the reliance on removals in the Finnish climate strategy and the lack of binding targets to guide policy towards their delivery poses a significant risk to achieving national climate commitments.

2. Finland’s government fails to implement advice by its scientific expert panel to moderate logging, putting climate targets at unnecessary risk. The Finnish Climate Change Panel gives a clear recommendation to moderate logging as the single most impactful measure to enhance the land sink. It emphasises that other forest management activities alone are insufficient. The Ministry of Agriculture and Forestry's forest growth and carbon sinks package proposed measures to improve the land sink, but excluded reductions in logging. No explanation for this decision is provided. Subsequent modelling indicates no enhancement in forest growth from the proposed measures. The Finnish government's failure to take scientific advice into account puts the achievement of Finland's 2035 net-zero target and its EU legislated LULUCF target at risk.

3. Crucial assessments for engineered removals are missing. The Finnish government failed to conduct adequate feasibility and risk assessments, despite its heavy reliance on engineered removals and the land sink to reach climate targets. For BECCS, biochar and afforestation measures, no assessment of biomass and land availability, impacts through climate change, or potential effects on the forest land sink were included in the reviewed documents.

4. Transport & storage of CO_2 are seen as a significant constraint, while investment plans lag behind BECCS projections. Finland lacks domestic geological storage sites, and geological storage is currently banned by national law. Therefore, it must compete with other European countries for limited storage capacity in Northern Europe (e.g. in Norway, Denmark, and the UK), according to the government's 2023 Carbon Dioxide Utilisation and Removals analysis. A 2023 report by the Finnish Climate Change Panel estimates that only about 10 Mt CO_2 of annual storage capacity will be available for competition in Northern Europe between 2030 and 2035, as most has already been claimed by other nations' industries. While the Finnish government has recently signed agreements with Norway and Denmark to address this gap, the discrepancy between expectations and concrete actions makes the delivery of BECCS volumes highly uncertain.

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CARBON MARKET WATCH

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