

City Case Studies

Helsinki - The Strategizer

This case study is part of a series. The development of the case study was led by Carbon Gap, a partner in the City CDR Initiative, and received direct input from the Urban Environment Division of the City of Helsinki.

City: Helsinki, Finland
Country Governance: Unitary parliamentary republic

Capital City: Yes
Climate Zone: Hemiboreal

Location: Coastal
Population: 684,600 (2024)

Carbon Footprint:
2.9 tCO₂e per capita annually (2024)

National Climate Targets:
60% reduction by 2030, 80% by 2040 and 90% by 2050, aiming for 95 %, compared to 1990 (National Climate Act)

City Climate Targets:
85% reduction from 1990 levels by 2030, Net Zero by 2040

Memberships:
[Carbon Neutral Cities Alliance](#), [ICLEI](#)

Capacity to Act:

The city of Helsinki has the ability to pursue ambitious climate goals because of the political commitment and a strong local democracy to back it up. The municipality owns over 60% of the land in the city and 20% of the buildings. It has a monopoly on urban planning, the right to collect taxes and a surplus budget to make infrastructure investments to help achieve climate targets. In addition, it has substantial regulatory powers, institutional capacity and national and international collaboration platforms to develop policies, implement programs and learn from peer cities.

POLICY LANDSCAPE ANALYSIS

Helsinki has set the goal of reducing emissions by 85% by 2030. To achieve this, the city must cut its direct emissions (Scopes 1 and 2) by at least 85% compared to 1990 levels. Helsinki focuses on decarbonizing transport, house and infrastructure construction, and acts as a pioneer in the use of carbon sequestration and storage in concrete and other low-emissions building solutions. Looking further ahead, Helsinki aims to reach “net zero” by 2040, meaning a balancing of emissions and carbon sequestration within the city limits.

While these long-term goals imply an important role for carbon sinks and CDR, the city has yet to articulate a concrete approach to achieving them. Notably, Helsinki’s original primary strategic document that covered

the period 2021-2025 — the [Carbon-neutral Helsinki Action Plan](#) — did not include any measures aimed specifically at increasing carbon removals. A new [Helsinki City Strategy](#) (document in Finnish) was issued in June 2025 when the new mayor and city council came in. It sets out the city's priorities for the period 2025-2029.

Discussions around CDR remain exploratory, with biochar and carbon negative cement identified as potential pathways. Increasing natural sinks within city limits is recognized as a major challenge due to Helsinki's rapidly growing population, high level of urbanization and limited greenfield space. Currently, natural sinks absorb 73.3 kt CO₂/year, which was 3% of the total emissions (scope 1 and 2) in 2022 and 10% of the projected emissions of 2030. While the city has acknowledged the need for balancing residual emissions to reach its climate targets, it has not yet defined the pathways it will prioritize. Financial mechanisms to support such efforts are also lacking, such as deployment incentives, tax agreements with CDR providers and grant funding. While city-owned enterprises like Helen Oy and HSY could play a role in piloting CDR solutions, no dedicated funding streams or incentives currently exist to scale them. Overall, CDR is implied in Helsinki's net-zero and carbon-negative framing, but remains absent from formal policies and underdeveloped in terms of actionable planning and finance.

GOVERNANCE LANDSCAPE ANALYSIS

The Climate Unit coordinates Helsinki's climate governance within the [Urban Environment Division](#), which is responsible for implementing the Carbon-neutral Helsinki 2030 Action Plan. While there is currently no dedicated department for carbon dioxide removal (CDR), the Climate Unit is well-positioned to integrate CDR into city planning given its thematic focus, particularly as the city transitions toward Net Zero. Strategic direction has traditionally come from the [Ambitious Climate Responsibility Programme Group](#), chaired by the mayor and composed of senior city executives. How this will be done under the new mayor and council will be decided later this fall. This group guides climate policy implementation across departments and provides a platform for cross-sectoral coordination. Political leadership is anchored in the office of the [Deputy Mayor for Urban Environment](#), which oversees planning, housing, construction, and environmental issues—key enablers for potential CDR integration in the built and green environments.

City-owned enterprises — such as [Helen Oy](#) (energy), [Heka](#) (housing), [Stara](#) (construction), and the jointly owned [HSY](#) (waste and water services) — cover much of the operational ground where CDR could be deployed. While each of these actors has relevant technical capabilities, no single entity is yet tasked with driving a city-wide CDR agenda. Helen Oy is aiming to switch away from bioenergy by 2040 as per its long-term organizational strategy to phase out combustion-based energy production. Therefore, the business case to conduct BECCS on their bioenergy plants is limited, at least in the long term. However, [Vantaa Energy](#) is planning to operate a CCS on its waste-to-energy plant by 2030 in the City of Vantaa near Helsinki. Vantaa Energy is 40% owned by Helen Oy.

Overall, the governance structure provides the institutional capacity for coordinated action. However, without a clear lead or mandate on CDR, there is a risk that it could fall between the cracks.

GAPS AND OPPORTUNITIES

- Helsinki lacks a dedicated CDR strategy, creating uncertainty around how carbon removals will contribute to the 2040 net zero target. A strategy is under development that should address this uncertainty.

- Rapid construction growth could become a carbon sink through the lifecycle emissions cap introduced in 2023. Following various city-led studies, there is significant potential to increase the uptake of CDR-linked materials and methods, such as biochar and carbon negative construction materials.*
- HSY's wastewater treatment operations are a major emissions source and a promising site for biochar production using sewage sludge, as well as wastewater alkalinity enhancement.
- A [2022 study](#) estimates 35,000–50,000 tonnes/year of biochar could be produced locally—this technical potential is not yet matched by policy or investment.
- Facilities owned by Vantaa Energy could be transformed into BECCS facilities (generating around 650.000 tCO₂/year of CDR) to anchor regional CDR, if aligned with Helsinki's climate planning.

CORE RECOMMENDATIONS

- 1 Develop a CDR Action Plan and integrate sector-specific pathways (e.g. waste, construction, land use) and link to Helsinki's 2030 and 2040 targets. Embed in the next update of the Climate Action Plan.
- 2 Co-finance a biochar pilot with HSY and national actors and use sludge from wastewater to produce biochar at scale. Seek support via Finland's climate investment platforms and circular economy funding to support a pilot and other types of financial support, such as free land or tax rebates. Do a side-by-side comparison of the project economics and climate impact with alternative use cases, such as composting.
- 3 Clarify criteria for the 15% residual emissions through in-boundary sinks and prioritize permanent and high-durability CDR methods. Define quality assurance principles through a city-level position paper, including public procurement standards for materials that integrate CDR to lower embodied carbon emissions.
- 4 Leverage the CDR potential of the construction sector and use this as a new strategic growth sector for the city of Helsinki. Collaborate with local companies, such as Carbonaide and apply the findings from the [“CO2ncrete Solution” studies existing building stocks’, in practice concrete structures”](#) project.
- 5 Leverage the Vantaa CCS plans as part of a regional CDR corridor and position Helsinki as a municipal buyer or logistics partner for the period until waste incineration is phased out. Initiate a joint feasibility study with Vantaa Energy and the [Helsinki-Uusimaa regional council](#) as part of the region's climate neutrality objective by 2030. Efforts to develop and scale technological CDR solutions have been highlighted in the region's [2022-2025 priority programme](#).
- 6 Develop clear and robust accounting frameworks for tracking and financing CDR activities. This could be done in collaboration with other cities in Finland and the Nordics.

EXISTING CDR PROJECTS AND STAKEHOLDERS

- [Carbo Culture](#) - Biochar carbon removal.
- [Compensate](#) - Carbon portfolio manager.
- [Puro.earth](#) - Carbon marketplace, standard, and registry.
- [Carbonaid](#) - Developed a CO₂-curing system for precast concrete.
- [Vantaa Energy](#) (40% owned by the City of Helsinki) is exploring CCS on all its waste-to-energy (WtE) plants, which emit 40–50% biogenic CO₂; the company aims to be carbon-negative in energy production by 2030.
- In 2021, the City of Helsinki held an open competition to design a [green urban block in the Verkkosaari neighborhood](#), focusing on energy efficiency, green solutions, and a low carbon footprint. In 2023 a limit for lifecycle emissions on all new residential buildings was introduced. A new open competition is considered that favors low carbon construction materials.
- HSY has considered developing a [sludge-to-biochar project](#) to reduce emissions from wastewater treatment and valorise organic waste. The initial outcome is that it will prioritize composting as more cost-effective.
- The City of Helsinki participated in the [Urban Biochar Project](#) (2022–2024) funded by Bloomberg Philanthropies, contributing to the development of carbon-negative urban infrastructure.
- Helsinki has several climate tech investors that provided early-stage funding to CDR startups. This includes Tesi (Finnish Industry Investment Ltd), Lifeline Ventures, Starlight VC, Wave Ventures, and Halton Ventures.

*NOTE:

One study was a master's thesis examining the use of biochar in the Helsinki city area across various application sites. It was conducted as an assignment for Helsinki's Climate Unit and supports the city's climate targets for 2030 and 2040, emphasizing the relevance of exploring new carbon sequestration methods. The objective was to assess the potential for biochar use in Helsinki and estimate the costs of purchasing and permanently applying biochar in city-specific projects. The global potential, scalability, and versatility of biochar make it an attractive option for carbon sequestration.

The biochar use potential was calculated for applications such as growing media, fields, grass areas, concrete structures, road bases, and asphalt. These calculations were based on application rates found in the literature and data provided by city experts for specific target areas. Over a 15-year evaluation period, the total potential was estimated to be 170 kilotons of sequestered CO₂ through biochar applications. Cost estimations were derived from literature sources and data provided by city experts. Marginal costs were determined for each application method, leading to a calculation of total costs. The cost analysis revealed significant variation across different application methods. Based on these findings, the most feasible applications for Helsinki are growing media and fields.

The city was analyzed as a biochar end-user in carbon markets, and also an actor purchasing carbon units resulting from biochar's carbon sequestration. To gain a broader understanding of biochar's usability and the state of production in Finland, representatives of biochar production and sales were interviewed. This market analysis highlighted that scaling up biochar production requires a committed demand side, which may in turn necessitate raising awareness about biochar among potential buyers.