

# Climate Neutral Nordics

Policy paper:

CO<sub>2</sub>-removal in the  
Nordic countries

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## Introduction

It is widely acknowledged that it is no longer enough to simply reduce emissions to reach international climate targets. Substantial amounts of CO<sub>2</sub> must also be removed from the atmosphere through carbon dioxide removal (CDR). This can be achieved with nature-based methods, such as forestation and restoration of wetlands, and technological methods, such as direct air capture of CO<sub>2</sub> (DACCS) and bioenergy with carbon capture and storage (BECCS).

In the latest climate scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) (2022), which keep warming within 1,5 degrees with little or no overshoot, a median of 584 billion tonnes of CO<sub>2</sub> is removed from the atmosphere within this century. The amount equals approximately 16 years of current annual global emissions.

To reach the volume shown by the IPCC, efforts need to be strengthened. Emissions from land use and land use change are still growing and there are only a few large-scale technological facilities operating globally. Removing carbon from the atmosphere is yet to become commercialized. Thus, efforts to incentivise their use on the national, regional and international level are key for adaptation and scale-up.

With large forest lands, many biogenic emission point sources, large carbon storage capabilities in the North Sea, and relevant technological communities, the Nordic countries have the possibility to take on a leadership role in developing and deploying CDR technologies. With various areas of expertise and dedicated national focus, there are also great possibilities for cooperation to enhance the effectiveness of value chains, reduce costs and share knowledge.

This paper gives an overview of developments in the Nordic countries and examines areas of common interest. This paper is based on presentations and knowledge from the webinar [“CO<sub>2</sub> removal: Nordic innovation power”](#) held on the 25th of October 2022.

## Financing

In the report [“Carbon dioxide removal – the solution that takes us to zero”](#) recently published by the environmental foundation ZERO, three main streams for financing projects are identified; namely the EU, national policy and the voluntary market for carbon credits.

### The European Union (EU)

The EU is an important agenda-setter for climate action in Europe. In January 2022 the European Commission launched its action plan “Sustainable Carbon Cycles”. The communication stresses the need for CDR to meet European climate targets. Their first step in making a CDR strategy is to develop a regulatory framework for certifying different carbon removal methods. At the end of 2022, the EU Commission published a quality criteria proposal for the certification scheme. Next, the commission will, in conjunction with an expert group, develop detailed certification rules for the measurement, monitoring, reporting and verification of carbon removals.



A common framework for accounting CDR is a prerequisite for trustworthy and climate-effective carbon removal. There are also EU finance schemes that are applicable for CDR projects, such as Horizon Europe and the EU Innovation Fund. Stockholm Exergi, a Swedish waste incineration plant, was granted funding in the last financing round of the EU Innovation Fund. Even though these financing schemes can support and enable certain projects, there is still a need for national policies to realize the full potential of CDR in Nordic countries.

### The voluntary market for carbon credits

Many corporations have set ambitious climate targets and net-zero strategies. To meet their ambitions, many use the voluntary market for carbon credits to offset some of their emissions. However, the voluntary market for carbon credits is dominated by cheap offsets, many with weak additionality. A project is “additional” if the project would not have materialized in the absence of the finance. Such projects are typically renewable projects or nature conservation projects and are often referred to as emission reductions and avoided emissions. The renowned Oxford principles set out that corporations should gradually switch from buying offsets that are based on emission reductions and avoided emissions to carbon removal offsets to legitimately balance an ongoing emission. The main barrier for CDR projects in the voluntary market is that the investment time horizon is short, typically 1–2 years. Many projects need higher income security, and risk relief to attain necessary external funding. Today, just above 2% of the credits in the market are from CDR projects, implying that there is a need for further investments.

### National policy

To ensure domestic realization of projects and sufficient speed and scale of deployment, national policies to finance projects are necessary. The EU and the voluntary market are important drivers, but more is needed to meet the envisioned scales presented by the IPCC. To ensure that CDR is done right, ZERO has developed five policy-relevant principles for climate-effective CDR. These are summarized on the right:



- 1. Carbon dioxide removal must not delay emission reductions.** In the IPCC scenarios that reach the 1.5 or 2-degree target, CDR is additional to rapid and deep emission reductions. To ensure that CDR does not delay or substitute emission reduction, ZERO recommends that an additional and separate target for CDR is established. A separate goal will also target public funding and policies.
- 2. Permanent CO2 storage is a goal.** Following industrial carbon capture, CO2 is stored geologically. The IPCC estimates that CO2 stored geologically remains stable underground for up to millions of years, which aligns with long-term climate goals. ZERO recommends that permanent storage is one of the goals when designing policies for CDR.
- 3. Co-benefits for nature-based solutions are a goal.** When designing nature-based CDR measures, CO2 storage and other important co-benefits such as biodiversity and climate adaptation, should be prioritized to maximize the measure’s value and ensure sustainability.
- 4. The short and long carbon cycles should be kept separate.** ZERO recommends that the fundamental distinction between the short-term and long-term carbon cycle is reflected in policy design for CDR. Meaning that it should not be possible to offset an ongoing fossil emission by increasing uptake in nature. Likewise, emissions from building down nature should not be compensated for by storing CO2 geologically.
- 5. CDR must be documented and certified.** To ensure credible CDR, traceability throughout the value chains is key. This will also promote value chains and solutions with a low climate and environmental impact.

## Developments on CDR in the Nordic countries

In 2020 the **Norwegian** government launched Longship, a full-scale CCS infrastructure project. The government co-funds CO<sub>2</sub> capture from two emission point sources in Norway where a share of the emissions are biogenic: the cement factory Norcem and the waste incineration facility Hafslund Oslo Celsio, as well as CO<sub>2</sub> transportation and storage in Northern Lights.

Northern Lights is an essential part of enabling CDR in the Nordics and in Europe. The company aims to collect CO<sub>2</sub> from European harbors and store it in geological reservoirs under the sea bed on the Norwegian continental shelf. The first phase of the Northern Lights project starts operations in 2024 with a capacity of 1,5 million tonnes of CO<sub>2</sub> per year. Phase two is already in planning, expanding the CO<sub>2</sub> storage capacity with an additional 5 million tonnes per year. ZERO, in its report, notes that to move at sufficient speed and scale, Norway needs to implement specific policy tools to enable projects at home at a faster rate.

Earlier this year (2022), **Finland** updated their climate targets established in the climate law. Finland's goal is now to reach net zero by 2035 and net negative by 2040. The strengthening of ambitions came after the government asked the national Climate Change Panel when Finland should reach net zero according to the "fair share" principles of the Paris Agreement. Finland has now the most ambitious climate targets amongst the Nordic countries.

Puro Earth is a Finnish-based marketplace for carbon removal offsets. The company connects buyers and sellers of carbon removal credits and independently verifies carbon removal projects. Their experience is that there are many carbon removal projects in planning. However, many lack fundamental funding to start operations. Puro Earth contributes to solving the financial gap by providing so-called pre-CORCs (CO<sub>2</sub>-removal certificates). Pre-CORCs are thus digital assets bought from a verified carbon removal project that materializes into CORCs when the project is up and running.

**Sweden's** plan is to take advantage of its many bio-based industries by implementing CCS on biogenic emission point sources to enable negative emissions. Sweden has come the furthest amongst the Nordic countries in designing policy instruments to incentivise CDR. The government will finance CO<sub>2</sub> removal by holding reversed auctions. In a reversed auction it is the buyer who bids to get the procurement. This way the government buys CO<sub>2</sub> removal from the seller who can offer a competitive price per ton removed. The first procurement is expected to be held in the first quarter of 2023. By 2030, Sweden's goal is to finance 3 million tonnes of CO<sub>2</sub> annually.

## Denmark

C4 is a Carbon capture cluster cooperation based in Copenhagen with nine members: three waste-to-energy plants, two biomass combined-heat-and-power plants, one wastewater treatment plant, two district heating networks and one commercial port. Together the cluster's emissions are in total 3 million tonnes of CO<sub>2</sub> per year. The goal is abatement by implementing CCS by 2025. More than 80% of the emissions stem from the use of biomass and thus qualify as CDR.

There are also ongoing applications and realization for geological CO<sub>2</sub> storage in Denmark. Greensand is a North Sea CO<sub>2</sub> storage project that aims to store 1,5 million tons of CO<sub>2</sub> annually by 2025. Last year the project received 197 million DKK (26 million €) in government funding. On an aggregated scale, it is estimated that the country has the capacity to store 12-22 billion tons of CO<sub>2</sub> geologically offshore.



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### Concluding remarks

There is a unique potential for CDR in the Nordic region, both by technological and nature-based solutions. Sweden and Finland, with their large bio-based industries, have a great potential to realize CDR with BECCS. Norway and Denmark, in turn, have large capacities to store CO<sub>2</sub> in underground reservoirs. This portrays that there are great opportunities for cross-border cooperation, to reduce costs and increase the total volume of CDR. If successful, the Nordic region can play an important role internationally in developing the technology and reducing the costs of the solutions that need to be adopted worldwide.

### Policy recommendations

To scale up CDR, national policy is key. It is evident that CDR is on the Nordic political agenda, there are political discussions and ongoing CDR projects in all the Nordic countries. The EU certification scheme for CDR, which is currently being finalized, can both accelerate national policy development and cross-border cooperation by offering a coherent framework for verification, reporting and monitoring CDR. Moving forward it is thus important that governments design incentivising policies fit for their national context. However, it is crucial that these contribute to enhancing cooperation between countries and that they harmonize with EU standards.

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