

# Regulatory framework for CCS in the Nordic countries



Nordic Council  
of Ministers

# Content

<b>Preface</b>	<b>4</b>
<b>Summary</b>	<b>5</b>
<b>Sammanfattning</b>	<b>11</b>
<b>Abbreviations</b>	<b>18</b>
<b>1. Introduction</b>	<b>20</b>
<b>2. International and EU Law</b>	<b>23</b>
2.1 The London Convention and Protocol	23
2.2 OSPAR	26
2.3 Convention on Biological Diversity	27
2.4 Helsinki Convention	29
2.5 The CCS Directive	30
2.6 The ETS Directive	34
<b>3. National legislation of CCS relevance</b>	<b>37</b>
3.1 Denmark	37
3.1.1 National context	37
3.1.2 Permits for capturing CO <sub>2</sub>	38
3.1.3 Permits for transporting CO <sub>2</sub> streams and intermediate storage of CO <sub>2</sub>	39
3.1.4 Permits for permanent storage of CO <sub>2</sub>	39
3.2 Finland	40
3.2.1 National context	40
3.2.2 Permits for capturing CO <sub>2</sub>	41
3.2.3 Permits for transportation and intermediate storage of CO <sub>2</sub>	42
3.3 Iceland	43
3.3.1 National context	43
3.3.2 Permits for capturing CO <sub>2</sub>	44
3.3.3 Permits for transporting and intermediate storage of CO <sub>2</sub>	44
3.3.4 Permits for permanent storage of CO <sub>2</sub>	44

3.4 Norway	45
3.4.1 National context	45
3.4.2 Permits for capturing CO <sub>2</sub> and intermediate storage of CO <sub>2</sub>	47
3.4.3 Permits for permanent storage of CO <sub>2</sub>	47
3.5 Sweden	48
3.5.1 National context	48
<b>3.5.2 Permits</b> for capturing CO <sub>2</sub>	49
3.5.3 Permits for transporting CO <sub>2</sub> streams and intermediate storage of CO <sub>2</sub>	49
3.5.4 Permits for permanent storage of CO <sub>2</sub>	50
<b>4. Monitoring, reporting and verification, and accounting for CCS</b>	<b>51</b>
4.1 Activity-level monitoring, reporting and verification	51
4.1.1 Key elements of MRV	51
4.1.2 Methodologies for carbon crediting and results-based finance	51
4.1.3 Current status of CCS methodology development	52
4.2 National inventories and accounting	55
4.2.1 National inventories and accounting under the Paris Agreement	55
4.2.2 Links between national inventories and activity-level MRV, as well as corporate inventories	56
4.2.3 Cross-border and EU considerations	57
<b>5. Concluding remarks and recommendations</b>	<b>60</b>
5.1 An emerging enabling regulatory environment	60
5.2 Significant barriers in international law	61
5.3 Evolving national legislation is adapted to national contexts	62
5.4 A need for robust MRV and accounting frameworks	63
5.5 Timely development of the components of the CCS value chain	65
5.6 Recommendations	66
<b>Literature</b>	<b>68</b>
<b>About this publication</b>	<b>70</b>

This publication is also available online in a web-accessible version at:  
<https://pub.norden.org/temanord2023-521>

# Preface

This report has been prepared by the Swedish Environmental Research Institute (IVL) in cooperation with the Perspectives Climate Group as a project partner. It is a follow-up study on an earlier report from 2021 concentrating on barriers to BECCS (TemaNord 2021:538).

The overall purpose of this project has been to analyse regulatory aspects in relation to CCS (including BECCS and Direct Air CO<sub>2</sub> Capture and Storage, so called DACCS) development and deployment that are of relevance in the Nordic context. The regulatory environment for CCS in the Nordic countries has developed significantly over the past years. In addition, significant developments have taken place at the international level. Regulatory obstacles and barriers still remain according to the report. In addition to an enabling regulatory environment, sufficient financial incentives are necessary for investments in CCS to take place.

The report highlights the cross border nature of CCS activities. Also the need for exchange of information between the Nordic countries seems obvious according to the findings. These conclusions point into the direction of a need to consider institutional arrangements on the Nordic level to deal with CCS activities of mutual interest.

Comments and inputs to the report have been provided by Members of the Nordic Working Group for Environment and Economy (NME) during the preparation of the report. The authors of the report are responsible for the content as well as the assessments and recommendations, which do not necessarily reflect the views and the positions of the governments in the Nordic countries.

May 2023

Magnus Cederlöf

Chair of the Nordic Working Group for Environment and Economics

# Summary

All Nordic countries and the EU have set ambitious targets to achieve net-zero and even net-negative greenhouse gas (GHG) emissions. The Nordic countries have set their targets both individually through various national goals and legislation, and jointly through the 2019 Helsinki Declaration on Nordic Carbon Neutrality. The Declaration and EU legislation acknowledge the important role of Carbon Capture and Storage (CCS). CCS has potential to enable rapid and deep reductions of CO<sub>2</sub> emissions from fossil sources where potential alternative mitigation solutions are insufficient. In addition, bioenergy with CCS (BECCS) has the capacity to deliver carbon dioxide removal (CDR) (active removal of CO<sub>2</sub> from the atmosphere), which is of significant importance in relation to net-zero targets, since any country (or region) aiming for a net-zero target will need to counterbalance some “residual” hard-to-abate emissions.

This project aimed to analyse regulatory aspects in relation to CCS (including BECCS and direct air CCS, so-called DACCS) development and deployment that are of relevance for the Nordic context. Specifically, the project considers:

- Similarities and differences between the Nordic countries concerning CCS regulation.
- Can barriers to CCS and/or BECCS deployment be identified which are caused by current regulatory frameworks?
- Are there plans to change regulatory frameworks in order to promote the development of CCS and/or BECCS?
- Whether there is a need to develop models for CCS co-operation between the Nordic countries, especially when it comes to co-operation at project level.
- The issue of division of responsibilities between actors in CCS projects. Is it clear who in the legal sense is responsible for what at different stages of a cross-border CCS project?
- The need to coordinate monitoring, reporting and verification of BECCS mitigation outcomes on a Nordic level.
- The need to develop Nordic co-operation on CCS and how increased interaction between the Nordic countries in the CCS area could be promoted.

The main findings of this work are summarised below.



The regulatory environment for CCS in the Nordic countries has developed significantly over the past decade or so. Also, at the international level, significant developments have taken place. For example, the EU has adopted the CCS Directive which regulates responsibility for the environmentally safe storage of CO<sub>2</sub> and contains provisions for CO<sub>2</sub> capture and transportation and included provisions for CCS in the EU ETS (Emission Trading System) Directive.<sup>[1]</sup> The CCS Directive has subsequently been transposed into national legislation. The International Maritime Organization IMO has adopted a resolution allowing the export/import of CO<sub>2</sub> for the purpose of sub-seabed storage. The European Commission has made it clear that they interpret EU regulations as meaning that the transportation of CO<sub>2</sub> by ship and truck is to be regarded as equivalent to pipeline transport and thus compatible with CCS.<sup>[2]</sup> The Commission furthermore proposed to extend the provision for CO<sub>2</sub> transport of the EU Emission Trading System (ETS) Directive to other means of transport as part of the ongoing revision of the ETS Directive. Regarding liabilities, the Commission has clarified that the liability for emissions caused by the operation of CO<sub>2</sub> capture, transport or storage in the CCS value-chain is transferred from one ETS installation to the other, without regard to the EEA country they are located in. Any leakage from storage is thus accounted as an emission by the storage operator, and also reported by the country where the storage site is located, in its national GHG inventory. The trend in EU politics is to develop the regulatory system in a more permissive direction, in support of CCS. National regulators in Nordic countries are also working to remove regulatory gaps and lower barriers.

Regulatory obstacles and barriers do, however, remain and the most significant ones identified in this study are summarised below. It should, however, first be noted that, in addition to an enabling regulatory environment, sufficient financial incentives must be in place for investments in CCS to actually happen.

### **International and EU law:**

Through an amendment to the London Protocol, the export of CO<sub>2</sub> for sub-seabed storage in another state is permitted, but the amendment has not yet entered into force. Export of CO<sub>2</sub> from one state for sequestration in another state therefore requires a provisional application of the amendment, which in turn requires a bilateral agreement or arrangement between the states concerned. According to the Commission's interpretation, the CCS Directive and the ETS Directive can act as such arrangement between EU Member States. The EEA treaty together with the incorporation of the two directives concerned in the EEA legal regime provides the necessary arrangement with EEA partners. This implies that additional bilateral

---

1. The ETS Directive sets out that an obligation to surrender allowances shall not arise in respect of emissions verified as captured and transported for permanent storage to a facility for which a permit is in force in accordance with the CCS Directive.

2. When it is later on transferred from the ship or the truck to a pipeline transport network or directly to a storage site.

arrangements should be strictly limited to the residual issues not covered by EU law and they should not refer to the subject matters covered by EU rules. Further knowledge-building and exchange of experiences regarding these matters at Nordic level is important.

The Helsinki Convention does not allow storage of CO<sub>2</sub> below the Baltic Sea. Enabling CO<sub>2</sub> storage in the Baltic Sea would increase the potential for CO<sub>2</sub> storage in Nordic Baltic Sea states that have such potentials. That would require that the Helsinki Convention be amended or that a resolution allowing an interpretation that allows storage of CO<sub>2</sub> sub-seabed be adopted. Furthermore, some of the possible Baltic Sea storage locations extend to territory or economic zones outside the Scandinavian countries and potentially also outside the territory of the EU. This poses a problem as geological storage outside the territory of the EEA (European Economic Area) countries is not covered by the EU CCS Directive.

A moratorium in the Convention on Biological Diversity (CBD) does not allow climate-related geo-engineering activities that may affect biodiversity until there is an adequate scientific basis on which to justify such activities. Capture and storage of CO<sub>2</sub> from fossil fuels is expressly exempted from the moratorium. However, this is not the case for CCS applied to biogenic CO<sub>2</sub>, which may therefore constitute an obstacle for BECCS. If and how BECCS is compatible with the moratorium is ultimately subject to interpretation by the individual Parties to the CBD. Such processes are ongoing in Denmark and Sweden in order to reduce uncertainties. Furthermore, tightening sustainability requirements for biomass within the EU could possibly affect the competitiveness of bioenergy and thus the conditions for BECCS.

### **National legislation:**

All the Nordic countries have implemented the CCS Directive and the implementations have been accepted by the EU. The most distinct difference between national legislations that has been identified is that while Finland has no known geological formations appropriate for geological CO<sub>2</sub> storage and, therefore, uses the possibility (of the CCS Directive) not to permit geological storage of CO<sub>2</sub> in their territory, it is allowed (to varying extent) in the remaining four Nordic countries. Denmark and Iceland have made recent changes to national regulations/legislation to enable permissions for industrial scale CO<sub>2</sub> storage. Differences in the national legislations on a more general level seem in part to depend on how far the country has come in planning and building up infrastructure for CCS activities but also national circumstances. An example of how legislation is gradually adapted to national contexts as CCS moves closer to deployment is the recent Danish legislative changes in order to allow companies regulated within utility laws for power and heat to commit financially to CCUS. The Icelandic implementation of the CCS Directive has been innovative in the sense that it is

adapted to Iceland's unique geology and permits "mineral storage" of CO<sub>2</sub>, while the CCS Directive has been developed with the intention of geological storage of CO<sub>2</sub> in a supercritical state.

It is difficult to identify barriers in the CCS-relevant national legislation in the Nordic countries as CCS activity is in its infancy and there is limited practical testing of the legislation. CCS is new technology (for actors in the value chain and for regulators) and complications are likely to arise when the first permitting processes are initialised in a specific national context.

### **Monitoring, Reporting, and Verification and Accounting for CCS:**

Monitoring, Reporting, and Verification (MRV) and accounting for CCS includes activity-level, national-level and, in some cases also EU-level and cross-boundary considerations. Robust and aligned activity-level MRV and national inventory methodologies for CCS are key for designing policies and incentives for CCS, since governments have an interest in incentivising activities that demonstrably help them to meet their targets. Robust and aligned MRV and accounting are particularly important for the effectiveness and integrity of results-based incentives, including market-based approaches. A key aspect of robust MRV and accounting for CCS is ensuring long-term durability of storage. This is a methodological and legal challenge since most actors and institutions cannot guarantee monitoring for hundreds of years.

At the activity level, MRV covers the monitoring, reporting and verification of emissions and removals associated with specific activities. If an activity wishes to generate carbon credits that represent additional mitigation outcomes (emission reductions or removals), it needs to apply methodologies and procedures developed specifically for carbon crediting, covering, inter alia, additionality demonstration, baseline setting, permanence, and MRV. Such methodologies exist for many CCS activity types, including BECCS and DACCS, and further methodologies are under development. The proposed EU framework for certification of carbon removals is expected to develop EU-wide approaches for ensuring high quality of certified carbon removal units, which can potentially be used to access carbon markets and/or subsidies.

At the national level, emissions and removals are monitored and reported through national GHG inventories. Current IPCC inventory guidelines enable the inclusion of CCS, including BECCS, in national GHG inventories. It is unclear whether and how DACCS could be included in national GHG inventories. Current EU regulation, including the newly adopted regulations and decisions on the ESR, LULUCF and the EU ETS, does not provide guidance concerning where and how BECCS and DACCS should be accounted. It is likely that the role of BECCS and DACCS will feature more prominently in upcoming negotiations on targets and architecture for the EU's climate policy after 2030.



CCS may include cross-border cooperation and some (including Nordic) governments are already piloting inter-governmental agreements on cross-border cooperation on CCS activities. Such cross-border piloting is much-needed and can help to develop universal guidance on how mitigation outcomes from cross-border cooperation should be accounted for at national level.

The national inventory serves as the basis for the emissions balance, which is used for tracking progress towards and achievement of national mitigation targets. Countries must make "corresponding adjustments" to their emissions balances for any transfers or acquisitions of authorised mitigation outcomes relating to market-based cooperation, in line with guidance relating to Article 6.2 of the Paris Agreement. Corresponding adjustments would prevent double-claiming also for any mitigation outcomes that are used by non-state actors for voluntary offsetting. The current EU regulation is not fully aligned with the Paris Agreement, for example with regard to corresponding adjustments in line with Article 6.2 of the Paris Agreement. In this context, it would be valuable to identify changes and updates to legislation and other policy commitments that are needed at the national level and more generally on EU level, in the short and long term.

### **Nordic coordination of infrastructure investment:**

Scaling CCS commensurate with the delivery of the ambitious Nordic mitigation targets would require complex CO<sub>2</sub> networks to evolve. Such networks would feature multiple sources connecting to multiple sinks, and installations owned by different operators with incentives and obligations that are not always aligned. Investors will not develop one part of the chain without mitigation of "cross-chain" risk, where failures in other parts of the chain affect their revenue. It has been suggested by various stakeholders in the debate on CCS development in the Nordic region that potential coordination failures need to be addressed to facilitate investment and prevent sub-optimisation.

### **Recommendations:**

Finally, a number of issues are identified where it may be useful for the Nordic countries to coordinate positions in order to have stronger impact on policy development, not least in the EU. These include:

- i. The CCS Directive and further actions to reduce uncertainties surrounding the treatment of other modes of CO<sub>2</sub> transport than pipeline.
- ii. Where and how Member States should report and account for removals from BECCS and DACCS at the EU level.
- iii. Policy in relation to energy use of biomass waste and residues from sustainable forest management and its implications for the potential of BECCS.

- iv. The further development of the emerging EU certification of carbon dioxide removals framework.
- v. Interpretations of the moratorium on geo-engineering in the CBD and its implications for implementation of BECCS in Nordic contexts, and
- vi. Initiatives to address the Helsinki Convention prohibition against the storage of CO<sub>2</sub> below the Baltic Sea.

It is recommended that the Nordic countries intensify their cooperation and dialogue, providing for joint efforts to build knowledge, sharing of Nordic experience and lessons learned coordinated through a Nordic forum, e.g., a working group, for collaboration on CCS that could build on experience from existing networks. Areas that may initially be considered for prioritisation include:

- Nordic-level technical work to coordinate CCS-relevant approaches to (a) activity-level Monitoring, Reporting, and Verification and (b) national GHG inventories and accounting.
- Explore opportunities for market-based solutions involving international transfers of mitigation outcomes that may facilitate enhanced CCS deployment and mitigation ambition. This includes issues related to the credible and transparent voluntary use of carbon credits, based on activities in the Nordic countries, that avoids double claiming, and
- Strengthening the capacity for long-term strategic planning/optimization of CCS infrastructure in the context of, inter alia, the 2035–2050 Nordic national net-zero targets.

Regular Nordic-level sessions could be held for exchange of information between governments and other stakeholders, including special sessions dedicated to specific themes, brainstorming sessions etc.

This report addresses CCS technologies which can potentially make significant contributions to abate emissions from fossil fuels and, as a part of CDR methods, to remove CO<sub>2</sub> from the atmosphere. As a final remark, the authors wish to underline that the experience of deploying CCS at scale is quite limited and uncertainties are considerable, in particular concerning CDR applications. The potential future role of CCS does not justify reduced efforts to pursue full mitigation by means that do not rely on CCS, where feasible.

# Sammanfattning

Alla nordiska länder och EU har satt upp ambitiösa mål för att uppnå nettonollutsläpp av växthusgaser. De nordiska länderna har satt upp sina mål både individuellt genom olika nationella mål och lagstiftning samt genom en gemensam ambition i 2019 års Helsingforsdeklaration om nordisk klimatneutralitet ("Deklarationen"). I både Deklarationen och i EU-lagstiftning tillskrivs avskiljning och lagring av koldioxid (carbon dioxide capture and storage, CCS) en betydelsefull roll för att klara ambitiösa klimatmål. CCS har potential att möjliggöra snabba och djupgående minskningar av koldioxidutsläpp från fossila källor där tillgången till andra lösningar är begränsade. Dessutom kan CCS bidra till negativa utsläpp, det vill säga att aktivt avlägsna CO<sub>2</sub> från atmosfären och lagra denna permanent, till exempel genom omvandling av biobränslen kombinerat med CCS (bioenergy with CCS, BECCS). Negativa utsläpp har en nyckelroll för att det ska vara möjligt att uppnå nettonollutsläpp genom sin förmåga att balansera "återstående" utsläpp som är svåra att åtgärda.

Detta projekt har syftat till att analysera nationell och internationell lagstiftning som reglerar användning av CCS i de nordiska länderna. Projektet har haft som mål att undersöka:

- Likheter och skillnader gällande regelverk kring CCS i de nordiska länderna.
- Kan hinder för CCS-utbyggnad identifieras som orsakas av nuvarande regelverk?
- Finns det planer på att ändra regelverk för att främja utvecklingen av CCS och/eller BECCS?
- Om det finns behov av att utveckla modeller för CCS-samarbete mellan de nordiska länderna, särskilt när det gäller samarbete på projektnivå.
- Frågan om ansvarsfördelning mellan aktörer i CCS-projekt. Är det tydligt vem i juridisk mening som är ansvarig för vad i olika skeden av ett gränsöverskridande CCS-projekt?
- Behovet av att samordna övervakning, rapportering och verifiering av CCS-projekt på nordisk nivå.
- Behovet av att utveckla det nordiska samarbetet kring CCS samt hur ökat samspel mellan de nordiska länderna på CCS-området skulle kunna främjas.

Projektets viktigaste resultat sammanfattas nedan.

Den regulatoriska miljön för CCS i de nordiska länderna har utvecklats avsevärt under det senaste dryga decenniet. Även på det internationella planet har en betydande utveckling skett. Till exempel har EU antagit CCS-direktivet som reglerar ansvaret för miljösäker lagring av koldioxid och innehåller bestämmelser för koldioxidavskiljning och transport. Bestämmelser gällande CCS har även inkluderats i direktivet för EU:s utsläppshandelssystem (EU ETS).<sup>[3]</sup> Bestämmelser ur dessa direktiv har därefter införlivats i nationell lagstiftning i samtliga nordiska länder. Internationella sjöfartsorganisationen IMO har antagit ett tillägg som medger geologisk koldioxidlagring under havsbotten och ytterligare ett tillägg och en resolution som gör att export/import av koldioxid i syfte att lagra under havsbotten kan tillåtas. EU-kommissionen har klargjort att EU:s regelverk kan tolkas som att koldioxidtransport med fartyg respektive lastbil är att betrakta som likvärdig med rörledningstransport och därmed förenlig med existerande regelverk.<sup>[4]</sup> EU-kommissionen har vidare föreslagit att regleringen av koldioxidtransport ska vidgas till att omfatta andra transportmedel än rörledningar som en del i den förestående översynen av ETS-direktivet. När det gäller ansvar för utsläpp som orsakas av driften av koldioxidavskiljning, -transport eller -lagring i CCS-värdekedjan har kommissionen klarlagt att ansvaret överförs från en ETS-anläggning till en annan, utan hänsyn till vilket EES-land de är belägna i. Eventuellt läckage från lagring redovisas således som ett utsläpp av lageroperatören och rapporteras av landet där lagringsplatsen är belägen i dess nationella växthusgasinventering. Trenden inom EU-politiken är att utveckla regelsystemet i en mer tillåtande riktning, till stöd för CCS. Nationella tillsynsmyndigheter i de nordiska länderna arbetar också för att ta bort luckor i lagstiftningen och avlägsna hinder.

Regulatoriska hinder finns dock kvar och de viktigaste som har identifierats i denna studie sammanfattas nedan. Det bör dock först noteras att, utöver möjliggörande regelverk, är det nödvändigt med tillräckliga ekonomiska incitament för att investeringar i CCS ska kunna bli lönsamma och kunna ske.

### **Regleringar på internationell och EU-nivå:**

Genom en ändring av Londonprotokollet tillåts export av koldioxid för lagring under havsbotten i en annan stat, men ändringen har ännu inte trätt i kraft. Export av koldioxid från en stat för lagring i en annan stat kräver därför en provisorisk tillämpning av ändringen, vilket i sin tur förutsätter bilaterala avtal mellan de berörda staterna. Enligt kommissionens tolkning kan CCS- och ETS-direktiven ta den funktion som sådana bilaterala avtal mellan EU-medlemsstater skulle fylla. EES<sup>[5]</sup>-fördraget tillsammans med införlivandet av de två berörda direktiven i

---

3. Enligt ETS-direktivet måste verksamhetsutövare överlämna utsläppsrätter motsvarande sina utsläpp varje år. Detta gäller dock ej för koldioxid som är avskild och transporterad för permanent geologisk lagring vid en lagringsplats som har fått tillstånd i enlighet med CCS-direktivet.  
4. Förutsatt att koldioxiden senare överförs från fartyg eller lastbil till ett rörledningsnätverk eller direkt till en lagringsplats.  
5. Europeiska ekonomiska samarbetsområdet.

EES-rättssystemet gör att detsamma gäller i relation till EES-partners. Detta betyder att bilaterala överenskommelser bör vara strikt begränsade till de återstående frågor som inte omfattas av EU-lagstiftningen och de bör inte avse frågor som omfattas av EU:s regler. Det är viktigt med kunskapsuppbyggnad och erfarenhetsutbyte på nordisk nivå kring praktiska tillämpningar inom detta område.

Helsingforskonventionen tillåter inte lagring av koldioxid under Östersjön och ett möjliggörande av koldioxidlagring i Östersjön skulle bidra till en ökad lagringspotential. Det skulle kräva att Helsingforskonventionen ändras eller att en resolution som tillåter en tolkning som tillåter lagring av koldioxid under havsbotten antas. Några av de möjliga lagringsplatserna i Östersjön sträcker sig dessutom över territorier eller ekonomiska zoner utanför de skandinaviska länderna, och potentiellt även utanför EU:s territorium, vilket tillför komplexitet eftersom geologisk lagring utanför EES-ländernas territorium inte omfattas av EU:s CCS-direktiv.

Ett moratorium i konventionen om biologisk mångfald (CBD) gör att klimatrelaterad så kallad "geoengineering" som kan påverka den biologiska mångfalden inte är tillåtet så länge det inte finns en adekvat vetenskaplig grund för att motivera sådan verksamhet. Avskiljning och lagring av koldioxid från fossila bränslen är uttryckligen undantagen från moratoriet. Detta är dock inte fallet för CCS som tillämpas på biogen koldioxid, vilket därför kan utgöra ett hinder för BECCS. Om och hur BECCS är förenligt med moratoriet är i slutändan föremål för tolkning av de enskilda parterna i CBD. Tolkningsprocesser pågår i Danmark och Sverige för att minska osäkerheterna. En delvis relaterad fråga är att skärpta hållbarhetskrav för biomassa inom EU potentiellt kan komma att påverka bioenergens konkurrenskraft och därmed förutsättningarna för BECCS.

### **Nationell lagstiftning:**

Alla de nordiska länderna har implementerat CCS-direktivet och implementeringarna har godkänts av EU. Den mest tydliga skillnaden mellan ländernas implementering som har identifierats är att Finland, som inte har några kända geologiska formationer som är lämpliga för geologisk koldioxidlagring, till skillnad från övriga nordiska länder utnyttjar möjligheten (i CCS-direktivet) att inte tillåta koldioxidlagring. Danmark och Island har nyligen gjort ändringar i nationella regleringar/lagstiftning för att möjliggöra tillstånd för lagring av koldioxid i industriell skala. Generellt tycks skillnader med avseende på nationell lagstiftning inom området delvis bero på hur långt respektive land har kommit i planering och uppbyggnad av infrastruktur för CCS-verksamhet och på specifika nationella förhållanden. Ett exempel på hur lagstiftningen successivt anpassas till nationella sammanhang när CCS närmar sig genomförande är danska lagändringar som nyligen gjorts för att kunna tillåta företag som regleras inom el- och värmelagstiftningen att förbinda sig ekonomiskt till verksamheter inom koldioxidavskiljning, -lagring och -användning. Den isländska implementeringen av

CCS-direktivet har varit innovativt i den meningen att den är anpassad till Islands unika geologi och tillåter "minerallagring" av koldioxid, medan CCS-direktivet har utvecklats med avsikten att lagra koldioxid i superkritiskt tillstånd i geologiska formationer.

Möjligheterna att identifiera hinder i den CCS-relevanta nationella lagstiftningen i de nordiska länderna begränsas av att CCS-verksamheten är i sin linda och det finns relativt få erfarenheter av praktisk testning av lagstiftningen. CCS är ny teknik (för aktörer i värdekedjan och för tillsynsmyndigheter) och fler barriärer kommer sannolikt att blottläggas när antalet tillståndsprocesser som initieras i ett specifikt nationellt sammanhang ökar.

### **Övervakning, rapportering och verifiering och bokföring av CCS:**

Övervakning, rapportering och verifiering (MRV) och bokföring av CCS inkluderar överväganden på aktivitetsnivå, nationell nivå och i vissa fall även EU-nivå samt särskilda hänsyn för värdekedjor som sträcker sig över nationsgränser. Robusta och anpassade MRV-metoder på aktivitetsnivå och nationella inventeringsmetoder för CCS är av central betydelse för utformning av policyer och incitament för CCS, eftersom stater har ett intresse av att stimulera aktiviteter som bevisligen hjälper dem att nå nationella mål. Robust och anpassad MRV och bokföring har en särskilt viktig roll för att säkerställa resultatbaserade incitaments effektivitet och integritet. En nyckelaspekt när det gäller MRV och bokföring i samband med CCS är att säkerställa lagringens beständighet. Detta är dels en metodologisk, dels en juridisk utmaning eftersom de flesta aktörer och institutioner inte kan garantera övervakning i hundratals år.

På aktivitetsnivå omfattar MRV övervakning, rapportering och verifiering av utsläpp och upptag i sänkor i samband med specifika aktiviteter. Om en aktivitet ska kunna generera växthusgaskrediter enligt god praxis så måste den tillämpa metoder och förfaranden som utvecklats specifikt för växthusgaskreditering, inklusive beräkning av en konservativ referensbana, demonstration av så kallad additionalitet och säkerställande av permanens. Metodiker som föreskriver hur sådana bedömningar ska göras har utvecklats för ett flertal CCS-aktivitetstyper, inklusive BECCS och DACCS (Direkt Air CCS) och ytterligare metodiker är under utveckling. Det föreslagna EU-ramverket "carbon removal certification framework" förväntas komma att utveckla EU-omfattande tillvägagångssätt för att säkerställa integriteten hos certifierade växthusgaskrediter som är baserade på negativa utsläpp.

På nationell nivå övervakas och rapporteras utsläpp och upptag genom nationella växthusgasinventeringar. IPCC:s nuvarande inventeringsriktlinjer gör det möjligt att inkludera CCS, inklusive BECCS, i nationella växthusgasinventeringar. Det är oklart om och hur DACCS skulle kunna inkluderas i nationella växthusgasinventeringar. Nuvarande EU-regelverk, inklusive de nyligen antagna förordningarna och besluten om ESR, LULUCF och EU ETS, ger ingen vägledning om var negativa utsläpp från



BECCS och DACCS ska redovisas. Det är troligt att rollen för BECCS och DACCS kommer att få en mer framträdande position i kommande förhandlingar om mål och arkitektur för EU:s klimatpolitik efter 2030, varför det är betydelsefullt att få klarhet i frågan.

CCS kan innefatta koldioxidtransport över nationsgränser och vissa länder (inklusive nordiska) utforskar redan mellanstatliga avtal om gränsöverskridande samarbete om CCS-aktiviteter. Sådan pilotverksamhet är välbehövlig och kan bidra till att utveckla universell vägledning om hur växthusgasminskningar, som gränsöverskridande samarbeten resulterar i, bör bokföras på nationell nivå.

Den nationella växthusgasinventeringen ligger till grund för länders "utsläppsbalans", som används för att följa upp framsteg mot och uppnående av nationella växthusgasminskningsmål. För alla överföringar eller förvärv av auktoriserade växthusgasminskningar som hänför sig till marknadsbaserat samarbete inom ramen för Parisavtalets artikel 6.2 måste länder göra justeringar<sup>[6]</sup> av sina utsläppsbalanser. Detta innebär då bland annat att aktuella "ursprungsländer" för minskningarna åtar sig att inte räkna med de aktuella minskningarna när de rapporterar sina nationella utsläpp, så att de inte dubbelräknas. I samband med frivillig klimatkompensation är sådana justeringar av nationella utsläppsbalanser ett sätt att förebygga dubbelräkning av växthusgasminskningar mot klimatmål satta på nationell respektive företagsnivå.

Nuvarande relevanta EU-regelverk är inte helt anpassade till Parisavtalet, till exempel vad gäller justeringar av utsläppsbalanser i linje med artikel 6.2 i Parisavtalet. I detta sammanhang skulle det vara värdefullt att identifiera förändringar och uppdateringar av lagstiftning och andra politiska åtaganden som behövs på nationell nivå och mer generellt på EU-nivå, på kort och lång sikt.

### **Nordisk samordning av infrastrukturinvesteringar:**

Den infrastruktur som krävs för den integrerade CCS-värdekedjan inkluderar ett flertal aktörer vars prioriteringar och incitament inte alltid är samordnade. För att klara ambitiösa klimatmål i Norden är det rimligt att anta att en komplex CCS-infrastruktur kommer att behöva byggas ut i snabb takt, som ansluter ett stort antal avskiljningsprojekt till flera lagringsplatser. Installationer som ingår i infrastrukturen kommer att ägas av olika operatörer vars mål och skyldigheter ofta skiljer sig åt. Denna mångfald av incitament, mål och prioriteringar skapar risker tvärs över värdekedjan, som riskerar att påverka investeringsbeslut negativt eftersom investerare påverkas av risken för brist på framsteg i andra delar av värdekedjan. Det har föreslagits av olika intressenter i debatten om CCS-utveckling i Norden att potentiella koordineringsmisslyckanden behöver uppmärksammas och hanteras för att investeringar inte ska bromsas upp och suboptimeringar undvikas.

---

6. "Corresponding adjustments".

## Rekommendationer:

Slutligen identifieras i rapporten ett antal frågor där det kan vara lämpligt för de nordiska länderna att söka samordning av ställningstaganden för att få ett mer kraftfullt genomslag i policyutvecklingen, inte minst inom EU. Dessa inkluderar

- i. CCS-direktivet och ytterligare åtgärder för att minska osäkerheter kring behandlingen av andra koldioxidtransportsätt än rörledning.
- ii. var och hur medlemsstaterna på EU-nivå ska rapportera och redovisa negativa utsläpp från BECCS och DACCS.
- iii. policy i relation till användning av biomassarester och rester från hållbart skogsbruk för energiändamål och dess konsekvenser för BECCS-potentialen.
- iv. den fortsatta utvecklingen av det framväxande EU-ramverket för certifiering av negativa utsläpp.
- v. tolkningar av moratoriet om klimatrelaterad geoengineering i konventionen om biologisk mångfald och dess implikationer för genomförande av BECCS i nordiska sammanhang och
- vi. initiativ för att utveckla strategier för hantering av Helsingforskonventionens förbud mot lagring av koldioxid under Östersjön.

De nordiska länderna rekommenderas att intensifiera samarbetet och ytterligare förstärka koordineringen av kunskapsuppbyggnad genom utbyte av erfarenheter och lärdomar på nordisk nivå. Etablering av en arbetsgrupp med uppdrag att öka det nordiska samarbetet kring CCS kan övervägas, som lämpligen kan bygga vidare på erfarenheter från befintliga nätverk. Teman som initialt kan övervägas för prioritering inom kunskapsuppbyggnad inkluderar:

- CCS-relevant tekniskt arbete på nordisk nivå för att samordna (a) övervakning, rapportering och verifiering på aktivitetsnivå och (b) nationella växthusgasinventeringar och bokföring.
- utforska möjligheter till marknadsbaserade lösningar som kan stimulera en snabbare utbyggnad av CCS-lösningar som ger negativa utsläpp och därmed kan möjliggöra en högre ambitionsnivå.
- frågor om trovärdig och transparent frivillig klimatkompensation, baserat på aktiviteter som genomförs i de nordiska länderna, till exempel hur dubbelräkning kan förebyggas.
- stärkt kapacitet för långsiktig strategisk planering/optimering av CCS-infrastruktur mot bakgrund av nordisk de nettonollmålen 2035–2050.

Regelbundna sessioner på kan vidare arrangeras på nordisk nivå som ger statliga och andra intressenter möjlighet att diskutera specifika aktuella teman, delta i brainstorming-sessioner etc.

Denna rapport tar upp CCS-tekniker som potentiellt kan ge betydande bidrag till dels minskade utsläpp från användning av fossila bränslen, dels negativa utsläpp. Som en sista anmärkning vill författarna understryka att globalt är erfarenheten av CCS i stor skala fortfarande begränsad och osäkerheterna är betydande. Den potentiella framtida rollen för CCS, inklusive möjligheten att åstadkomma negativa utsläpp, motiverar inte minskade ansträngningar att reducera växthusgasutsläpp genom att fasa ut fossila bränslen och energieffektivisera med mera.

# Abbreviations

A6.4ERs	Article 6.4 Emission Reductions
BEC	Bio-Energy with Carbon Dioxide Capture
BECCS	Bio-Energy with Carbon Dioxide Capture and Storage
CBD	The 1992 Convention on Biodiversity
CCS	Carbon Dioxide Capture and Storage
CCUS	Carbon Dioxide Utilisation and Storage
CDM	Clean Development Mechanism
CDR	Carbon Dioxide Removal
COP	Conference of the Parties
DAC	Direct Air Carbon Dioxide Capture
DACCS	Direct Air Carbon Dioxide Capture and Storage
EAU	EU Allowance Units
EEA	European Economic Area
EFTA	European Free Trade Association
EIA	Environmental Impact Assessment
ETS Directive	Emissions Trading System Directive
EOR	Enhanced Oil Recovery
EU	European Union
EU ETS	European Union Emissions Trading System
ESR	Effort Sharing Regulation

GHG	Greenhouse Gas
ICROA	International Carbon Reduction & Offset Alliance
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITMO	Internationally Transferred Mitigation Outcome
LULUCF	Land Use, Land Use-Change, and Forestry
MoU	Memorandum of Understanding
MRV	Monitoring, Reporting, and Verification
MW	Megawatts (one million watts)
NDC	Nationally Determined Contribution
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
SEPA	Swedish Environmental Protection Agency
TFEU	Treaty of the Functioning of the European Union
VCLT	Vienna Convention on the Law of Treaties

# 1. Introduction

All Nordic countries have set ambitious targets to achieve net-zero and even net-negative greenhouse gas (GHG) emissions in line with a (global) 1.5-degree pathway, both individually through various national goals and legislation, and jointly through the 2019 Helsinki Declaration on Nordic Carbon Neutrality<sup>[7]</sup> (“the Declaration”). In the Declaration, the Prime Ministers declare that the Nordic countries want to lead by example and intensify cooperation. The Declaration underlines the important role of carbon capture and storage (CCS), including bioenergy with CCS (BECCS) which is the leading technology that can deliver permanent carbon dioxide removal (CDR) in the Nordics.<sup>[8]</sup> Furthermore, the EU has an ambition to achieve a balance between emissions by sources and removals by sinks of GHG domestically within the EU by 2050 and, as appropriate, achieve net negative emissions thereafter.<sup>[9]</sup>

CCS may have different roles to play:

- CCS is a solution that has potential to enable rapid and deep reductions of CO<sub>2</sub> emissions from fossil sources where potential alternative mitigation solutions are insufficient.
- In addition, BECCS and direct air carbon capture and storage (DACCS) has the capacity to actively remove CO<sub>2</sub> from the atmosphere permanently, which is of significant importance in relation to net-zero targets. Any country (or region) aiming for a net-zero target will need to counterbalance some “residual” emissions due to the difficulty to fully mitigate within certain sectors such as agriculture. This is where CDR can play a significant role.

---

7. The Helsingfors Declaration, a declaration from the meeting between the Nordic Prime Ministers and the Ministers of Environment, 25 January 2019. Available at: <https://www.norden.org/en/declaration/declaration-nordic-carbon-neutrality>

8. Other CDR methods that are being considered for their potential future contributions include biochar and Direct Air Carbon Capture and Storage (DACCS).

9. European Climate Law. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1119>



However, when discussing CCS, it is important to bear in mind that it should primarily be seen as a tool to manage emissions in sectors where full mitigation by alternative measures is difficult. In particular, the capacity of BECCS and DACCS to remove CO<sub>2</sub> from the atmosphere should not be seen as a tool to allow for business-as-usual and the perpetuation of GHG emissions across other sectors. Once net-zero has been attained, continued and increased use of BECCS (as well as other CDR methods) can also play a role to achieve net-negative GHG emissions (on a national, regional or global scale). CCS will play an important role, but its role should not be overstated.

This project aims to analyse regulatory aspects in relation to CCS (including BECCS and DACCS) development and deployment that are of relevance for the Nordic context. Project objectives specifically include to investigate:

- Similarities and differences between the Nordic countries concerning CCS regulation.
- Can barriers to CCS and/or BECCS deployment be identified which are caused by current regulatory frameworks?
- Are there plans to change regulatory frameworks in order to promote the development of CCS and/or BECCS?
- Whether there is a need to develop models for how CCS co-operation between the Nordic countries, especially when it comes to co-operation at project level.
- The issue of division of responsibilities between actors in CCS projects. Is it clear who in the legal sense is responsible for what at different stages of a cross-border CCS project?
- The need to coordinate monitoring, reporting and verification of BECCS mitigation outcomes on a Nordic level.
- The need to develop Nordic co-operation on CCS at the institutional level, as well as how increased interaction between the Nordic countries in the CCS area could be promoted.

The gathering of information for this report has been done through interviews with actors within ministries and government agencies in all Nordic countries. Information has also been collected by studying reports, scientific literature, and relevant legal documents such as acts and regulations. The analysis of the different countries' legal documents has mainly been done through an analysis of the wording as it has been carried out by researchers without in-depth understanding of each country's respective legal system or language. The differences in depth of the information regarding the Nordic countries CCS regulation relates, at least in part, to the fact that some countries have come further than others towards implementation of CCS activity and therefore have more information to provide. In

addition, authors of the report attended a Nordic workshop where representatives of Nordic ministries and government agencies presented national perspectives on CCS and discussed potential needs and benefits of Nordic cooperation related to CCS. Findings from the workshop have been useful as input for this report. Representatives of the NME reference group and Nordic ministries and government agencies have been given the opportunity to comment on an early draft of the report as well as a final draft.

The project has been carried out IVL Swedish Environmental Research Institute (coordinating partner) and Perspectives Climate Group (project partner). Contributors from IVL: Sofi Marklew and Kenneth Möllersten (project leader). Contributors from Perspectives: Hanna-Mari Ahonen. The authors are grateful for valuable comments and guidance from the NME project reference group, Svante Söderholm and Nicki Carnbrand Håkansson (Swedish Energy Agency), Eve Tamme (Climate Principles), Adrian Lefvert and Malin Pehrs (KTH Royal Institute of Technology) as well as several colleagues at IVL and Perspectives Climate Group.

## 2. International and EU Law

CCS regulation has a strong international character, which is partly due to CCS activity often being transboundary. Furthermore, on the European Union (EU) level, CCS activity is partly regulated through directives such as Directive 2009/31/EC on the geological storage of CO<sub>2</sub><sup>[10]</sup> (CCS Directive) and Directive 2003/87/EC (ETS Directive)<sup>[11]</sup>. In the following subchapters (2.1-2.6), international and subsequently European legislation related to CCS is presented.

### 2.1 The London Convention and Protocol

The London Convention<sup>[12]</sup> (“the Convention”) and the London Protocol<sup>[13]</sup> (“the Protocol”) are both international agreements regarding the prevention of marine pollution by dumping of wastes and other matter. The objective of the agreements is to promote the effective control of all sources of marine pollution. The London Protocol is a protocol to the London Convention. Regarding states party to the Protocol which are also party to the Convention the Protocol supersedes the Convention.<sup>[14]</sup>

The Convention entered into force on the 30<sup>th</sup> of August 1975. The Convention consists of a “black-list” and a “grey-list” regarding dumping of waste, where the waste listed in the former is prohibited and the latter requires a special permit.<sup>[15]</sup> All other materials that are not on the two lists can be dumped after a general permit is issued.<sup>[16]</sup> All Nordic countries are parties to the Convention.<sup>[17]</sup>

The London Protocol was brought forward to modernise and eventually replace the Convention. All Nordic countries are parties to the Protocol. The Protocol has a different approach compared to the Convention as it prohibits all dumping apart from that which is explicitly permitted in Annex I to the Protocol.<sup>[18]</sup> The Protocol is, therefore, more restrictive than the Convention.

Two resolutions to amend the Protocol have been put forward. One regards the

- 
10. Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of CO<sub>2</sub> and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (OJ L 140, 5.6.2009, p. 114–135).
  11. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32–46)
  12. 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 29 December 1972, entered into force 30 August 1975) 1046 UNTS 120 (LC).
  13. 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (adopted 7 November 1996, entered into force 24 March 2006) 36 ILM 7 (LP).
  14. Article 23 LP.
  15. Article 4 LC.
  16. Article 4 LC.
  17. For an overview of the parties to the Convention see the United Nations Treaty Series, available at: <https://treaties.un.org/pages/showDetails.aspx?objid=08000002800fdd18> (last visited 2022-08-26).
  18. Article 4 and Annex I LP.

inclusion of CO<sub>2</sub> sequestration in sub-seabed geological formations in the Annex I to the Protocol and was adopted in 2006.<sup>[19]</sup> The amendment further clarifies that CO<sub>2</sub> streams may only be considered for dumping under three conditions. Firstly, disposal must be made into a sub-seabed geological formation. Secondly, they must consist overwhelmingly of CO<sub>2</sub> but may however contain incidental associated substances derived from the source material and the CCS processes used. Thirdly, no wastes or other matter are to be added for the purpose of disposing of those wastes or other matter.<sup>[20]</sup> Amendments to the Annexes of the Protocol enter into force for parties to the Protocol either immediately if the party notifies its acceptance to the International Maritime Organization (IMO) or 100 days after the adoption of the amendment.<sup>[21]</sup> CO<sub>2</sub> streams from CCS processes for sequestration are therefore, after the amendment, included in Annex I and can be considered for dumping under the circumstances set out above.

The second resolution to amend the Protocol regarded export of CO<sub>2</sub> for storage in sub-seabed geological formations. The export of wastes for the purpose of dumping or incineration at sea is prohibited in article 6 of the Protocol.<sup>[22]</sup> This includes the export of CO<sub>2</sub> streams as defined in Annex I. To allow the export of CO<sub>2</sub> streams from one State for sequestration in another State an amendment to article 6 was proposed in 2009. Amendments to the Protocol enter into force for the parties accepting the amendment when two thirds of the parties to the Protocol have deposited an instrument of acceptance to the IMO.<sup>[23]</sup> As this has not yet happened, the amendment to article 6 is not in force and the export of CO<sub>2</sub> streams for dumping as stated above is prohibited. As of April 2023, of the required 35 only 10 states have formally ratified the amendment to article 6 – out of the Nordic countries Norway, Finland, Sweden and Denmark.<sup>[24]</sup> Iceland is prioritising onshore CO<sub>2</sub> storage (see section 3.3) and therefore has no immediate need for the amendment to enter into force, which may, at least partly, explain why there is as of yet no Icelandic ratification.

As a provisional solution to the export prohibition, parties to the Protocol can enter into bilateral agreements. This is possible due to article 25 of the Vienna Convention on the Law of Treaties (VCLT) which allows for the provisional application on a treaty or a part of a treaty pending its entry into force. Such a provisional solution is allowed if the treaty provides for such an application or the negotiating States<sup>[25]</sup> have in some manner so agreed. As the London Protocol does not in itself allow for

---

19. Resolution LP.1(1) on the Amendment to Include CO<sub>2</sub> Sequestration in Sub-Seabed Geological Formations in Annex 1 to the London Protocol 2006.

20. See Annex I para 4 LP.

21. Article 22(4) LP.

22. Article 6 LP.

23. Article 21(3) LP.

24. IMO, Status of IMO Treaties, 6 January 2023, p. 571. Available at: <https://wwwcdn.imo.org/localresources/en/About/Conventions/StatusOfConventions/Status%20of%20IMO%20Treaties.pdf> (last viewed 2023-04-16).

25. "Negotiating State" means a State which took part in the drawing up and adoption of the text of the treaty, see article 2(1)(e) VCLT.

provisional application pending entry into force, the parties to the London Protocol agreed through a resolution in 2019 that the amendment of article 6 of the London Protocol can be applied provisionally.<sup>[26]</sup> Parties willing to apply the amended article 6 provisionally must deposit a declaration of provisional application and provide notification of any agreements or arrangements with the IMO.<sup>[27]</sup> Out of the Nordic countries, Norway, Denmark, and Sweden have accepted the provisional application of the amendment of article 6 as of January 2023.<sup>[28]</sup> The parties shall also come to a bilateral agreement on the export of CO<sub>2</sub> for geological storage. An overview of London Protocol requirements in the context of the Legal Framework in the EEA has been presented in a paper published by the European Commission.<sup>[29]</sup> The paper concludes that the CCS Directive and the ETS Directive can act as a relevant "arrangement" between the Parties in the meaning of Art. 6(2) of the London Protocol. Similarly, the EEA treaty and the incorporation of the two directives concerned in the EEA legal regime provides the necessary arrangement with EEA partners. Furthermore, the paper concludes that Member States that are party to the Protocol could conclude additional bilateral arrangements with other EU Member States and EEA partner countries only on issues that are not covered by the directives. These additional bilateral arrangements should be strictly limited to the residual issues not covered by EU law and they should not refer to the subject matters covered by EU rules.

The Netherlands and Norway signed a [Memorandum of Understanding](#) (MoU) in November 2021 agreeing to finalise a bilateral agreement. In September 2022, [Denmark, and Flanders, Belgium](#) signed a bilateral arrangement<sup>[30]</sup> which makes it possible to transport CO<sub>2</sub> between the two countries for the purpose of permanent geological storage.<sup>[31]</sup>

Langlet (2015) has argued that the London Protocol is an international agreement where "the rights and obligations of the treaty cannot be reduced to reciprocal rights and obligations between any two Parties".<sup>[32]</sup> Langlet argues that, from a purely legal standpoint, the provisional solution of article 6 in today's form may not be entirely suitable since dumping in one area of the sea within one state's territory could have effects on the sea in other states territories, due to the movement of water and the sea's

- 
26. This took place at the 41st Consultative Meeting of Contracting Parties to the London Convention and the 14th Meeting of Contracting Parties to the London Protocol (LC 41/LP 14) 7-11 October 2019, see [41st Consultative Meeting of Contracting Parties to the London Convention and the 14th Meeting of Contracting Parties to the London Protocol \(LC 41/LP 14\) 7-11 October 2019 \(imo.org\)](#).
  27. Resolution LP.5(14) on the Provisional Application of the 2009 Amendment to Article 6 of the London Protocol (adopted on 11 October 2019) para 1 & 3.
  28. IMO, Status of IMO Treaties, Comprehensive information on the status of multilateral Conventions and instruments in respect of which the International Maritime Organization or its Secretary-General performs depositary or other functions, 6 January 2023, p. 572. Available at: <https://wwwcdn.imo.org/localresources/en/About/Conventions/StatusOfConventions/Status%20of%20IMO%20Treaties.pdf> (last viewed 2023-04-16).
  29. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en)
  30. <https://en.kefm.dk/Media/638000596525014193/Bilateral%20arrangement%20DK-BE.pdf>.
  31. <https://en.kefm.dk/news/news-archive/2022/sep/denmark-flanders-and-belgium-sign-groundbreaking-arrangement-on-cross-border-transportation-of-co2-for-geological-storage->
  32. Langlet, D. (2015). "Exporting CO<sub>2</sub> for Sub-Seabed Storage: the Non-Effective Amendment to the London Dumping Protocol and its Implications", *International Journal of Marine and Coastal Law*, 30(3), 395-417.

inhabitants.<sup>[33]</sup> This argument can however be seen as less prominent when applied to CO<sub>2</sub> storage in sub-seabed geological formations, as the movement of waste is significantly less likely compared to dumping straight into the sea. However, leakage of CO<sub>2</sub> can in principle occur which would mean a risk of elevated CO<sub>2</sub> levels in the water column. For a further analysis see Weber (2021).<sup>[34]</sup>

## 2.2 OSPAR

Another international agreement relevant to sub-seabed geological storage of CO<sub>2</sub> is the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic<sup>[35]</sup> (OSPAR Convention) which applies to the northeast Atlantic.<sup>[36]</sup> The Convention has been ratified by, amongst others, Denmark, Finland, Iceland, Norway, Sweden, and the EU.<sup>[37]</sup> The Parties' general obligation under the Convention is to prevent and eliminate pollution and to take the necessary measures to protect the maritime area against the adverse effects of human activities.<sup>[38]</sup> All dumping of waste or other matters is prohibited with certain exceptions as set out in Annex II.<sup>[39]</sup>

In 2007, an amendment was made to Annex II of the OSPAR Convention in order to exempt CO<sub>2</sub> streams from CCS processes for storage from the dumping prohibition under some circumstances.<sup>[40]</sup> The amendment of Annex II largely reflects the amendment of Annex I of the London Protocol mentioned above, apart from the use of the term 'sub-soil' instead of 'sub-seabed' and the additional condition that the CO<sub>2</sub> streams are intended to be retained in these formations permanently and will not lead to significant adverse consequences for the marine environment, human health and other legitimate uses of the maritime area.<sup>[41]</sup> The OSPAR Convention therefore, does not constitute an obstacle to the sub-seabed storage of CO<sub>2</sub>.

---

33. Langlet, D. (2015). "Exporting CO<sub>2</sub> for Sub-Seabed Storage: the Non-Effective Amendment to the London Dumping Protocol and its Implications", *International Journal of Marine and Coastal Law*, 30(3), p. 414.

34. Weber, V. (2021). "Are we ready for the ship transport of CO<sub>2</sub> for CCS? Crude solutions from international and European law", *Review of European, Comparative & International Environmental Law*, 30(3), 387-395.

35. 1992 Convention for the protection of the marine environment of the North-East Atlantic (adopted 22 September 1992, entered into force 25 March 1998) 2354 UNTS 67 (OSPAR Convention).

36. For a closer description of the area covered see article 1(a) OSPAR Convention and

37. OSPAR. Contracting Parties. Available at: <https://www.ospar.org/organisation/contracting-parties> (last visited 2022-09-09).

38. Article 2 OSPAR Convention.

39. Article 4 OSPAR Convention.

40. <https://www.ospar.org/work-areas/oic/carbon-capture-and-storage>

41. Article 3(2)(f)(i)-(iv) Annex II OSPAR Convention.



## 2.3 Convention on Biological Diversity

The 1992 Convention on Biodiversity<sup>[42]</sup> (CBD) is also relevant to CCS activity. The objective of the CBD is in part the conservation of biological diversity and the sustainable use of its components.<sup>[43]</sup> The CBD is ratified by all Nordic countries.<sup>[44]</sup>

In 2010 a decision was adopted by the Parties to the CBD regarding a moratorium on climate-related geo-engineering.<sup>[45]</sup> In short, the decision sets out that in the absence of science-based, global, transparent and effective control and regulatory mechanisms for geo-engineering, and in accordance with the precautionary approach, no climate-related geo-engineering activities that may affect biodiversity shall take place until there is an adequate scientific basis on which to justify such activities.<sup>[46],[47]</sup> CCS applied to emissions from fossil fuels is explicitly stated to not be included within "geo-engineering".<sup>[48]</sup> As the decision only includes a provisional definition of "geo-engineering", the implications of the Decision on BECCS is unclear.

Upon a request from the Swedish Energy Agency's National Centre for CCS, the Swedish Environmental Protection Agency (SEPA) has analysed the wording of the moratorium to assess its legal meaning.<sup>[49]</sup> The SEPA notes that the moratorium is a Conference of the Parties (COP) decision which means it is made by the highest decision-making body under the Convention and that the Convention is legally binding. Furthermore, it is noted that the paragraph in question uses the wording that Parties "ensure [...] that no climate-related geo-engineering activities that may affect biodiversity take place", which is more stringently expressed than other parts of the decision. That being said, the SEPA also notes that the CBD is a Convention largely based on voluntary compliance which, according to the SEPA, gives the Parties a legal space and an obligation to regulate the conditions for BECCS in more detail. The SEPA concludes that BECCS in Sweden must be in line with the intentions of the CBD and that the negative environmental effects must be studied further. It cannot be concluded therefore that BECCS is compatible with the CBD as a general rule, but there is an opening for BECCS to be allowed provided that it can be shown its implementation does not impact biodiversity

---

42. 1992 Convention on Biological Diversity (adopted 5 June 1992, entered into force 29 December 1993) 1760 UNTS 79 (CBD).

43. Article 1 CBD.

44. Convention on Biological Diversity. List of Parties. Available at: <https://www.cbd.int/information/parties.shtml> (last viewed 2022-09-09).

45. Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its Tenth Meeting, x/33. Biodiversity and Climate Change. 29 October 2010 (Decision X/33), available: <https://www.cbd.int/doc/decisions/cop-10/cop-10-dec-33-en.pdf> (last visited 2022-08-26).

46. Para 8(w) Decision X/33.

47. Taking into consideration the associated risks to the environment and biodiversity and associated social, economic and cultural consequences.

48. See footnote 3 of Decision X/33.

49. Swedish the Swedish Environmental Protection Agency, yttrande, Bedömning av eventuella rättsliga hinder för att bedriva verksamhet med bio-CCS, utifrån förutsättningarna i konventionen om biologisk mångfald (CBD), 2021-11-22.

negatively.<sup>[50]</sup> The Swedish Energy Agency has analysed whether the moratorium includes BECCS, taking the outcome of the SEPA analysis into consideration. The analysis concluded that the moratorium is applicable to BECCS if deployment is extensive and is considered to have an impact on biological diversity. The analysis proposes that a Swedish support scheme for BECCS should require that eligible BECCS operators must be able to present a sustainability statement for the biomass used, where applicable.<sup>[51]</sup> The final official Swedish interpretation needs to be based on a government decision.

The Danish Ministry of Environment also analysed the same issue and concluded that that the rules must be interpreted so that a moratorium in the Biodiversity Convention for geo-engineering does not include CCS activities, regardless of whether it is CCS or BECCS. In that context, they looked particularly at a definition used in the context of the London Protocol:<sup>[52]</sup>

*" 'Marine geoengineering' means a deliberate intervention in the marine environment to manipulate natural processes, including to counteract anthropogenic climate change and/or its impacts, and that has the potential to result in deleterious effects, especially where those effects may be widespread, long lasting or severe."*

Furthermore, Fridahl et al. (2020) have concluded that the CBD will likely not be a strong barrier prohibiting BECCS due to the soft-law nature of the Convention and the moratorium.<sup>[53]</sup>

---

50. The Swedish Environmental Protection Agency, yttrande, Bedömning av eventuella rättsliga hinder för att bedriva verksamhet med bio-CCS, utifrån förutsättningarna i konventionen om biologisk mångfald (CBD), 2021-11-22.

51. Swedish Energy Agency (2023), "Särskild redovisning av Energimyndighetens arbete med utformning av stödssystem för bio-CCS 2022", ER 2023:11.

52. Resolution LP.4(8) on the Amendments to the London Protocol to regulate the placement of matter for ocean fertilization and other marine geoengineering activities.

53. Fridahl, M., et al. (2020). "Mapping Multi-Level Policy Incentives for Bioenergy with Carbon Capture and Storage in Sweden", *Frontiers in climate*, 2, 1-25.

## 2.4 Helsinki Convention

The 1992 Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) is an updated version of a convention of the same name from 1974. The Helsinki Convention entered into force in 2000 and is ratified by, amongst others, all Nordic States in the Baltic region, namely Sweden, Finland, and Denmark as well as the EU.<sup>[54]</sup> The Convention applies in the Baltic Sea area.<sup>[55]</sup> The convention sets out to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance.<sup>[56]</sup>

The dumping of waste in the sea or into the seabed is prohibited in the Helsinki Convention. Dumping is defined as "any deliberate disposal at sea or into the seabed of wastes or other matter from ships, other man-made structures at sea or aircraft [or] any deliberate disposal at sea of ships, other man-made structures at sea or aircraft".<sup>[57]</sup> None of the exemptions from the dumping prohibition relate to the sub-seabed storage of CO<sub>2</sub>. No amendment to the Convention has been made that corresponds to those made in the London Protocol and OSPAR Convention exempting CO<sub>2</sub> from dumping prohibitions. This means that CO<sub>2</sub> storage in the Baltic Sea is still prohibited under the Helsinki Convention.

When the EU is party to an international treaty, the treaty becomes higher in the norm hierarchy than secondary EU Law such as directives. The EU Member States have a responsibility under EU primary law in accordance with the principle of sincere cooperation<sup>[58]</sup> to, *inter alia*, facilitate the achievement of the Union's task. In doctrine, the conclusion has been drawn that the aforementioned is an indication that the EU Member States party to the Helsinki Convention shall work toward the exemption of CO<sub>2</sub> from the dumping prohibition in the Convention.<sup>[59]</sup> It should however be mentioned that the CCS Directive does not obligate EU Member States to allow storage of CO<sub>2</sub> within their territory. Therefore, it could be argued that it is not the Union's task to facilitate storage to all ends.

---

54. HELCOM. Contracting Parties. Available at: <https://helcom.fi/about-us/contracting-parties/> (last visited 2022-09-09).

55. See article 1 of the Helsinki Convention: "This Convention shall apply to the Baltic Sea Area. For the purposes of this Convention the "Baltic Sea Area" shall be the Baltic Sea and the entrance to the Baltic Sea bounded by the parallel of the Skaw in the Skagerrak at 57° 44.43'N. It includes the internal waters, i.e., for the purpose of this Convention waters on the landward side of the base lines from which the breadth of the territorial sea is measured up to the landward limit according to the designation by the Contracting Parties".

56. See Article 3 of the Helsinki Convention.

57. Article 2(4)(a) Helsinki Convention.

58. See article 4(3) TEU.

59. SOU 2020:4 s. 455 f.

## 2.5 The CCS Directive

The CCS Directive is an EU directive establishing a legal framework for the environmentally safe geological storage of CO<sub>2</sub><sup>[60]</sup> to contribute to the fight against climate change.<sup>[61]</sup> The Directive should not apply to projects with a total intended storage below 100 kilotonnes, undertaken for research, development or testing of new products and processes.<sup>[62]</sup> According to the Directive, the purpose of environmentally safe geological storage of CO<sub>2</sub> is permanent containment of CO<sub>2</sub> in such a way as to prevent and, where this is not possible, eliminate as far as possible negative effects and any risk to the environment and human health.<sup>[63]</sup> It also contains provisions on the capture and transport components of CCS, though these activities are covered mainly by existing EU environmental legislation, such as the Environmental Impact Assessment (EIA) Directive<sup>[64]</sup> or the Industrial Emissions Directive<sup>[65]</sup>, in conjunction with amendments introduced by the CCS Directive. The CCS Directive is not directly applicable in the EU Member States and has to be implemented in the national legislation as it is a directive. Directives are binding on the Member States, as to the result to be achieved, but national authorities are left with the choice of form and methods.<sup>[66]</sup> The CCS Directive was to be implemented before June 2011.<sup>[67]</sup>

The Directive is divided into eight chapters as follows: chapter one (article 1–3) sets out the subject matter, scope and definitions of the Directive; chapter two (articles 4–5) regards selection of storage sites and exploration permits; chapter three (articles 6–11) regards storage permits; chapter four (articles 12–20) regards operation, closure and post-closure obligations; chapter five (articles 21–22) regards third-party access; chapter 6 (articles 23–30) sets out general provisions; chapter seven (articles 31–37) consists of amendments to other directives; and chapter eight (articles 38–41) sets out final provisions.

The Directive builds largely on the Member States establishing or designating a so-called competent authority or authorities to be responsible for fulfilling the duties established under the Directive.<sup>[68]</sup> Article 4 regards the selection of storage sites.<sup>[69]</sup> Member States retain the right to determine in which areas within their territory storage sites may be selected, including the right not to allow any storage

---

60. According to the definition in article 3(1)(1) of the CCS Directive the geological storage of CO<sub>2</sub> "means injection accompanied by storage of CO<sub>2</sub> streams in underground geological formations".

61. Article 1(1) CCS Directive.

62. Recital 18 CCS Directive.

63. Article 1(2) CCS Directive.

64. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052>.

65. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32010L0075>.

66. Article 288 Treaty of the Functioning of the European Union (TFEU).

67. Article 39 CCS Directive.

68. Article 39 CCS Directive.

69. According to the definition in article 3(3) of the CCS Directive a storage site "means a defined volume area within a geological formation used for the geological storage of CO<sub>2</sub> and associated surface and injection facilities".

sites within their territory.<sup>[70]</sup> If a Member States allows such storage, it shall undertake an assessment of the storage capacity available in parts or in the whole of the territory, including by allowing exploration through exploration permits.<sup>[71]</sup> The suitability of a potential storage site is to be assessed through a characterisation and assessment of the area as provided for in Annex I to the Directive.<sup>[72]</sup> A storage site shall have no significant risk of leakage, and no significant environmental or health risks shall exist.<sup>[73]</sup> In the Directive, significant risk is defined as "a combination of a probability of occurrence of damage and a magnitude of damage that cannot be disregarded without calling into question the purpose of this Directive for the storage site concerned".<sup>[74]</sup> If exploration is determined to be required by Member States to gain necessary information for the selection of storage sites, they must make sure that no exploration takes places without an exploration permit.<sup>[75]</sup>

All storage sites shall be operated with a storage permit, with only one operator being allowed to use each storage site.<sup>[76]</sup> Which information that shall be included at a minimum in an application for such a permit is laid out in the Directive, including plans for monitoring, corrective measures, post-closure and proof of financial security.<sup>[77]</sup> The minimal requirement of information to be contained in a storage permit is also set out in the Directive.<sup>[78]</sup> Under the CCS Directive, only storage facilities in the EEA can obtain a permit.

The acceptance criteria for CO<sub>2</sub> streams are set out in the Directive.<sup>[79]</sup> CO<sub>2</sub> streams are defined in the CCS Directive as "a flow of substances that results from CO<sub>2</sub> capture processes".<sup>[80]</sup> The stream is to consist overwhelmingly of CO<sub>2</sub>, which reflects the wording in the London Protocol.<sup>[81]</sup> This entails that no waste or other matter can be added for the purpose of disposal.<sup>[82]</sup> Incidental associated substances from the source, capture or injection process as well as trace substances added to monitor migration after injection are however permitted. These shall be below concentration levels that would adversely affect the integrity of the storage site or the relevant transport infrastructure; pose a significant risk to the environment or human health; or breach the requirements of applicable EU legislation.<sup>[83]</sup>

For all incineration plants with installed electrical power at least 300 megawatts

---

70. Article 4(1) CCS Directive.

71. Article 4(2) CCS Directive. According to the definition in article 3(9) of the CCS Directive an 'exploration permit' means a written and reasoned decision authorising exploration and specifying the conditions under which it may take place, issued by the competent authority pursuant to the requirements of this Directive".

72. Article 4(3) CCS Directive.

73. Article 4(4) CCS Directive.

74. Article 3(18) CCS Directive.

75. Article 5(1) CCS Directive.

76. Article 6(1) CCS Directive.

77. Article 7 CCS Directive.

78. Article 9 CCS Directive.

79. Article 12 CCS Directive.

80. Article 3(1)(13) CCS Directive.

81. Article 12(1) CCS Directive.

82. Article 12(1) CCS Directive.

83. Article 12(1) CCS Directive.

(MW), where the competent authority determines that it is technically and economically feasible to carry out the capture and compression of CO<sub>2</sub>, conditions shall be stipulated in the permit to ensure that sufficient space is allocated at the plant for the necessary retrofitting of equipment for this.<sup>[84]</sup> In other words these plants are to be built CO<sub>2</sub> "capture ready".

Member States are to ensure that the operator monitors both injection facilities, the storage complex and, where appropriate the surrounding environment.<sup>[85]</sup> The purpose of the monitoring includes detecting leakage, migration, significant irregularities, and adverse effects on the surrounding environment. The monitoring shall be grounded on the monitoring plan, mentioned above, and be updated every five years.<sup>[86]</sup> The Directive also sets out that the Member State shall determine reporting requirements for the operator.<sup>[87]</sup> Also, Member States shall ensure that the competent authorities follow out inspections.<sup>[88]</sup> In the case of a leakage or a significant irregularity, the Member State is to ensure that the operator immediately notifies the competent authority and take corrective matters. If there is a risk of leakage, the competent authority under the ETS Directive is to be notified.

When a storage site has been closed due to relevant conditions stated in the permit being met or to the request of the operator and after authorisation of the competent authority a transfer of responsibility is to take place from the operator to the competent authority under certain conditions.<sup>[89]</sup> These conditions include that all available evidence indicates that the stored CO<sub>2</sub> will be contained, completely and permanently, that the operator lives up to certain financial obligations towards the authority and that the site has been sealed and the injection facilities have been removed.<sup>[90]</sup> The Commission has adopted a Guidance Document on *Criteria for Transfer of Responsibility to the Competent Authority*, which aims to assist implementation of the CCS Directive.<sup>[91]</sup>

The Directive regulates third party access to transportation networks and storage sites. Member States are to take the necessary measures to ensure that potential users can obtain access to transport networks and to storage sites for the purpose of geological storage of the produced and captured CO<sub>2</sub>. A transport network is the network of pipelines, including associated booster stations, for the transport of CO<sub>2</sub> to the storage

---

84. Article 33 CCS Directive & article 36 Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (OJ L 334 17.12.2010, p. 17) replacing article 9(1) Directive 2001/80/EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants (OJ L 309, 27.11.2001, p. 1-21).

85. Article 13 CCS Directive.

86. Article 13(2) CCS Directive.

87. Article 14 CCS Directive.

88. Article 15 CCS Directive.

89. Article 17(1)(a)-(b) & article 18(1).

90. Article 18(1).

91. EU Commission, Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide, Guidance Document 3, Criteria for Transfer of Responsibility to the Competent Authority, 2011. Available: [https://ec.europa.eu/clima/system/files/2016-11/gd3\\_en.pdf](https://ec.europa.eu/clima/system/files/2016-11/gd3_en.pdf) (last viewed 2022-08-31).



site.<sup>[92]</sup> In the future several EU Member States may cooperate in developing cross-border transport and storage infrastructure according to the CCS Directive's Article 24 (for example through joint ownership). It was expressed in stakeholder interviews that it would be beneficial if there were guidance regarding how the countries' respective goal fulfilment should be weighed against each other in relation to provisions on third party access.

In the case of transboundary transport of CO<sub>2</sub>, transboundary storage sites or transboundary storage complexes, the competent authorities of the Member States are to jointly meet the requirements of this Directive and of other relevant EU legislation.<sup>[93]</sup>

It is important to note that the CCS Directive does not set out regulation for the intermediate storage of captured CO<sub>2</sub>. How these storage sites are to be regulated is up to the Member States but shall, of course, live up to the requirements set out in other EU, national or international law applicable to the Member State. Another aspect that is not regulated in the Directive are permits for CO<sub>2</sub> capturing facilities, apart from the requirements to assess if such facilities can be added to new combustion plants when issuing permits as mentioned above.

Norway and Iceland are European Free Trade Association (EFTA) States and are parties to the European Economic Area Agreement<sup>[94]</sup> (EEA Agreement). They are not members of the EU. The EEA unites EEA EFTA States with the EU Member States by extending the EU internal market.<sup>[95]</sup> EU Acts can become binding on the EEA EFTA States if they are incorporated into the EEA Agreement.<sup>[96]</sup> The CCS Directive was implemented in the EEA in 2012.<sup>[97]</sup> This means that the CCS Directive is to be implemented in Norway and Iceland even though they are not EU Member States.<sup>[98]</sup> The implementation of the CCS directive in the Nordic countries is described in section 3.

---

92. Article 3(1)(22) Directive 2009/31/EC.

93. Article 24 CCS Directive.

94. <https://www.efta.int/eea/eea-agreement>

95. EFTA. European Economic Area (EEA) / Relations with the EU. <https://www.efta.int/eea> (last visited 2022-08-16).

96. This is done through an annex to the agreement or through the EEA Joint Committees Decisions, see article 7 EEA Agreement.

97. <https://www.efta.int/eeahttps://www.efta.int/media/documents/legal-texts/eea/other-legal-documents/adopted-joint-committee-decisions/2012%20-%20English/115-2012.pdf>

98. Article 7(b) EEA Agreement.

## 2.6 The ETS Directive

The Emissions Trading System Directive (ETS Directive)<sup>[99]</sup> establishes the EU Emissions Trading System (EU ETS).<sup>[100]</sup> The ETS Directive also falls under the EEA Agreement. There are connections between the EU ETS and CCS and their respective directives. In short, the EU ETS creates a system where certain operators must own emission allowances for GHG they produce and emit. Annex I of the ETS Directive sets out which activities that are included in EU ETS and includes both activities such as power generation but also the capturing and transportation by pipeline of CO<sub>2</sub> from installations covered by the Directive and the geological storage of CO<sub>2</sub> in a storage site.<sup>[101]</sup> Article 12(3a) of the ETS Directive sets out that an obligation to surrender allowances shall not arise in respect of emissions verified as captured and transported for permanent storage to a facility for which a permit is in force in accordance with the CCS Directive. Since under the CCS Directive, only storage facilities in the EEA can obtain a permit, storage outside the EEA cannot comply with the requirements of Article 12(3a).

The EU ETS may provide economic feasibility for CCS applied to emissions from fossil fuels in the EU provided that the price of emission allowances (called EU Allowance Units, EAUs) is sufficiently high relative to the cost of CCS.<sup>[102]</sup> The EU ETS is based on allowances rather than credits and thus does not provide incentives for BECCS regardless of the EAU price. Allowing the use of BECCS credits for the purpose of compliance in the EU ETS would require significant revisions not only to the EU ETS, but also to the effort sharing regulation (ESR) and the land use, land use changes, and forestry (LULUCF) Directive.<sup>[103]</sup>

Through an Implementing Regulation<sup>[104]</sup> (Monitoring Regulation), the Commission has set out rules for the monitoring and reporting of GHG emissions and activity data pursuant to the ETS Directive.<sup>[105]</sup> According to article 49 of the Monitoring Regulation, CO<sub>2</sub> originating from fossil CO<sub>2</sub> in activities covered by the ETS Directive that is not emitted from the installation but instead transferred to a capture installation, a transport network or a storage site is to be subtracted from the emissions of the installation.<sup>[106]</sup> A "transportation network" is defined in the Monitoring Regulation as it is in the CCS Directive, namely as "the network of

---

99. Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003, p. 32–46)

100. Article 1 ETS Directive.

101. See Annex I of the ETS Directive.

102. Weber, V. (2021), p. 393 note 87.

103. Rickels, W., et al. (2021). "Integrating carbon dioxide removal into European emissions trading", *Frontiers in climate*, 3, 1-10.

104. Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012 (EUT L 334, 31.12.2018, s. 1–93) (Monitoring Regulation).

105. Article 1 Monitoring Regulation.

106. Article 49(1)(a) Monitoring Regulation.

pipelines, including associated booster stations, for the transport of CO<sub>2</sub> to the storage site". This clearly does not include transportation by shipping. The consequence is that CO<sub>2</sub> that is captured and transported through shipping is not eligible to be subtracted from the emissions of the installation. This is of particular significance in a Nordic context as according to current plans, a significant part of the transportation of captured CO<sub>2</sub> will be through shipping.

As part of the ongoing revision of the ETS Directive, however, the Commission has proposed to extend the provision for transport of CO<sub>2</sub> for geological storage "by pipelines" to all means of transport.<sup>[107]</sup> It is however not until CO<sub>2</sub> has been transferred from other means of transport to a transportation network that is fixed to a storage site that the capturing installation can subtract the CO<sub>2</sub>. Furthermore, a paper from the Commission published in 2022 states that "for concrete cases, the Commission, already today applies a broad interpretation so that the transfer of captured CO<sub>2</sub> to a ship or a truck does not prevent the right to subtract the CO<sub>2</sub> when it is later on transferred from the ship or the truck to a pipeline transport network or directly to a storage site. When that later transfer from the ship or truck to the network or storage site is completed, the capturing installation can subtract the CO<sub>2</sub> according to Article 49 (a) (ii) or (iii) of the Monitoring and Reporting Regulation 2018/2066".<sup>[108]</sup> It is also worth noting that the TEN-E regulation<sup>[109]</sup> (Annex II) acknowledges ship as one mode of CO<sub>2</sub> transport along with pipeline, barge, truck and train.

In a letter to the Commission, Norway has asked if the transfer of captured CO<sub>2</sub> to a ship or a truck prevents the right to subtract the CO<sub>2</sub> when it is later transferred from the ship or the truck to a pipeline transport network or directly to a storage site. The Commission answered that in view of article 49 of the Monitoring Regulation and the ETS Directive, an operator should be allowed to deduct any CO<sub>2</sub> *intended for* an offshore storage facility from its emissions, which is consistent with the position presented in the paper from the Commission published in 2022.<sup>[110]</sup> A second question that Norway posed to the Commission in the letter was if CO<sub>2</sub>, regardless of fossil or biogenic origin, can be subtracted from the emissions of the installation as long as it does not exceed the installation's total amount of produced fossil CO<sub>2</sub>. The Commission answered that that captured CO<sub>2</sub> from biological origin may *not* be subtracted from the emissions of the installation as there is no legal ground in the ETS Directive to support this. The Commission further states that article 49(1) of the Monitoring Regulation makes it clear that this is not possible ("*The operator shall subtract from the emissions of the*

---

107. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en)

108. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en)

109. Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013.

110. Letter from the European Commission, Directorate-General Climate Action, to the Ambassador of Norway to the European Union (Ref. Ares(2020)3943156 – 27/07/2020).

*installation any amount of CO<sub>2</sub> originating from fossil carbon [...]”). The Commission deems however, that other instruments could address the issue of and create incentives for BECCS in a more efficient way.<sup>[111]</sup>*

In conclusion, as of the wording of the ETS Directive and the Monitoring Regulation captured CO<sub>2</sub> of biogenic origin from one installation cannot be deducted from the CO<sub>2</sub> emissions from the same installation. However, contrary to the direct wording of the ETS Directive and the Monitoring Regulation, captured fossil CO<sub>2</sub> transported by other method than pipeline, such as by ship, intended to be stored in a sub-seabed geological formation, can be deducted from the installations emissions from where it came as soon as it is stored.

Questions have been raised concerning the distribution of risk and liability between parties, e.g., Weber (2020). As noted by Weber, when CO<sub>2</sub> is transported by pipeline, the CO<sub>2</sub> producers' risk goes, in accordance with the provisions of the ETS Directive and the Monitoring Regulation, to the storage operator as soon as the CO<sub>2</sub> is handed over. However, the current regulation does not provide the same clarity when other modes of transportation are involved. A paper from the Commission published in 2022 clarifies that in order to make the calculation consistent in the case of a “CCS value chain” (i.e. several installations together performing the capture, transport and geological storage of CO<sub>2</sub>), the receiving installation has to add that CO<sub>2</sub> to its emissions, before it may again subtract the amount transferred to the next installation or to the storage site.<sup>[112]</sup> In other words, the liability for emissions caused by the operation of CO<sub>2</sub> capture, transport or storage in the CO<sub>2</sub> value-chain is transferred from one ETS installation to the other, without regard to the EEA country they are located in. Any leakage from storage is thus accounted as an emission by the storage operator, and also reported by the country where the storage site is located, in its national GHG inventory.<sup>[113]</sup>

---

111. Letter from the European Commission, Directorate-General Climate Action, to the Ambassador of Norway to the European Union (Ref. Ares(2020)3943156 – 27/07/2020).

112. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en).

113. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en).

# 3. National legislation of CCS relevance

In the following chapter CCS-relevant legislation in the Nordic Countries will be described.

## 3.1 Denmark

### 3.1.1 National context

The first Danish Climate Law was adopted in 2014, with the aim of providing a stable direction and framework for the Danish climate policy. A new Climate Law with binding targets was adopted in 2020. It includes targets to reduce GHG emissions by 70 percent by 2030 and to reach climate neutrality by 2050.<sup>[114]</sup> According to a climate agreement for energy and industry of 2020, CCS constitutes an essential element in achieving the climate policy objectives enshrined in the Climate Act.<sup>[115]</sup> In 2021 a roadmap for capture, transport and storage of CO<sub>2</sub> was agreed by a majority of parties in the Danish Parliament. The roadmap includes several initiatives, including agreement to enable CO<sub>2</sub> storage in Danish subsoil and CO<sub>2</sub> import/export for the purpose of permanent geological storage.<sup>[116],[117]</sup> The roadmap also included the establishment of a Danish stakeholder forum for CCUS.<sup>[118]</sup> The political ambition in Denmark is to build an entire CCS value chain and that Denmark should become a European hub for on-/off-shore CO<sub>2</sub> storage.<sup>[119]</sup> In January 2022 Denmark acceded to the necessary articles in the London Protocol.

Agreements regarding subsidy schemes for CCUS were made in 2020, 2021, and 2022 with a total budget of 38. billion DKK (in 2023 prices) and a target of reductions and removals of 3.2 Mt CO<sub>2</sub> per year in 2030. The subsidies are structured under three separate funds.<sup>[120]</sup> Eligible technologies include CCS applied to fossil and biogenic CO<sub>2</sub> as well as DACCS, depending on the specific fund. Subsidy periods span over 2024–2044 and contract periods are between 8 to 20 years. First tranche bids have been invited in an initial tender.<sup>[121]</sup> Further tenders are expected to be rolled-out from 2023.

---

114. <https://climate-laws.org/>

115. [https://en.kefm.dk/Media/C/B/faktaark-klimaafteale%20\(English%20august%2014\).pdf](https://en.kefm.dk/Media/C/B/faktaark-klimaafteale%20(English%20august%2014).pdf)

116. <https://kefm.dk/Media/637914812834794479/Aftale%20om%20rammevilk%C3%A5r%20for%20CO2-lagring.pdf>

117. [https://en.kefm.dk/Media/637849284671255278/Endelig%20aftaletekst\\_CCS.pdf](https://en.kefm.dk/Media/637849284671255278/Endelig%20aftaletekst_CCS.pdf)

118. <https://kefm.dk/klima-og-vejir/interessentforum-for-ccus>

119. [https://en.kefm.dk/Media/637849284671255278/Endelig%20aftaletekst\\_CCS.pdf](https://en.kefm.dk/Media/637849284671255278/Endelig%20aftaletekst_CCS.pdf)

120. <https://kefm.dk/Media/637995168833263248/Status%20on%20CCS%20in%20Denmark.pdf>

121. Information about the tender published in the context of a market dialogue can be found at: [https://ens.dk/sites/ens.dk/files/CCS/note\\_regarding\\_second\\_round\\_of\\_market\\_dialogue\\_-\\_07.03.2022.pdf](https://ens.dk/sites/ens.dk/files/CCS/note_regarding_second_round_of_market_dialogue_-_07.03.2022.pdf)

On CO<sub>2</sub> storage, potential storage sites and volumes preliminarily been identified by the Geological Survey of Denmark and Greenland. Denmark has a limited number of emitters and ample space for storage. However, many of the potential storage sites are not thoroughly examined and mature for injection. Ongoing projects in the North Sea include the Greensand project, which has been granted a CO<sub>2</sub> storage pilot project permit and the Bifrost project.<sup>[122]</sup> In August 2022, Denmark has opened its first tender for CO<sub>2</sub> investigation and storage licenses for offshore storage.<sup>[123]</sup> The application window closed October 2022 and two applications were received.<sup>[124]</sup> The first full-scale investigation licences were issued in February 2023 and injection is projected to start in 2025.

The Geological survey of Denmark and Greenland has initiated preliminary seismic studies of further potential storage structures onshore and near the coast. Moreover, a process for strategic Environmental Impact Assessment for onshore storage has been initiated to be followed by a first tender for investigation and storage licenses for onshore storage.

Denmark has transposed the CCS Directive in several national legislative instruments, including the Danish Storage Regulation<sup>[125]</sup> and the Danish Maritime Protection Act<sup>[126]</sup>.

### 3.1.2 Permits for capturing CO<sub>2</sub>

When transposing the CCS Directive amendments were made to Denmark's Environmental legislation. The Environmental Protection Act<sup>[127]</sup> regulates when environmental permits are needed. Activities that require permits are specified in separate lists.<sup>[128]</sup> The capturing of CO<sub>2</sub> for the purpose of geological storage was included among activities that require an environmental permit in 2011.<sup>[129]</sup> The requirement applies to heat and power plants as well as all major industrial sectors associated with process-related CO<sub>2</sub> emissions.

A challenge that has had to be addressed is that much of point CO<sub>2</sub> sources are in waste to energy or other thermal power plants. These are all regulated within utility laws for power or heat and it is strictly regulated what they are allowed to do. Carbon capture is not seen as a core business in this respect. It has been necessary to change legislation to make it possible for them to engage financially in and carry out CO<sub>2</sub> capture. An overview of permits etc for CO<sub>2</sub> capture is being carried out in collaboration between the Energy Agency, the Environmental Protection Agency, Working Environment Authority, Safety Technology Authority and municipalities.

---

122. <https://kefm.dk/Media/637995168833263248/Status%20on%20CCS%20in%20Denmark.pdf>

123. <https://ens.dk/ansvarsomraader/ccs-fangst-og-lagring-af-co2>

124. <https://ens.dk/en/node/3994/pdf>

125. Bekendtgørelse om geologisk lagring af CO<sub>2</sub> m.v., BEK nr 1425 af 30/11/2016.

126. Bekendtgørelse af lov om beskyttelse af havmiljøet, BK nr 1165 af 25/11/2019.

127. <https://www.retsinformation.dk/eli/lta/2022/100>

128. <https://www.retsinformation.dk/eli/lta/2012/486>

129. <https://www.retsinformation.dk/eli/lta/2011/706>

CCS is a completely new technology, and thus presents challenges from a regulatory point of view.

In December 2022 new legislation was adopted, which entered into force 1 January 2023, that enables the state granting financial support for CCUS activities and companies regulated within utility laws for power and heat to commit financially to CCUS.<sup>[130]</sup> Such companies are subject to constraints concerning what is considered to be "core business" (and thus permitted economic activity).

### 3.1.3 Permits for transporting CO<sub>2</sub> streams and intermediate storage of CO<sub>2</sub>

On CO<sub>2</sub> transportation, part of necessary acts and regulations are in place, but it has also been identified that new legislation is needed in particular regarding responsibilities in relation to pipelines. Pipelines with a diameter above 800 mm and length above 40 km for the transportation of CO<sub>2</sub> intended for geological storage require permits on the basis of an environmental impact assessment.<sup>[131]</sup> How to secure access to pipeline infrastructure (private or state owned) is an issue that needs to be resolved. In 2021 the Danish government asked 6 regional clusters to come up with recommendations on CCUS infrastructure. Recommendations from the clusters were given in January 2023 and will be taken into account as the Danish government puts forward regulatory recommendations.

In September 2022, [Denmark and Flanders, Belgium](#) signed a bilateral arrangement (in accordance with the London Protocol) to allow for cross-border CO<sub>2</sub> transport for the purpose of offshore storage (as already mentioned in section 2.1).

### 3.1.4 Permits for permanent storage of CO<sub>2</sub>

Since its inception in 1981, the Danish Marine Environment Act has prohibited dumping of materials and substances in the sea, in the seabed and under the seabed, and the transport of materials and substances for dumping, including geological storage of CO<sub>2</sub> under the seabed. In 2021 a change of the Marine Environment Act was adopted which authorizes the Minister of Environment to exempt storage of CO<sub>2</sub> below the subsurface from the prohibition against dumping.<sup>[132]</sup> Legislation exempting geological storage and transport of CO<sub>2</sub> from prohibitions against dumping in the Marine Environment Act entered into force in 2022.<sup>[133]</sup>

---

130. <https://www.retsinformation.dk/eli/lta/2022/1593>  
131. <https://www.retsinformation.dk/eli/lta/2010/1510>  
132. <https://www.retsinformation.dk/eli/lta/2021/2608>  
133. <https://www.retsinformation.dk/eli/lta/2022/934>.

The current rules on geological storage of CO<sub>2</sub> are found in the Act on Use of the Danish Subsoil<sup>[134]</sup> (the Subsoil Act) with later amendments and in the CCS Order.<sup>[135]</sup> When the CCS Directive was implemented in the Subsoil Act in 2011<sup>[136]</sup> and subsequently in the CCS Order<sup>[137]</sup>, Denmark chose not to distinguish between geological storage of CO<sub>2</sub> of less than 100 kilotonnes for the purpose of research, development or testing of new products and processes and other geological storage of CO<sub>2</sub>. Legislation introducing a less comprehensive approval process for geological storage of CO<sub>2</sub> of less than 100 kilotonnes to promote the necessary research and development in the field of geological storage of CO<sub>2</sub> was introduced in 2022.<sup>[138]</sup>

Moreover, a process for strategic Environmental Impact Assessment for onshore and near-shore storage has been initiated and at the time of writing this report it was expected that a first tender for investigation and storage licenses for onshore storage will open Q4 2023.

## 3.2 Finland

### 3.2.1 National context

The revised Finnish Climate Act (423/2022) entered into force in July 2022. Its key objective is to ensure that Finland will achieve carbon neutrality by 2035 at the latest. The Act includes an updated emission reduction target for 2050 and new emission reduction targets to be reached by 2030 and 2040, respectively (60 percent reduction by 2030, 80 percent by 2040 and 90 percent by 2050 with a view to reach 95 percent reduction).

Plans include a Medium-term Climate Change Plan, a Climate plan for the land use sector, a National Climate Change Adaptation Plan and a Long-term Climate Plan. In addition, a Climate and Energy Strategy has been prepared every parliamentary term.

There are around 70 large facilities emitting CO<sub>2</sub> in Finland (including CO<sub>2</sub> of both fossil and biogenic origin). These are located at coastal as well as inland sites.

Ongoing CCUS-related activities in Finland include:

- The Sustainable Growth Programme for Finland allocated EUR 150 million to hydrogen and carbon capture and utilisation projects.
- E-fuels will be included in the transport fuel distribution obligation from the beginning of 2023.

---

134. <https://www.retsinformation.dk/eli/lta/2019/1533>.

135. <https://www.retsinformation.dk/eli/lta/2016/1425>.

136. <https://www.retsinformation.dk/eli/lta/2011/960>.

137. <https://www.retsinformation.dk/eli/lta/2016/1425>.

138. <https://www.retsinformation.dk/eli/lta/2022/803>.



- CCUS technologies to reduce CO<sub>2</sub> emissions caused by waste incineration will be piloted.
- A strategic research project for carbon use and removals by the Finnish government has been carried out.<sup>[139]</sup>

As mentioned in section 2.5, the CCS Directive allows Member States to choose not to permit storage within their territory. Finland has chosen to do so, only allowing storage that does not exceed 100 000 tonnes for the purpose of research or the development and testing of new products and processes.<sup>[140]</sup> In the Government Bill on implementation of the CCS Directive, it is explained that the prohibition of storage of CO<sub>2</sub> in Finnish territory is due to that there are no known geological formations appropriate for storage.<sup>[141]</sup> However, it is further stated in the Government Bill that the prohibition can be reevaluated in the future in light of new CCS technology and new investigations on the possibility of geological storage of CO<sub>2</sub> within Finland's territory or in its economic zone.<sup>[142]</sup>

### 3.2.2 Permits for capturing CO<sub>2</sub>

When transposing the CCS Directive amendments were made to Finland's Environmental Protection Act<sup>[143]</sup> which regulates when environmental permits are needed. Permits are needed *inter alia* for activities which entail a risk of pollution of the environment, and which are specified in annex 1 to the Act.<sup>[144]</sup> The capturing of CO<sub>2</sub> streams from facilities require a permit when the captured CO<sub>2</sub> is going to be geologically stored.<sup>[145]</sup>

The Act states that permits regarding CO<sub>2</sub> capture shall be combined with the necessary conditions to ensure compliance with the Finnish quality requirements for CO<sub>2</sub> streams and obligations relating to CO<sub>2</sub> capture.<sup>[146]</sup> The quality requirements of CO<sub>2</sub> streams come across as a direct implementation of those in the CCS Directive.

The capturing process and permits for capturing facilities are not directly regulated in the CCS Directive. Finland has set out several requirements regarding the obligations relating to CO<sub>2</sub> capture. Firstly, an actor separating CO<sub>2</sub> must ensure

---

139. [https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164795/VNTEAS\\_2023\\_19.pdf](https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/164795/VNTEAS_2023_19.pdf)

140. 3 § laki hiilidioksidin talteenottamisesta ja varastoinnista/ lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012 (Act (416/2012)).

141. Regeringens proposition till riksdagen med förslag till lag om avskiljning och lagring av koldioxid och till lagar om ändring av miljöskyddslagen och 7 § i havsskyddslagen samt om godkännande av ändringarna i bilagorna II och III till konventionen för skydd av den marina miljön i Nordostatlanten och med förslag till lag om sättande i kraft av de bestämmelser i ändringarna som hör till området för lagstiftningen (RP 36/2012 rd).  
<https://www.finlex.fi/sv/esitykset/he/2012/20120036.pdf>

142. RP 36/2012 rd p. 1.

143. Laki ympäristönsuojelulain muuttamisesta/Lag om ändring av miljöskyddslagen (417/2012) 29/06/2012.

144. 27 § ympäristönsuojelulaki/miljöskyddslag (527/2014) (27/6/2014).

145. Annex 1, tabel 1, 3.b. ympäristönsuojelulaki/miljöskyddslag (527/2014) (27/6/2014).

146. 56 § ympäristönsuojelulaki/miljöskyddslag (527/2014) (27/6/2014) & 5–6 §§ laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

that an analysis of the composition of the CO<sub>2</sub> stream, including corrosive substances, and a risk assessment is carried out.<sup>[147]</sup> Secondly, CO<sub>2</sub> may only be captured if the CO<sub>2</sub> stream's content of substances according to the risk assessment will not exceed the level specified in the quality requirements mentioned above.<sup>[148]</sup> Thirdly, an actor separating CO<sub>2</sub> must keep a record of the quantity, properties and composition of the CO<sub>2</sub> streams delivered for geological storage.<sup>[149]</sup>

### 3.2.3 Permits for transportation and intermediate storage of CO<sub>2</sub>

The Finnish Energy Authority can, under certain conditions and after an application, authorise an actor capturing CO<sub>2</sub> access to a transport network not operated by that actor, if the operator of the network and the actor are unable to agree on access.<sup>[150]</sup> The Authority can also, after the application of the actor, order the owner of the transport network to make the necessary changes to the network due to the actor joining the network or to the fact that the demand of transport has risen.<sup>[151]</sup> This is a direct implementation of the CCS Directive. If the transport network in part runs in another state's territory a special provision applies.<sup>[152]</sup>

CO<sub>2</sub> that has been captured within Finland can be handed over for storage in a location that is in its entirety situated within the territory, exclusive economic zone, or contented shelf of an EU Member State.<sup>[153]</sup>

The building of a transport network shall be based on a so-called binding plan.<sup>[154]</sup>,<sup>[155]</sup> The provisions of the Land Use and Building Act<sup>[156]</sup> are applicable on the planning and building of the transport network.

Special regulation is in place in Finland for pressure-bearing arrangements in the Act on Pressure-Bearing Arrangements (869/1999)<sup>[157]</sup> which applies to cisterns, pipe systems and other technical assemblies, including pipelines and cisterns that transport or intermediately store compressed CO<sub>2</sub> at elevated pressure.

---

147. 6 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

148. 6 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

149. 6 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

150. 7 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

151. 8 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

152. 10 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

153. 4 § Act (416/2012) & 7 § merensuojelulaki/havsskyddslag (1415/1994) 29/12/1994 (Act (1415/1994)).

154. "Plan med rättsverkningar"

155. 11 § laki hiilidioksidin talteenottamisesta ja varastoinnista/lag om avskiljning och lagring av koldioxid (416/2012) 29/06/2012.

156. Markanvändnings- och bygglag (132/1999).

157. [https://www.finlex.fi/sv/laki/ajantasa/2016/20161144?](https://www.finlex.fi/sv/laki/ajantasa/2016/20161144?search%5Btype%5D=pika&search%5Bpika%5D=869%2F1999#L1P1)

[search%5Btype%5D=pika&search%5Bpika%5D=869%2F1999#L1P1](https://www.finlex.fi/sv/laki/ajantasa/2016/20161144?search%5Btype%5D=pika&search%5Bpika%5D=869%2F1999#L1P1)

## 3.3 Iceland

### 3.3.1 National context

Iceland has a target to reduce GHG emissions at least 55 percent by 2030 compared to 1990 to be achieved by acting jointly with EU Member States and Norway. There is also a target to reach climate neutrality no later than 2040, which has been written into the climate act, and that Iceland shall be fossil fuel-free by 2040.

Iceland first implemented the CCS Directive in their Climate Law. The storage of CO<sub>2</sub> on industrial scale in Iceland was forbidden at the first implementation.<sup>[158]</sup> The political agenda however changed, and storage in Iceland was later allowed. Amendments to the legislation were made 2021 to enable CO<sub>2</sub> storage at industrial scale. Before those amendments only research projects were permitted. The implementation is now being carried out in the Health and Pollution Prevention Act.<sup>[159]</sup>

Iceland has special geological circumstances. Since 2012, the company Carbfix develops a unique technology for CO<sub>2</sub> storage. It involves dissolving CO<sub>2</sub> in water and the subsequent injection into basaltic layers, where it solidifies through mineralisation in less than two years.<sup>[160]</sup> So-far, Carbfix has been operated as what would be classified as a research project according to the CCS Directive. However, the storage activities are approaching the upper limit for research of 100 kilotonnes CO<sub>2</sub>.

In 2019 a declaration of intent was signed between the government, Carbfix and 5 other companies. The parties of the declaration agree to investigate if the Carbfix method is suitable for reducing CO<sub>2</sub> emissions from heavy industry in Iceland. The work is still in progress.

There is one demonstration plant (ORCA) for DACCS in Iceland. The heat and electricity required to run the direct air capture process is supplied by the Hellisheidi Geothermal Power Plant and the captured CO<sub>2</sub> is injected by Carbfix.

Carbfix is planning to build a CO<sub>2</sub> storage hub with a terminal that would enable import of CO<sub>2</sub> to Iceland via ships, e.g., from European industry. The project recently received a large grant from the EU Innovation fund. The methodology and implementation will be verified by DNV.

Iceland is currently looking further into regulations and legal frameworks, including issues related to CO<sub>2</sub> import and the EU ETS.

---

158. <https://www.althingi.is/altext/stjt/2015.062.html> (Article 3).

159. <https://www.althingi.is/lagas/152b/1998007.html>

160. Carbfix. Available at: <http://www.carbfix.com> (last viewed 2023-01-16).

Storage activities so far have been onshore but there are plans to start looking at dissolving CO<sub>2</sub> in salt water offshore where there are large areas with large potential for storage.

### 3.3.2 Permits for capturing CO<sub>2</sub>

The transposition of the CCS Directive was made with amendments to Iceland's Health and Pollution Prevention Act<sup>[161]</sup> (No 7/1998) which regulates when operating permits are needed. The capture of CO<sub>2</sub> streams for the purpose of geological storage in accordance with the CCS Directive from facilities listed in Annexes of the Health and Pollution Prevention Act require a permit.

### 3.3.3 Permits for transporting and intermediate storage of CO<sub>2</sub>

No permits for transportation and intermediate storage of CO<sub>2</sub> have been issued in Iceland. Such permits will be issued according to the Health and Pollution Control Act.<sup>[162]</sup> Operators should grant third party access to transportation systems unless denial can be justified, and disputes are subject to decision by the Environmental Agency.<sup>[163]</sup>

Potential users must have access to the carbon dioxide transmission system and/or the operator's injection area, for the purpose of transporting and/or injecting carbon dioxide there for permanent storage. The operator is allowed to charge for that fee.

### 3.3.4 Permits for permanent storage of CO<sub>2</sub>

The Icelandic climate change act of 2012 was amended in 2016 whereby the geological storage of CO<sub>2</sub> in Iceland was prohibited with the exception of projects for research, development or testing purposes where the intention is to store less than a total of 100 kilotonnes of CO<sub>2</sub>.<sup>[164]</sup> At the time geological storage of CO<sub>2</sub> was not considered a viable option in Iceland due to the geological conditions.<sup>[165]</sup>

Since then, however, the development of the Carbfix method advanced significantly. In 2021 a legislation that transposes the CCS Directive into Icelandic legislation was passed by the parliament of Iceland, as required by the terms of the EEA Agreement.<sup>[166]</sup> According to the Act on Health and Pollution Control, as amended in 2022, it is permitted to geologically store CO<sub>2</sub> in Icelandic territory, its exclusive economic zone and in its continental shelf.<sup>[167]</sup> The legislation authorises

---

161. <https://www.althingi.is/lagas/152b/1998007.html>.

162. <https://www.althingi.is/lagas/152b/1998007.html> (Chapter 6).

163. <https://www.althingi.is/lagas/152b/1998007.html> (Chapter 33, art. h-i).

164. <https://www.althingi.is/altext/stjt/2015.062.html>.

165. <https://www.althingi.is/altext/151/s/0391.html>.

166. <https://www.althingi.is/altext/151/s/0391.html>.

167. <https://www.althingi.is/lagas/152b/1998007.html>.

the Environmental Agency to issue permit for injection for a certain period of time, upon receipt of a satisfactory application and according to the rules stipulated by law. Notably, the CCS Directive is adopted to the specific conditions in Iceland in that it distinguishes between two storage strategies mineral storage of CO<sub>2</sub> (the Carbfix method) and the more "conventional" supercritical storage of CO<sub>2</sub> in geological formations for which the CCS Directive was originally developed. The legislation considers that for the former method, it is not assumed that CO<sub>2</sub> is stored in strata underground at supercritical pressure, as stipulated in the CCS Directive, where there is a risk that CO<sub>2</sub> will leak and find its way to the surface. While the provisions of the CCS Directive envisage extensive monitoring for 30 years for possible leaks, those provisions are not considered to apply to mineral storage of CO<sub>2</sub>, since the most important thing is to observe the sequestration of CO<sub>2</sub> in the beginning immediately after it is pumped down and to confirm the mineralisation of the carbon dioxide.

Iceland has yet not granted permits for capture or storage of CO<sub>2</sub> at industrial scale. At the time of the writing of this report there was one application for a CO<sub>2</sub> storage permit which was being processed within the system of the Environment Agency of Iceland and other agencies.

## 3.4 Norway

### 3.4.1 National context

Norway has 26 years of experience of CCS including CO<sub>2</sub> storage under the seabed in the Sleipner and Snöhvit fields outside its coast. There is a great potential for CO<sub>2</sub> storage beneath the seabed in the North Sea.

National targets for CCS in Norway are closely linked to targets for the Longship project. In this project CO<sub>2</sub> will be captured in a waste incineration plant<sup>[168]</sup> and a cement plant, respectively, in the Oslo fjord area, transported by ship to a terminal on the west coast, then transported in pipeline to the injection site. The CO<sub>2</sub> will be injected to geological formations 2600 meters under the seabed. The transport and storage component of the Langship project is called Northern Lights. Two-thirds of the cost of the first phase is covered by the Norwegian state.

With this project, Norway aims to contribute to the development of technology for CCS and facilitate a cost-effective solution for full-scale CCS in Norway, which will contribute to technological development in an international perspective. The aim includes demonstrating that CCS is safe and feasible, to facilitate learning and cost reduction in subsequent projects, development of infrastructure with

---

<sup>168</sup>. It was announced April 2023 that the project has been paused for a year amid projections of large cost overruns. During the 12-month hiatus ways to reduce costs will be sought, which would delay the project from its initially planned 2026 commissioning date.

additional capacity that other project developers can utilise, hence lowering the threshold for establishing new CCS projects. At the time of writing this report, the first capture projects and the storage project were 30–40 percent finished. There is significant interest in utilising the Longship infrastructure. The first commercial agreement has been signed with fertiliser company Yara regarding storage of CO<sub>2</sub> which will be transported from the Netherlands to Northern Lights.

Northern Lights is planning the next phase which involves an investment decision to expand the capacity with 5 million tonnes CO<sub>2</sub> stored annually. The permit is expected to be issued in 2023. Two more storage licenses have been awarded and one more is in the pipeline. Equinor and Wintershall Dea announced a cooperation including a 900 km long pipeline for CO<sub>2</sub> transport which will provide European CO<sub>2</sub> emitters with access to offshore storage sites on the Norwegian Continental Shelf.

Future CCS projects will have to compete for grants and state aid from general funding schemes, like the Norwegian climate funding instrument and the EU Innovation fund. The Norwegian state will not engage in direct negotiations with individual stakeholders. The government of Norway expects that additional storage will be developed by third parties that are not funded by the Norwegian state. No new instruments targeting CCS are planned. The main obstacle that needs to be addressed going forward is the lack of coherent support mechanisms for negative emissions.

The CCS Directive has been implemented in Norway through one new regulation and two additions and an amendment in two other regulations.<sup>[169]</sup> The new act is the Storage Regulation.<sup>[170]</sup> New chapters have been added to the Petroleum Regulation<sup>[171]</sup> and the Pollution Regulation.<sup>[172]</sup>

The Storage Regulation was inspired by the existing petroleum regulation. It has the purpose of contributing to sustainable energy and industrial production, by laying the groundwork for the utilisation of underwater reservoirs on the continental shelf for the environmentally safe storage of CO<sub>2</sub> as a measure to counteract climate change.<sup>[173]</sup> A permitting system is established through the Regulation for exploration and exploitation.<sup>[174]</sup> The new chapter in the Petroleum Regulation, chapter 4A, was added to meet the CCS Directives requirements relating to resource management not covered by the existing provisions in the Regulation. The provisions in the new chapter 5 of the Storage Regulation are largely the same as the new chapter 4A.<sup>[175]</sup> The new chapter in the Pollution

---

169. Fogstad Vold, S. (2020). "CCS Legislation in Norway: The EU CCS Directive and its Implementation into Norwegian Law". In: European Energy Law Report XIII, Roggenkamp, M., Banet C. (ed.), 2020, p. 369-386.

170. Forskrift om utnyttelse av undersjøiske reservoarer p å kontinentalsokkelen til lagring av CO<sub>2</sub> og om transport av CO<sub>2</sub> p å kontinentalsokkelen, forskrift 5 desember 2014 nr. 1517 (Lagringsforskriften).

171. Forskrift 27 juni 1997 nr. 653 (Petroleumsforskriften).

172. Forskrift 1 juni 2004 nr. 931 (Forurensningsforskriften).

173. Article 1 Storage Regulation.

174. Fogstad Vold, S. (2020) p. 383.

175. Fogstad Vold, S. (2020) p. 384.

Regulation implements the environmental aspects of the CCS Directive.

The regulation of CCS, including CO<sub>2</sub> capture, transport, and storage activities in conjunction with petroleum activities is regulated in the Petroleum Regulation. CCS activities in conjunction with all other activities is regulated in the Storage Regulation.<sup>[176]</sup> The Norwegian regulation concerning CCS is therefore split in two parts. The Pollution Regulation however concerns all CCS activity. The reasoning behind the split in the regulation was that possible challenges could arise if petroleum activity and CCS in conjunction with petroleum activity were regulated in different legal frameworks.<sup>[177]</sup>

The CCS regulatory system is permit-based, where all exploitation or exploration requires a permit as the resources belong to the state. The same process regarding permits is used in the three regulations to make the permitting system as similar as possible for operators.

### **3.4.2 Permits for capturing CO<sub>2</sub> and intermediate storage of CO<sub>2</sub>**

It is set out in the Norwegian Pollution Act that permits are required for some activities that can cause pollution.<sup>[178]</sup> The Pollution Regulation contains closer provisions regarding such permits. The capture of CO<sub>2</sub> streams for the purpose of geological storage in accordance with the CCS Directive from facilities listed in Annex I to chapter 36 of the Pollution Regulation require a permit.<sup>[179]</sup> These facilities include facilities within the energy industry and the mineral industry such as cement production. Moreover, for all incineration plants with installed electrical power at least 300 MW, where the Pollution Control Authority determines that it is technically and economically feasible to carry out the capture and compression of CO<sub>2</sub>, conditions shall be stipulated in the permit to ensure that sufficient space is allocated at the plant for the necessary retrofitting of equipment for this.<sup>[180]</sup>

The Ministry of Petroleum and Energy can give special permits for the transportation of CO<sub>2</sub>. From the interviews it has been indicated that no new or specific regulation regarding intermediate storage of CO<sub>2</sub> has been implemented in the Norwegian legal order. The application processes for such storage facilities are regulated within the relevant legislation already in place, such as planning and building regulation.

### **3.4.3 Permits for permanent storage of CO<sub>2</sub>**

Norway's implementation of the CCS Directive only allows for offshore geological

---

176. Storage Regulation 1-3 §.

177. Fogstad Vold, S. (2020), p. 381.

178. Pollution Act Ch. 3.

179. Pollution Regulation § 36-1 & Appendix 1 6.9.

180. Pollution Regulation § 36-12. See also § 36.4. This applies only to incineration plants where the first building permit or first operating permit is granted after entry into force of Chapter 35 of the Pollution Regulation which is the chapter added to the Regulation due to the CCS Directive.

storage below the seabed within the continental shelf.<sup>[181]</sup> The limitation in the geological scope is due to the results of geological assessments of suitable areas.<sup>[182]</sup>

The Pollution Regulation sets out that any entity that injects and stores CO<sub>2</sub> in geological formations must have a permit to do so. Before a permit is given by the Norwegian Environment Agency, the ESA must be given the chance to comment.<sup>[183]</sup> An exploration permit, an exploitation permit, and an injection permit are required by for any CCS activity. There is therefore no single storage permit as stated in the CCS Directive, but the requirements set out by the Directive are covered by the aforementioned permits.<sup>[184]</sup>

The Storage Regulation sets out that no one other than the State can carry out exploration or exploitation of underwater reservoirs on the continental shelf for the storage of CO<sub>2</sub> and/or transport CO<sub>2</sub> on the continental shelf without the permits, approvals and consents required in accordance with the Storage Regulation.<sup>[185]</sup>

## 3.5 Sweden

### 3.5.1 National context

The Swedish Climate Act from 2017 includes a target to reach net-zero GHG emissions no later than 2045 and negative emissions thereafter. GHG emissions shall be reduced by at least 85 percent by 2045 compared to 1990. This means that, in order to attain net-zero emissions the remaining emissions, approximately 11 million tonnes CO<sub>2</sub>e, have to be counterbalanced through so-called "complementary measures".

There is no formal CCS strategy, however a Preparation Committee focused on "complementary measures" and a brief plan for implementation of CCS in Sweden was given.<sup>[186]</sup> In this context, BECCS is one of three "complementary measures" that can be used for counterbalancing residual emissions, the other two being forest carbon sinks and some other measures in the land use sector, and international investments through Article 6 (of the Paris Agreement). The Committee provided three main recommendations that resulted in government policy of relevance for BECCS: Firstly, the creation of a support scheme for negative emissions in the form of reverse auctions. Secondly the preparation of a proposal for a treaty with Norway according to the amendment of the London Protocol to enable Swedish export of CO<sub>2</sub> for storage. In early 2022, the prime ministers of Norway and Sweden announced that work is ongoing and that it is

---

181. Storage Regulation 1-3 §, Petroleum Regulation § 1 & Pollution Regulation § 1-3.

182. Fogstad Vold, S. (2020), p. 382.

183. Pollution Regulation § 35-4.

184. Fogstad Vold, S. (2020), p. 382.

185. Storage Regulation § 1-4.

186. Government of Sweden (2020).



important that the work is finalised. Thirdly, the creation of a national centre for CCS to be part of the Swedish Energy Agency.

The Preparation Committee also pointed out the need for R&D in the area of CCS. The programme for R&D related to CCS is already in place and it is called the "Industrial leap programme". It runs over 2018 through 2030 with a budget of 1 354 MSEK.

The Swedish Energy Agency has been assigned to develop the support scheme for BECCS and is currently developing the design of the planned reverse auctions. 36 billion SEK have been allocated for the programme for the years 2026–2046. It has been communicated that the scheme has a target of up to 2 million tonnes biogenic CO<sub>2</sub> stored annually by 2030. This is to be achieved through 1 to 3 reverse auctions between 2023 and 2026. The support period per project should be up to 15 years.

### 3.5.2 Permits for capturing CO<sub>2</sub>

As mentioned above, the capturing of CO<sub>2</sub> is not directly regulated in the CCS Directive. In Sweden CO<sub>2</sub> capture is regulated in the Regulation on Geological Storage of CO<sub>2</sub><sup>[187]</sup> (Storage Regulation). A permit is required for the capturing of CO<sub>2</sub> streams for geological storage from facilities.<sup>[188]</sup> When adding a capturing facility to an existing operating permit two situations could arise. Either the entire existing permit is to be reassessed or only the capturing facility is to go through a permit application process in the form of an amendment permit.<sup>[189]</sup> Operators have expressed that to save time and costs the ideal solution would be to only have to apply for an amendment permit.<sup>[190]</sup>

### 3.5.3 Permits for transporting CO<sub>2</sub> streams and intermediate storage of CO<sub>2</sub>

Concessions need to be granted to draw and use pipelines longer than 20 km for the transportation of CO<sub>2</sub> for geological storage.<sup>[191]</sup> Such a concession can be valid for a maximum of 40 years and the validity can subsequently be prolonged for 40 years at a time.<sup>[192]</sup> When pipelines stretch over property that is not owned by the pipeline operator, a pipeline easement<sup>[193]</sup> is needed.<sup>[194]</sup> Such an easement can be granted if it satisfies a public need, benefits business activities or communication facilities of national importance or a certain area, or causes only minor intrusions compared to the benefits.<sup>[195]</sup>

---

187. Förordning (2014:21) om geologisk lagring av koldioxid.

188. Miljöprövningsföreläggningen (2013:251) 29 kap. 62–63 §§.

189. 16 kap. 2 g § MB.

190. Romson, Å., Steen, L. (2021). "Miljötillstånd i kedjan för bio-CCS". In: Löfblad, E., et al. (2021). "Samverkan kring infrastruktur för transport och lagring av koldioxid". Energiforsk rapport 2022:838, Annex B.

191. Lag (1978:160) om vissa rörledningar 1 §.

192. Lag (1978:160) om vissa rörledningar 5–5 a §§.

193. Swedish "ledningsrätt".

194. Ledningsrättslagen (1973:1144) 2 § 4 p.

195. Ledningsrättslagen (1973:1144) 2 § 4 p.

In the Swedish legal system, captured CO<sub>2</sub> is seen as waste but is in certain circumstances exempt from the Waste Regulation. During intermediate storage however, CO<sub>2</sub> is not exempt from the Swedish Waste Regulation based on the wording of the regulation. This means that the intermediate storage of CO<sub>2</sub> is seen as storage of non-harmful waste. Such activity requires a permit if the quantity stored exceeds 10 000 tonnes or a compulsory registration if the quantity is up to 10 000 tonnes.<sup>[196]</sup>

### **3.5.4 Permits for permanent storage of CO<sub>2</sub>**

Sweden has allowed the geological storage of CO<sub>2</sub> for volumes larger than 100 000 tonnes within the exclusive economic zone and areas in the territorial sea within one nautical miles (nm) from the baseline and excluding property.<sup>[197]</sup> The government has however opened for the storage of CO<sub>2</sub> on land in the future.<sup>[198]</sup> For the exploration of a location to assess if it is suitable for storage compulsory registration of the activity is needed.<sup>[199]</sup> So far, Sweden has not carried out a closer mapping of potential storage spaces which means that storage in Sweden is a matter for the future. Sweden's regulation on storage permits has been accepted by the EU.

---

196. Miljöprövningsförelrdningen (2013:251) 29 kap. 48–49 §§.

197. Förelrdning (2014:21) om geologisk lagring av koldioxid 10 §.

198. Prop. 2011/12:125 p. 104.

199. Miljöprövningsförelrdningen (2013:251) 29 kap. 64 §§.

# 4. Monitoring, reporting and verification, and accounting for CCS

## 4.1 Activity-level monitoring, reporting and verification

### 4.1.1 Key elements of MRV

Robust activity-level monitoring, reporting and verification (MRV) of the emissions, mitigation outcomes (emission reductions and removals) and storage associated with CCS activities is important for incentivising investments in CCS and recognising their contribution to mitigation. Starting upon the implementation of the activity, MRV consists of applying an applicable monitoring methodology to calculate the activity's emissions, emission reductions and removals, based on an ensemble of measured and default variables (as defined in the methodology), reporting the results and verification by a competent third party.

Under emissions trading systems, MRV focuses on the quantification of emissions, typically on an annual basis, given that the typical reference point is the system's annual emissions cap. Under carbon crediting programmes, MRV focuses on the quantification of mitigation outcomes against a crediting baseline, for the purpose of generating tradable carbon credits. Besides, carbon crediting programmes also require demonstrating additionality.

### 4.1.2 Methodologies for carbon crediting and results-based finance

Robust additionality testing principles and design of robust baseline and monitoring methodologies are key for ensuring the environmental integrity of carbon credits as well as the effectiveness of results-based finance.<sup>[200]</sup> They are, however, not relevant for emissions trading systems or national inventories (see below). Additionality testing is used to assess whether an activity seeking support through the sale of carbon credits or results-based finance would be implemented even without this support, taking into account national policies and market conditions.<sup>[201]</sup> Baseline methodologies provide guidance and requirements for

---

200 Poralla, M., et al. (2022). "Tracking greenhouse gas removals: baseline and monitoring methodologies, additionality testing, and accounting", NET-Rapido Consortium and Perspectives Climate Research.

201. since CCS is relatively expensive, many activities may be assumed to be additional and the baseline can assume limited adoption of CCS in the absence of the activity in question. However, government subsidies need to be taken into account when demonstrating additionality (and determining baseline)

establishing a conservative and plausible reference scenario for emissions, removals and storage without the activity, taking into account national policies, the risk of leakage and uncertainties. Monitoring methodologies provide requirements and guidance for quantifying the emissions, emission reductions and removals associated with the activity, including parameters to be measured or calculated, default factors, measurement frequencies, calculation formulas etc.

For activity types, such as CCS, that have a risk of reversal of emission reductions or removals, monitoring methodologies should include requirements for transporting and durably storing the captured CO<sub>2</sub>, monitoring the storage and addressing any leakage and reversals. However, there is no consensus on what constitutes the relevant timeframe (and retention percentage) for “durable storage” or “permanence”, with proposals ranging from 55 to 1000 or more years [202], partly due to different storage forms.

Methodologies may be developed by individual activity developers or international or national experts, and they may be approved for application under specific carbon crediting programmes and other carbon pricing instruments. These may be international (e.g., the Kyoto Protocol's Clean Development Mechanism, the Paris Agreement's Article 6.4 Mechanism), multilateral (e.g., EU's carbon removal certification framework), bilateral (e.g., Japan's Joint Crediting Scheme, cooperative approaches under Article 6.2 of the Paris Agreement), national (e.g., Australia's Emission Reduction Fund), sub-national (e.g., California's Low Carbon Fuel Standard) or independent (e.g., the Verified Carbon Standard, Puro.earth).

### **4.1.3 Current status of CCS methodology development**

Several CCS methodologies have been developed under carbon crediting programmes, including the American Carbon Registry), Alberta Carbon Offset Program (applicable only to storage in saline aquifers), Australia's Emission Reduction Fund (applicable to a wide range of CCS technologies) and Puro.Earth (applicable for atmospheric and biogenic sources of carbon with geological storage, i.e., DACCS and BECCS). Under the Kyoto Protocol's Clean Development Mechanism (CDM), there are no approved CCS methodologies. There are, however, approved modalities and procedures for CCS in geological formations as CDM project activities, and the CDM Project Standard includes specific design requirements for CCS activities, including the requirements of the monitoring plan. The independent, private-sector-driven CCS+ initiative is developing a suite of methodologies for CCS under the Verified Carbon Standard. At the international level, methodologies for a broad range of activity types, including removals, may be approved under the Paris Agreement's Article 6.4 Mechanism. The Paris Agreement also allows countries to apply nationally or bilaterally approved methodologies as

the basis of cooperation involving internationally transferred mitigation outcomes (ITMOs) under its Article 6.2. Japan is currently developing a CCS methodology with Indonesia under its bilateral Joint Crediting Mechanism.

CCS methodologies have also been developed under other types of policy instruments. The California Air Resources Board has developed a widely applicable methodology for CCS technologies (including DACCS) under the Low Carbon Fuel Standard. Installations covered under the EU ETS must apply the system's MRV requirements, which include requirements for CCS activities. The storage-related elements of the EU CCS Directive also apply. In November 2022, the European Commission proposed an EU-wide certification framework for carbon removals.<sup>[203]</sup> According to the proposal, the Commission, supported by an Expert Group<sup>[204]</sup>, would develop baseline and monitoring methodologies for different activity types and require certification under programmes approved by the Commission. The certified removal units could cater for results-based policies as well as voluntary (and potentially also compliance) carbon markets.

Methodologies have also been developed by individual actors outside of specific programmes. The ISO Standard 27914:2017 – Geological Storage is also relevant for the MRV of CCS activities<sup>[205]</sup> establishes requirements and recommendations for the geological storage of CO<sub>2</sub> streams. The Greenhouse Gas Protocol provides guidance for corporate- and activity-level MRV and accounting, including draft guidance for removals. Swiss DACCS developer Climeworks, together with the Icelandic storage provider Carbfix have developed the first full-chain methodology for DACCS<sup>[206]</sup> in-house, which was validated by DNV in September 2022.

---

203.COM(2022) 672 final; [https://climate.ec.europa.eu/system/files/2022-11/Proposal\\_for\\_a\\_Regulation\\_establishing\\_a\\_Union\\_certification\\_framework\\_for\\_carbon\\_removals.pdf](https://climate.ec.europa.eu/system/files/2022-11/Proposal_for_a_Regulation_establishing_a_Union_certification_framework_for_carbon_removals.pdf)  
204.[https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/expert-group-carbon-removals\\_en](https://climate.ec.europa.eu/eu-action/sustainable-carbon-cycles/expert-group-carbon-removals_en)  
205.<https://www.iso.org/standard/64148.html>.  
206.<https://climeworks.com/news/certification-methodology-for-permanent-carbon-removal>.

**Table 1** Existing CCS methodologies (non-exhaustive)

Methodology (Standard)	Activity scope	Geographical scope	ICROA <sup>[207]</sup> endorsement
Alberta Quantification Protocol for CO2 Capture and Permanent Storage in Deep Saline Aquifers <b>(Alberta Government)</b>	CCS in aquifers and EOR projects (ER)	Alberta (Canada)	No
Carbon Dioxide Removal by Direct Air Capture & Permanent and Secure Geological Storage of CO2 by In-situ Carbon Mineralization <b>(ISO 14064-2)</b>	DAC, storage by carbon mineralization (CDR)	Global	No
Methodology for the Quantification and MRV of GHG emission reduction and removals from CCS projects <b>(American Carbon Registry)</b>	EOR; DAC and BEC with storage in saline formations and depleted oil and gas reservoirs (CDR and ER)	US, Canada, Mexico	<b>Yes</b>
Geologically Stored CO2 Methodology <b>(Puro.earth)</b>	DAC and BEC with storage in deep geological formations and reservoirs (CDR)	Global	No
California Carbon Capture and Sequestration Protocol <b>(Low Carbon Fuel Standard)</b>	CCS projects with onshore sequestration (either saline aquifer or depleted oil and gas reservoirs) + EOR (ER)	US	No
Accelerated Carbonation of Concrete Aggregate <b>(Gold Standard)</b>	DAC and BEC, mineral carbonation of CO2 in demolished concrete (CDR)	Global	<b>Yes</b>
CCS+ Initiative (under development) <b>(Verified Carbon Standard)</b>	CCS, DAC, BECCS, Bio-CCS, CCU, with storage in saline aquifer, depleted oil & gas, and products	Global	<b>Yes</b>

207. International Carbon Reduction & Offset Alliance.

## 4.2 National inventories and accounting

### 4.2.1 National inventories and accounting under the Paris Agreement

Ideally, emission reductions and removals resulting from CCS activities, as well as any leakage or reversals, would be fully reflected in the national GHG inventories. CCS activities relating to fossil fuel combustion and industrial process emissions (e.g. from cement production) reduce emissions while BECCS (if based on sustainable biomass) and DACCS generate removals. National GHG inventories are used as the basis for national GHG accounting, that is, assessing progress towards achieving national mitigation targets, such as Nationally Determined Contributions (NDCs) under the Paris Agreement.

Under the Paris Agreement, Parties that engage in cooperation involving ITMOs must establish an emissions balance reflecting national emissions and removals covered by its NDC, adjusted for any transfers and acquisitions of ITMOs. To avoid double counting, countries that transfer ITMOs cannot count them towards their NDC while countries that acquire ITMOs can count these towards their NDC. At the EU level, the current EU regulation does not enable EU Member States to apply such corresponding adjustments.<sup>[208]</sup>

Host countries may authorise real, additional and verified emission reductions or removals as ITMOs for various purposes: for use towards an NDC, for international mitigation purposes (e.g., compliance under the Carbon Offsetting and Reduction Scheme for International Aviation) and other purposes (e.g., voluntary offsetting).

In case of ITMOs authorised for other purposes, transfer can be defined as the authorisation, issuance or use of the ITMO. Such ITMOs represent a decrease in global net emissions relative to agreed targets, thus providing a legitimate basis for best-practice voluntary offsetting claims.<sup>[209]</sup> Carbon credits that are not authorised as ITMOs and represent mitigation that is counted towards the host country's NDC provide a legitimate basis for best-practice claims about national mitigation contributions by voluntary buyers. The Paris Agreement's Article 6.4 Mechanism issues Article 6.4 Emission Reductions (A6.4ERs) which may or may not be authorised as ITMOs. Non-authorised A6.4ERs are referred to as "mitigation contribution A6.4ERs" and can be used, inter alia, "for results-based climate finance, domestic mitigation pricing schemes, or domestic price-based measures, for the purpose of contributing to the reduction of emission levels in the host Party".<sup>[210]</sup>

---

208.Laininen, J., et al. (2022). "Selvitys – Vapaaehtoisin päästökompensatioihin liittyvät Erityiskysymykset", Ministry of the Environment Finland.

209.Ahonen et al. (2022). "Harnessing voluntary carbon markets for climate ambition. An action plan for Nordic cooperation". Nordic Council of Ministers.

210. Draft decision -/CMA.4 Guidance on the mechanism established by Article 6, paragraph 4, of the Paris Agreement.

## 4.2.2 Links between national inventories and activity-level MRV, as well as corporate inventories

National GHG inventories must apply good practice methodologies accepted by the Intergovernmental Panel on Climate Change (IPCC). The current IPCC guidelines for national inventories<sup>[211]</sup> enable to account for emission reductions and removals from CCS activities, including BECCS, to be reflected in the national GHG inventories. The treatment of DACCS in inventory reporting is currently unclear and may require additional IPCC guidance. IPCC guidance provides for three methodological tiers: Tier 1 is the basic method, Tier 2 intermediate and Tier 3 the highest in terms of complexity and data requirements. Generally speaking, Tier 3 captures the greatest level of detail.

Due to the generally higher level of aggregation, national GHG inventories do not necessarily fully capture activity-level emission reductions and removals. Only emission reductions and removals that are reflected in the national inventory help the country in achieving its mitigation target. Thus, countries have an interest in ensuring that emission reductions and removals show up in the national inventory, especially in cases where they are linked to national policies and incentives and/or transferred as ITMOs. This requires alignment between activity-level MRV and national inventory methodologies.

If mitigation outcomes authorised as ITMOs are not fully reflected in the national GHG inventory and are not fully within the scope of the national target, the required adjustments to the emissions balance would make the national target more difficult to achieve compared with the situation where no adjustments would be made. If, however, the underlying mitigation outcomes are truly additional and fully reflected in the national inventory, the required adjustments would not have an impact on the achievement of the national target. Countries may also choose to authorise only part of the mitigation outcomes of a specific activity as ITMOs, for example to reflect the extent to which they show up in the national inventory and/or they are financed by private sources.

Similar considerations of "inventory granularity" apply also to corporate-level GHG inventories. The Greenhouse Gas Protocol has developed a standard<sup>[212]</sup> for estimating companies' direct (scope 1) and indirect (scope 2 and scope 3) emissions and is developing guidance for corporate-level accounting and reporting of GHG emissions and removals from land management, land use change, biogenic products, carbon dioxide removal technologies, and related activities in their

---

211. IPCC (2006): 2006 IPCC Guidelines for National Greenhouse Gas Inventories;

<https://www.ipcc.ch/report/2006-ipcc-guidelines-for-national-greenhouse-gas-inventories/>, and

IPCC (2019): 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Glossary;

[https://www.ipcc.ch/site/assets/uploads/2019/12/19R\\_V0\\_02\\_Glossary.pdf](https://www.ipcc.ch/site/assets/uploads/2019/12/19R_V0_02_Glossary.pdf)

212. <https://ghgprotocol.org/corporate-standard>



inventories.<sup>[213]</sup> The draft guidance also has provisions for avoiding all forms of double counting.

### 4.2.3 Cross-border and EU considerations

For cross-border CCS activities, where CO<sub>2</sub> is captured in one country and stored in another, participating Parties need to cooperate on a robust approach to ensure consistency across their national inventories and accounting and avoid double counting. They also need to agree on accounting and liability provisions in case of any reversals or leakage.

At the EU level, the collective nature of the EU Member States' pledge to the Paris Agreement, as well as EU-level targets and related regulation for different sectors, warrant further consideration. The EU's economy-wide pledge to the Paris Agreement consists of distinct EU-level targets for emissions within and outside of the EU ETS, as well as for the LULUCF sector. The EU ETS target is EU-wide, while non-ETS emissions will be allocated between Member States. Forthcoming EU regulation will specify accounting details for these targets.

The EU CCS and EU ETS Directives apply to CCS cases where both the capture and storage take place within the EU and EEA (including Norway and Iceland). As explained in section 2.6, EU ETS installations do not need to surrender allowances for CO<sub>2</sub> emissions that are captured, subject to the intent of durable storage within the EU/EEA.<sup>[214]</sup> In order to make the calculation consistent in the case of several installations together performing the capture, transport and geological storage of CO<sub>2</sub>, the receiving installation has to add that CO<sub>2</sub> to its emissions, before it may again subtract the amount transferred to the next installation or to the storage site.<sup>[215]</sup> Consequently, the liability for emissions caused by the operation of CO<sub>2</sub> capture, transport or storage in the CO<sub>2</sub> value-chain is transferred from one ETS installation to the other, without regard to the EEA country they are located in. Any leakage from storage is thus accounted as an emission by the storage operator, and also reported by the country where the storage site is located, in its national GHG inventory.<sup>[216]</sup>

Each EU ETS installation (operator) will have in place an emissions monitoring plan, approved by the Competent Authority, which forms part of its GHG emission permit.<sup>[217]</sup> The operator will also need to submit an annual verified emissions report be it from operations or from leakages during the processing or the transport of CO<sub>2</sub>, if any. An overview of London Protocol requirements in the

---

213. <https://ghgprotocol.org/land-sector-and-removals-guidance>.

214. An installation can deduct from its emissions the CO<sub>2</sub> not emitted in atmosphere and transferred to i) a capture installation for the purpose of transport and long-term geological storage in a storage site permitted under Directive 2009/31/EC; ii) a transport network with the purpose of long-term geological storage in a storage site permitted under Directive 2009/31/EC; or iii) a storage site permitted under Directive 2009/31/EC for the purpose of long-term geological storage.

215. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en).

216. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en).

217. [https://climate.ec.europa.eu/system/files/2022-02/gd1\\_guidance\\_installations\\_en\\_0.pdf](https://climate.ec.europa.eu/system/files/2022-02/gd1_guidance_installations_en_0.pdf)

context of the Legal Framework in the EEA published by the European Commission, presents guidance regarding additional topics identified relevant to CO<sub>2</sub> import/export in the EU. In this context, the Commission recommends that the relevant competent authorities of the EEA countries concerned should foresee the exchange of emissions monitoring plans and reports of relevant ETS installations.<sup>[218]</sup> The Commission, furthermore, notes that information exchanges between the inventory compilers of the respective CO<sub>2</sub> import and export EEA countries would allow for alignment of the respective amounts and to avoid cross-border double-counting.

As already mentioned in section 2.6, the EU ETS covers biomass emissions. However, biomass emissions that result from sustainable biomass count as zero and no allowances need to be surrendered for these emissions. Installations that use 100 percent biomass are therefore excluded from the EU ETS. Emissions from non-sustainable biomass are, on the other hand, treated like fossil fuel-based emissions. In its proposal for the revision of the EU ETS Directive, the Commission has proposed that it "should be empowered to adopt implementing acts to specify how to account for the storage of emissions from mixes of zero-rated biomass and biomass that is not from zero-rated sources".<sup>[219]</sup>

Accounting is less clear for removals from DACCS and sustainable biomass-based BECCS, since they capture carbon dioxide that does not show up in current national inventories. DACCS is currently outside the scope of EU climate policy.

Since the EU ETS does not cover removals from BECCS, some experts argue that they should be accounted under the so-called effort-sharing regulation, ESR while others argue they should be accounted under the LULUCF sector. Current EU regulation, including the newly adopted regulations and decisions on the ESR, LULUCF and the EU ETS, does not specify where BECCS should be accounted.<sup>[220]</sup> According to the new ESR<sup>[221]</sup>, an analysis about the accounting of permanently stored CO<sub>2</sub> ("safely and permanently stored carbon removals") under Union law can be made after the EU carbon removal certification framework (see section 4.1.3) has entered into force. The LULUCF regulation<sup>[222]</sup> mentions BECCS as a technical CDR method that may be needed to attain the level of GHG removals necessary within the Union to reach net-zero emissions by 2050 and net-negative emissions thereafter. No further guidance concerning the accounting of BECCS can be found in the LULUCF regulation.

It is likely that the issue of BECCS will have a more prominent role in upcoming negotiations on targets and architecture for the EU's climate policy after 2030, which are expected to begin as early as 2023. There are great uncertainties about

---

218. [https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30\\_en](https://climate.ec.europa.eu/document/dfbbc90c-071e-4088-ada2-7af467084b30_en)

219. COM (2021) 551 final, para 39.

220. Swedish Environmental Protection Agency (2022). "Analys av bokföring av Bio-CCS inom reviderat 2030-ramverk på EU-nivå - Delredovisning av Naturvårdsverkets regeringsuppdrag". NV-00052-20.

221. <https://data.consilium.europa.eu/doc/document/PE-72-2022-INIT/en/pdf>

222. <https://data.consilium.europa.eu/doc/document/PE-75-2022-INIT/en/pdf>

the architecture of the EU's climate policy after 2030. For example, the Commission has previously proposed to merge LULUCF with the agricultural sector into an AFOLU sector after 2030 and cease having an ESR with national targets. Such a development would mean that an accounting of BECCS in the ESR would only be a solution until 2030. There are also other possible solutions that would be difficult to reconcile with current legislation and architecture, for example a new sector only for different types of removals.

# 5. Concluding remarks and recommendations

This work has analysed regulatory aspects in relation to CCS (including BECCS and DACCS) development and deployment that are of relevance for the Nordic context. This section compiles observations that have been made that are of relevance for the project objectives:

## 5.1 An emerging enabling regulatory environment

The regulatory environment that applies to CCS activities in the Nordic countries has developed significantly over the past decade or so. For example, the EU has adopted the CCS Directive which regulates responsibility for the environmentally safe storage of CO<sub>2</sub> and contains provisions for CO<sub>2</sub> capture and transportation. The CCS Directive has subsequently been transposed into national legislation. The International Maritime Organization IMO has adopted a resolution allowing the export of CO<sub>2</sub> for the purpose of sub-seabed storage, the UN climate panel IPCC has clarified that BECCS can and should be recorded as a "negative emission" and the European Commission has made it clear that they interpret EU regulations as meaning that the transportation of CO<sub>2</sub> by ship and truck is to be regarded as equivalent to pipeline transport and thus compatible with provisions for CCS in the ETS Directive. Regarding liabilities, the European Commission has clarified that the liability for emissions caused by the operation of CO<sub>2</sub> capture, transport or storage in the CCS value-chain is transferred from one ETS installation to the other, without regard to the EEA country they are located in. Any leakage from storage is thus accounted as an emission by the storage operator, and also reported by the country where the storage site is located, in its national GHG inventory. The trend in EU politics is to develop the regulatory system in a more permissive direction, in support of CCS. Regulators are working to remove regulatory gaps and lower barriers. Regulatory obstacles and barriers do, however, remain and the most significant ones identified in this study are discussed below.

It should also be noted that, in addition to an enabling regulatory environment, sufficient financial incentives must be in place for investments in CCS to actually happen. This is also largely up to regulators but has not been within the scope of this project to analyse. The current regulatory design of the EU ETS, the union's flagship economic instrument to incentivise climate change mitigation, has included CCS applied to emissions from fossil fuels among technologies that can be

rewarded. The EU has so far, however, not introduced any policy instrument that drives investments into carbon removals through BECCS or DACCS. Some national initiatives in Nordic countries, such as Norway, Denmark and Sweden have been implemented, or are being prepared, to enable CCS investments in CCS (including, depending on the national context, DACCS and/or BECCS).

## 5.2 Significant barriers in international law

The analysis of the regulatory environment for CCS presented in this report has identified a number of barriers that risk slowing down CCS deployment in the Nordics.

- **Transboundary transport:** Through an amendment to the London Protocol, the transport of CO<sub>2</sub> for sub-seabed storage in another state is permitted, but the amendment has not yet entered into force. Transport of CO<sub>2</sub> therefore requires a provisional application of the amendment, which in turn requires a bilateral agreement or arrangements between the states concerned. The European Commission has concluded that the CCS Directive and the ETS Directive can act as such arrangement between EU states and that the EEA treaty together with the incorporation of the two directives concerned in the EEA legal regime provides the necessary arrangement with EEA partners. The Commission furthermore concluded that states that are party to the London protocol could conclude additional bilateral arrangements with other EU Member States and EEA partner countries only on issues that are not covered by the directives. These additional bilateral arrangements should be strictly limited to the residual issues not covered by EU law and they should not refer to the subject matters covered by EU rules. Further knowledge building and exchange regarding these matters would be desirable.
- **CO<sub>2</sub> storage in the Baltic Sea:** Currently, the Helsinki Convention does not allow the storage of CO<sub>2</sub> in the Baltic Sea. Enabling CO<sub>2</sub> storage in the Baltic Sea would increase the potential for CO<sub>2</sub> storage in Denmark, Finland and Sweden. In order to enable the storage of CO<sub>2</sub> in the Baltic Sea, it is required that the Helsinki Convention be amended or that a resolution allowing an interpretation that allows storage of CO<sub>2</sub> sub-seabed be adopted.
- **Some of the possible Baltic Sea storage locations extend to territory or economic zones outside Scandinavian countries and potentially also outside the territory of the EU.** This poses a problem as geological storage outside the territory of the EU is not covered by the CCS Directive.

- Deployment of BECCS: A moratorium in the Convention on Biological Diversity (CBD) does not allow climate-related geo-engineering activities that may affect biodiversity. Capture and storage of CO<sub>2</sub> from fossil fuels is expressly exempted from the moratorium, but not CCS applied to biogenic CO<sub>2</sub>, which may therefore constitute an obstacle for BECCS. If and how BECCS is compatible with the moratorium is ultimately subject to interpretation by the individual Parties to the CBD. Such processes are ongoing in Denmark and Sweden in order to reduce uncertainties.

Also related to BECCS deployment, tightening sustainability requirements for biomass within the EU could possibly affect the competitiveness of bioenergy and thus the conditions for BECCS.

### **5.3 Evolving national legislation is adapted to national contexts**

Concerning national legislation of relevance for CCS in the Nordic countries, all the countries have implemented the CCS Directive. The implementations of the CCS Directive have been accepted by the EU and have in other words been deemed correct. Whether or not the national CCS regulations, in part the implementation of the CCS Directive, have been found to be barriers when carrying out CCS activity is yet difficult to determine as CCS activity is in its infancy.

With regard to differences in national legislation the perhaps most distinct difference that has been identified in this study is that Finland uses the possibility (of the CCS Directive) not to permit geological storage of CO<sub>2</sub> in their territory (due to lack of known geological formations suitable for storage of CO<sub>2</sub>) while it is allowed in the remaining four Nordic countries. Iceland originally prohibited CO<sub>2</sub> storage with the exception of projects for research, development or testing purposes where the intention is to store less than a total of 100 kilotonnes of CO<sub>2</sub>. After revisions of legislation in the most recent years industrial scale geological storage of CO<sub>2</sub> is now, however, permitted. Legislation in Denmark has been changed in the most recent years to enable exemptions from a prohibition against geological CO<sub>2</sub> storage below the seabed. Denmark, furthermore, adopted legislation introducing a less comprehensive approval process for geological storage of CO<sub>2</sub> of less than 100 kilotonnes to promote the necessary research and development in the field.

Differences in the national legislations on a more general level seem in part to depend on how far the country has come in planning and building up infrastructure for CCS activities but also national circumstances. As an example, Norway has come far in planning and building infrastructure for CCS activities and to elaborate on the detail in the legislation. This is partly due their oil and gas industry and the early introduction of economic incentives for CCS. An example of how legislation is gradually adapted to national contexts as CCS moves closer to deployment is the recent Danish legislative changes in order to allow companies regulated within utility laws for power and heat to commit financially to CCUS. The Icelandic implementation of the CCS Directive has been innovative in the sense that it's adopted to Iceland's unique geology and permits mineral storage of CO<sub>2</sub> whereby captured CO<sub>2</sub> is dissolved in water and injected into basaltic formations underground where it transforms to stone, while the CCS Directive has been developed with the intention of geological storage of CO<sub>2</sub> in a supercritical state.

It is hard to indicate barriers in the CCS relevant national legislation in the Nordic countries as CCS activity is in its infancy and there is limited practical testing of the legislation. Romson & Steen (2021)<sup>[223]</sup> discuss permitting processes in a Swedish context and observe that CCS is new technology (for actors in the value chain and for regulators) and conclude that complications are likely to arise when the first permitting processes are initialised. The authors also argue that the processes are likely to become more predictable as experience accumulates and that one way of easing the process may be guidelines issued by responsible authorities at an early stage of the development.

## 5.4 A need for robust MRV and accounting frameworks

Monitoring, Reporting, and Verification (MRV) and accounting for CCS includes activity-level, national-level and, in some cases also EU-level and cross-boundary considerations. Robust and aligned activity-level MRV and national inventory methodologies for CCS are key for designing policies and incentives for CCS, since governments have an interest in incentivising activities that demonstrably help them to meet their targets. Robust and aligned MRV and accounting are particularly important for the effectiveness and integrity of results-based incentives, including market-based approaches. A key aspect of robust MRV and accounting for CCS is ensuring long-term durability of storage. This is a methodological and legal challenge since most actors and institutions cannot guarantee monitoring for, e.g., 100 years.

At the activity level, MRV covers the monitoring, reporting and verification of emissions and removals associated with specific activities. If an activity wishes to

---

223. Romson, Å., Steen, L. (2021).

generate carbon credits that represent additional mitigation outcomes (emission reductions or removals), it needs to apply methodologies and procedures developed specifically for carbon crediting, including additionality demonstration, baseline setting and MRV. Such methodologies exist for many CCS activity types, including BECCS and DACCS, and further methodologies are under development. Methodologies developed under carbon crediting programmes are designed to be "market-grade", i.e. enabling the generation of tradable carbon credits that can mobilise private finance from voluntary and compliance carbon markets and other climate policies (e.g. use for reducing tax liability or accessing subsidy). The proposed EU framework for certification of carbon removals is expected to develop EU-wide approaches to ensuring the integrity of certified carbon removal units, which could potentially be used to access carbon markets and/or subsidies.

To promote the effective and transparent use of scarce resources, the interplay between different incentives accessed by the activity, such as subsidies and voluntary carbon markets, needs to be carefully considered. This includes ensuring additionality, avoiding double claiming across various sources of support, and promoting transparent and credible claims related to CCS-related support.

At the national level, emissions and removals are monitored and reported through national GHG inventories. Current IPCC inventory guidelines enable the inclusion of CCS, including BECCS, in national GHG inventories. BECCS-related removals have yet not been reported by any country and it is yet to be determined how BECCS is to be reported by EU Member States. It is unclear whether and how DACCS could be included in national GHG inventories. Inclusion of CCS in the national inventory enables the design of policies, including market-based instruments, to incentivise CCS and BECCS, if this is what national governments wish to do. Some governments are already considering incentives for BECCS. CCS may include cross-border cooperation and some (including Nordic) governments are already piloting inter-governmental agreements on cross-border cooperation on CCS activities, including for DACCS. These agreements can include provisions for MRV and accounting, including for long-term monitoring and reporting as well as liability in case of leakage. Such cross-border piloting is much-needed and can help to develop universal guidance on how mitigation outcomes from cross-border cooperation should be accounted for at national level.

The national inventory serves as the basis for the emissions balance, which is used for tracking progress towards and achievement of national mitigation targets. Countries must adjust their emissions balances for any transfers or acquisitions of mitigation outcomes relating to market-based cooperation, in line with guidance relating to Article 6.2 of the Paris Agreement. Applying corresponding adjustments would prevent double claiming in the context of mitigation outcomes that are used by non-state actors for voluntary offsetting.

The current EU regulation is not fully aligned with the Paris Agreement, for example



with regard to corresponding adjustments in line with Article 6.2 of the Paris Agreement. Furthermore, it is not yet fully clear how and where Member States should report and account for removals from BECCS and DACCS at the EU level.

In Nordic countries and the EU, key policies and incentives, such as the EU ETS, currently focus on emissions and incentives for emission reductions, including through CCS. A robust MRV and accounting framework for CCS has been key in incentivising CCS activities. By contrast, there are currently very few incentives for enhancing removals through BECCS and DACCS, besides some planned subsidies. Robust and consistent MRV and accounting are key for designing effective and transparent incentives also for removals. Making use of existing and forthcoming methodologies, voluntary carbon markets provide a potential and readily available source of funding for BECCS and DACCS. However, new national and EU regulation would be needed to ensure the credible and transparent voluntary use of carbon credits that avoids double claiming, e.g., through corresponding adjustments (in case of use voluntary offsetting claims) or mitigation contribution claims. Furthermore, as noted above, the roles of and interactions between different incentives, such as subsidies and voluntary carbon markets, would need to be carefully considered. MRV and accounting can help to attribute climate benefits transparently between different sources of support.

## 5.5 Timely development of the components of the CCS value chain

Finally, it is important to underline that the attainment of Nordic countries' individual and joint ambitions to reach net-zero GHG emissions may require very significant CCS deployment within a couple of decades. This would require build-up of large infrastructures for the integrated CCS value chain by multiple actors with incentives that are not always aligned (Karlsson, 2022)<sup>[224]</sup> This implies a challenge since CCS at scale would require that the different components along the value chain be developed (and incentivized through policy) jointly to avoid cross-chain risks (i.e. that a failure of one of the components in the value chain affects operations in other parts of the chain). A given industrial actor is unlikely to want to invest heavily in capture equipment before knowing that there is a suitable, reasonably priced storage with sufficient capacity available. Conversely, a storage operator is unlikely to want to invest heavily in CO<sub>2</sub> storage and injection capacities without knowing that there will be capture plants that will want to pay for using storage capacity. Such considerations are crucial for achieving the ramp-up required to work towards meeting the ambitious mitigation targets that have been adopted on national, Nordic and international level and the contributions from CCS

---

224. Karlsson, S. (2022). "CO<sub>2</sub> transportation infrastructure and biomass supply systems for carbon capture and storage", *Chalmers University of Technology*.

that will in all likelihood be necessary for the attainment of those targets. Efficient co-ordination across the Nordic countries may be very important to address a potential "hold-up" or "commitment" problem and that it could also bring cost savings through facilitating more rational infrastructure configurations (e.g., SEA (2010); Rootzen, et al. (2018); Möllersten et al., (2021); Lefvert (2022)).<sup>[225]</sup>

## 5.6 Recommendations

While the Nordic countries have somewhat different entry points in CCS, there are several shared ambitions. Issues where it may be useful for the Nordic countries to coordinate positions in order to have stronger impact on policy development, not least in the EU, include:

- The CCS Directive and further actions to build certainty related to the treatment of other modes of CO<sub>2</sub> transport than pipeline.
- Where and how Member States should report and account for removals from BECCS and DACCS at the EU level.
- Policy in relation to energy use of biomass waste and residues from sustainable forest management and its implications for the potential of BECCS.
- The further development of the emerging EU carbon removal certification framework.
- Interpretations of the moratorium on geo-engineering in the CBD and its implications for implementation of BECCS in Nordic contexts.
- Initiatives to address the Helsinki Convention prohibition against the storage of CO<sub>2</sub> below the Baltic Sea.
- How to address storage locations, e.g., in the Baltic Sea region, that extend to territory or economic zones outside the EU where CO<sub>2</sub> storage would be geologically appropriate.
- Explore opportunities for market-based solutions involving international transfers of mitigation outcomes from activities in the Nordic countries that may facilitate enhanced CCS deployment and mitigation ambition.

It is recommended that the Nordic countries intensify their cooperation and dialogue, providing for joint efforts to build knowledge, sharing of Nordic experience and lessons learned coordinated through a Nordic forum for collaboration on CCS.

---

225. SEA (2010), "Systemstudie av möjligheter att etablera en infrastruktur för CCS i Östersjöregionen"; Rootzen, et al. (2018), "Deployment of BECCS in basic industry - a Swedish case study"; Möllersten et al, (2021), "Policies for the promotion of

BECCS in the Nordic countries"; Lefvert (2022), "Capture and storage – the chicken and egg of CCS".

A Nordic forum could, for example, build on the Existing Networking Group on CCUS (NGCCUS) under Nordic Energy Research that already facilitates knowledge sharing.

Some stakeholders see the need for a more formal working group that would hold meetings more frequently than the current biannual meetings of the NGCCUS.

Areas that may initially be considered for prioritisation include:

- Establish Nordic-level technical work to coordinate CCS-relevant approaches to (i) activity-level Monitoring, Reporting, and Verification and (ii) national GHG inventories and accounting, including:
  - Development of optimal and consistent Measuring, Reporting and Verification (MRV) protocols for the whole value chain, from CO<sub>2</sub> capture to storage, including for cross-border projects.
  - Prepare for relevant competent authorities' exchange of emissions monitoring plans and reports of relevant ETS installations.
  - Prepare for information exchanges between the inventory compilers of the respective (CO<sub>2</sub> import and export) countries to allow for alignment of the respective amounts and to avoid cross-border double-counting.
- Ensuring the credible and transparent voluntary use of carbon credits based on activities in the Nordic countries, that safeguards environmental integrity, including issues related to the avoidance of double claiming and the ownership of mitigation outcomes that go beyond national GHG mitigation targets.
- Strengthen the capacity for long-term strategic planning/optimization of CCS infrastructure in the context of, inter alia, what may be required for attainment of the 2035–2050 Nordic national net-zero targets.

Regular Nordic-level sessions could be arranged for exchange of information between governments and other stakeholders, including special sessions dedicated to specific themes, dedicated brainstorming sessions etc.

# Literature

Ahonen, H., Berninger, K., Kessler, J., Möllersten, K., Spalding-Fecher, R., Tynkynen, O. (2022). Harnessing voluntary carbon markets for climate ambition. Nordic Council of Ministers. <https://www.norden.org/en/publication/harnessing-voluntary-carbon-markets-climate-ambition>.

Fogstad Vold, S. (2020). "CCS Legislation in Norway: The EU CCS Directive and its Implementation into Norwegian Law". In: European Energy Law Report XIII, Roggenkamp, M., Banet C. (ed.), 2020, pp. 369-386.

Fridahl, M., Bellamy, R., Hansson, A., Haikola, S. (2020). "Mapping Multi-Level Policy Incentives for Bioenergy With Carbon Capture and Storage in Sweden", *Frontiers in climate*, 2, 1-25. doi: <https://doi.org/10.3389/fclim.2020.604787>.

Government of Sweden (2020). "Vägen till en klimatpositiv framtid". SOU 2020:4, p. 448. <https://www.regeringen.se/rattsliga-dokument/statens-offentliga-utredningar/2020/01/sou-20204/>

Karlsson, S. (2022). "CO<sub>2</sub> transportation infrastructure and biomass supply systems for carbon capture and storage", Chalmers University of Technology, Gothenburg. [https://research.chalmers.se/publication/533043/file/533043\\_Fulltext.pdf](https://research.chalmers.se/publication/533043/file/533043_Fulltext.pdf).

Laininen, J., Ahonen, H. M., Laine, A., Kulovesi, K. (2022). "Selvitys – Vapaaehtoiseen päästökompensatioihin liittyvät Eriyiskysymykset", Ministry of the Environment Finland.

Langlet, D. (2015). "Exporting CO<sub>2</sub> for Sub-Seabed Storage: the Non-Effective Amendment to the London Dumping Protocol and its Implications", *International Journal of Marine and Coastal Law*, 30(3), 395-417. doi: <https://doi.org/10.1163/15718085-12341362>.

Lefvert, A. (2022). "Capture and storage – the chicken and egg of CCS", presented at Possibilities of CCS and CCU in the Nordic countries webinar 25 October. Available at: <https://www.ivl.se/english/ivl/our-offer/research-projects/climate/carbon-neutrality-webinars.html>.

Möllersten, K., Zetterberg, L., Nielsen, T., Torvanger, A., Siikavirta, H., Hannula, I. (2021). "Policies for the promotion of BECCS in the Nordic countries". Nordic Council of Ministers. Available at: <https://www.norden.org/en/publication/policies-promotion-beccs-nordic-countries>.

Poralla, M., Honegger, M., Gameros, C., Wang, Y., Michaelowa, A., Sacherer, A.-K., Ahonen, H.-M., Moreno, L. (2022). "Tracking greenhouse gas removals: baseline and monitoring methodologies, additionality testing, and accounting", NET-Rapido

Consortium and Perspectives Climate Research.

<https://climatestrategies.org/publication/tracking-greenhouse-gas-removals-baseline-and-monitoring-methodologies-additionality-testing-and-accounting>.

Rickels, W., Proelß, A., Geden, O., Burhenne, J., Fridahl, M. (2021). "Integrating Carbon Dioxide Removal Into European Emissions Trading", *Frontiers in climate*, 3, 1-10. doi: <https://doi.org/10.3389/fclim.2021.690023>.

Romson, Å., Steen, L. (2021). "Miljö tillstånd i kedjan för bio-CCS". In: Löfblad, E., et al. (2021). "Samverkan kring infrastruktur för transport och lagring av koldioxid". Energiforsk rapport 2022:838, Annex B.

<https://energiforsk.se/media/30914/samverkan-kring-infrastruktur-for-transport-och-lagring-av-koldioxid-energiforskrappport-2022-838.pdf>.

Rootzen, J., Kjärstad, J., Johnsson, F., Karlsson, H. (2018). "Deployment of BECCS in basic industry - a Swedish case study". International Conference on Negative CO<sub>2</sub> Emissions. Gothenburg.

Swedish Energy Agency (2010). "Systemstudie av möjligheter att etablera en infrastruktur för CCS i Östersjöregionen", Report ER 2010:36.

Swedish Energy Agency (2023). "Särskild redovisning av Energimyndighetens arbete med utformning av stödsystem för bio-CCS 2022", Report ER 2023:11.

Weber, V. (2021). Are we ready for the ship transport of CO<sub>2</sub> for CCS? Crude solutions from international and European law, *Review of European, Comparative & International Environmental Law*, 30(3), 387-395. doi:

<https://doi.org/10.1111/reel.12399>.

# About this publication

## Regulatory framework for CCS in the Nordic countries

*Kenneth Möllersten, Sofi Marklew, Hanna-Mari Ahonen*

TemaNord 2023:521

ISBN 978-92-893-7623-5 (PDF)

ISBN 978-92-893-7624-2 (ONLINE)

<http://dx.doi.org/10.6027/temanord2023-521>

© Nordic Council of Ministers 2023

Cover photo: Michael Held/Unsplash

Published: 24/6/2023

### Disclaimer

This publication was funded by the Nordic Council of Ministers. However, the content does not necessarily reflect the Nordic Council of Ministers' views, opinions, attitudes or recommendations.

### Rights and permissions

This work is made available under the Creative Commons Attribution 4.0 International license (CC BY 4.0) <https://creativecommons.org/licenses/by/4.0>.

**Translations:** If you translate this work, please include the following disclaimer: This translation was not produced by the Nordic Council of Ministers and should not be construed as official. The Nordic Council of Ministers cannot be held responsible for the translation or any errors in it.

**Adaptations:** If you adapt this work, please include the following disclaimer along with the attribution: This is an adaptation of an original work by the Nordic Council of Ministers. Responsibility for the views and opinions expressed in the adaptation rests solely with its author(s). The views and opinions in this adaptation have not been approved by the Nordic Council of Ministers.

**Third-party content:** The Nordic Council of Ministers does not necessarily own every single part of this work. The Nordic Council of Ministers cannot, therefore, guarantee that the reuse of third-party content does not infringe the copyright of the third party. If you wish to reuse any third-party content, you bear the risks associated with any such rights violations. You are responsible for determining whether there is a need to obtain permission for the use of third-party content, and if so, for obtaining the relevant permission from the copyright holder. Examples of

third-party content may include, but are not limited to, tables, figures or images.

**Photo rights (further permission required for reuse):**

Any queries regarding rights and licences should be addressed to:  
Nordic Council of Ministers/Publication Unit  
Ved Stranden 18  
DK-1061 Copenhagen  
Denmark  
pub@norden.org

**Nordic co-operation**

*Nordic co-operation* is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, and the Faroe Islands, Greenland and Åland.

*Nordic co-operation* has firm traditions in politics, economics and culture and plays an important role in European and international forums. The Nordic community strives for a strong Nordic Region in a strong Europe.

*Nordic co-operation* promotes regional interests and values in a global world. The values shared by the Nordic countries help make the region one of the most innovative and competitive in the world.

The Nordic Council of Ministers  
Nordens Hus  
Ved Stranden 18  
DK-1061 Copenhagen  
pub@norden.org

Read more Nordic publications on [www.norden.org/publications](http://www.norden.org/publications)