

## REGULATION OF CCS STORAGE SITES IN NORWAY AND COMPLIANCE WITH EEA LAW

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### Abstract

Carbon capture and storage (CCS) has been deployed in Norway since 1996. Originally, this activity came under the country's mineral legislation. In the late 2000s, the European Union established a detailed legal framework for the safe deployment of CCS, which was often considered by the industry to be burdensome. Being applicable in Norway as well, this article examines how the Norwegian legal system has adopted the European CCS legislation and how it addressed the challenges posed by it.

**Keywords:** CCS Directive, implementation, liability, flexibility, Norway, EEA

### 1. Introduction

Carbon (dioxide) capture and storage (CCS) is a technology whereby carbon dioxide (CO<sub>2</sub>) is separated from flue gases at large emission sources like power stations and factories, compressed, and injected into geological formations like depleted oil and gas fields, saline aquifers, and basalt formations. CCS is supported both at the international<sup>1</sup> and the European level,<sup>2</sup> and it is understood to be part of the portfolio of measures that have to be deployed to reach the Paris goal of 1.5°C.<sup>3</sup>

Carbon capture and storage exists in Norway since 1996. The Sleipner T platform in the North Sea injects CO<sub>2</sub> into the Utsira formation beneath it. The CO<sub>2</sub> originates from the production of natural gas from the Sleipner West reservoirs. Since 2014 the Sleipner T platform also injects CO<sub>2</sub> from the Gudrun field. Since 2008 the Snøhvit site also stores produced CO<sub>2</sub> in the Barents Sea. CCS has been deployed on these platforms in response to the carbon tax that the Norwegian government introduced for petroleum activities in 1991.<sup>4</sup>

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<sup>1</sup> UNFCCC 'Decision 7/CMP.6, Carbon Dioxide Capture and Storage in Geological Formations as Clean Development Mechanism Project Activities' UN Doc FCCC/KP/CMP/2010/12/Add.2 (15 March 2011); and UNFCCC 'Decision 10/CMP.7, Modalities and Procedures for Carbon Dioxide Capture and Storage in Geological Formations as Clean Development Mechanism Project Activities' UN Doc FCCC/KP/CMP/2011/10/Add.2 (15 March 2012).

<sup>2</sup> CCS has been the fourth part of the EU's 20-20-20 climate and energy package.

<sup>3</sup> See in particular V Masson-Delmotte et al (eds), *Global Warming of 1.5°C* (Intergovernmental Panel on Climate Change 2018) 14. This source shows four model pathways to reach the 1.5°C goal with no or limited overshoot. Only one of these models does not include CCS technology.

<sup>4</sup> CO<sub>2</sub> Tax Act on Petroleum Activities (LOV-1990-12-21-72). In 2021, this tax is NOK 543 (about EUR 55) / ton of CO<sub>2</sub>. This tax is independent from and additional to the allowances that have to be purchased in the European Emission Trading Scheme (ETS). See: <https://www.norskpetroleum.no/en/environment-and-technology/emissions-to-air/>.

Today, Norway is ready for its first full-scale, full-chain CCS project, called Longship. At the moment, the project is planned to store the CO<sub>2</sub> captured at Norcem's cement plant in Brevik. In time, the Longship project is hoped to expand into a North-West European CCS network and that other states in Europe embark on their own CCS projects. However, CCS technology requires substantial investment, and the related legal framework is considered to be burdensome.

The legal challenges associated with this framework have been widely discussed before.<sup>5</sup> Earlier experience indicates that the general answer to these challenges is a close cooperation between the industry and the authorities and the commercially reasonable interpretation of the legal terms in question and the making of commercially reasonable estimates.<sup>6</sup> The present article aims at examining the Norwegian experience against this background.

## 2. The relevance of European legislation

At the European level, the legal framework for CCS comprises of three instruments: the CCS Directive,<sup>7</sup> the Environmental Liability Directive,<sup>8</sup> and the Emission Trading Scheme Directive.<sup>9</sup> Each of these instruments are so-called 'instruments with EEA relevance'. This means that they are made part of the European Economic Area Agreement. Norway being a member of the EEA, the provisions of these directives are applicable to it. Thus, the Norwegian experience is highly relevant to other EEA and EU states. Initially, Norway was averse to the European efforts to introduce CCS legislation. However, over time it became supportive.<sup>10</sup> In fact, Norway took an active role in the shaping of the international and European legal framework for CCS.<sup>11</sup> Despite Norway's involvement, the national implementation of the CCS Directive was a long and contentious process both at the level of stakeholder interests and at

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<sup>5</sup> The following concerns have been raised in the past: How to show 'complete and permanent' containment? Is it possible? What is 'leakage'? How will the competent authority evaluate that the hand-over criteria are met? The default 20-year post-closure period is too long. What should the financial security cover? How to estimate the future price of emission allowances? The liability is not limited. Guidance Document 4 on the Financial Security can be read as too rigid and demanding.; For discussion, see for example: A Pop, 'The EU Legal Liability Framework for Carbon Capture and Storage: Managing the Risk of Leakage while Encouraging Investment' 6 *Aberdeen Student Law Review* 2015, 32-56; V Weber, 'Uncertain liability and stagnating CCS deployment in the European Union: Is it the Member States' turn?' 27 *Review of European, Comparative and International Environmental Law* 2018, 153-161.

<sup>6</sup> See for example: Carbon Sequestration Leadership Forum, 'Practical Regulations and Permitting Process for Geological CO<sub>2</sub> Storage' November 2017, available at <https://www.cslforum.org/cslf/sites/default/files/documents/7thMinUAE2017/7thMinAbuDhabi17-PG-RegulationTaskForceReport.pdf>; ROAD CCS, 'Case Study of the ROAD Storage Permit, A Report by the ROAD Project' (ROAD CCS 2013), available at <https://www.globalccsinstitute.com/resources/publications-reports-research/case-study-of-the-road-storage-permit/>; V Weber (fn.5).

<sup>7</sup> Directive 2009/31/EC of 23 April 2009 on the geological storage of carbon dioxide [2009] OJ L140/114 (CCS Directive).

<sup>8</sup> Directive 2004/35/EC of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage [2004] OJ L143/56 (ELD).

<sup>9</sup> Directive 2003/87/EC of 13 October 2003 on establishing a scheme for greenhouse gas emission allowance trading within the Community [2003] OJ L275/32, as amended by Directive 2009/29/EC [2009] OJ L140/63.

<sup>10</sup> T Jevnaker, 'Norway's implementation of the EU climate and energy package - Europeanization or cherry-picking?' FNI Report 7/2014 (Fridtjof Nansen Institute, 2014), p.32; See also: T Jevnaker, 'Implementation in Norway' ch.9 in J B Skjærseth et al., 'Linking EU Climate and Energy Policies' (Edward Elgar, 2017) pp.184-186.

<sup>11</sup> *Ibid.*

the level of EU-Norway relations.<sup>12</sup> The main concerns on the substance related to the liability that may arise for the operator, with particular regard to ETS liability, and the terms of transferring responsibility for the storage site to the State.<sup>13</sup> The implementation was further complicated, by geo-political arguments (the application of the EEA Agreement on the continental shelf), by the loss of political momentum between 2013 and 2015, and by the fact that two ministries rivalled for the responsibility of implementation.<sup>14</sup>

### 3. Implementation and authorization requirements

In the event, the CCS Directive has been implemented through the new Storage Regulations<sup>15</sup> and amendments to the Petroleum Regulations<sup>16</sup> (especially new chapter 4a) and Pollution Regulations<sup>17</sup> (new chapter 35).<sup>18</sup>

The Pollution Regulations apply to all forms of CCS and fall under the competence of the Ministry of Climate and Environment. The other two regulations are applicable depending on the type of CCS conducted. Where CCS is linked to a petroleum activity, the Petroleum Regulations apply. When CCS is conducted in itself, the Storage Regulations apply. These regulations come under the competence of the Ministry of Petroleum and Energy. After public consultation,<sup>19</sup> the Ministry noted that difficult questions of financial and legal nature would arise if the earlier, petroleum production-related CCS operations came under the new Regulations. Consequently, the Ministry deemed that it would be the most appropriate to regulate CCS linked to petroleum activities under the petroleum legislation as earlier (with some modifications) and to apply the new Storage Regulations to CCS where the source of the CO<sub>2</sub> is not from the petroleum industry.

It has been raised during the public consultation that there is an overlap between new chapter 35 of the Pollution Regulations and the other two regulations. The Ministry of Petroleum and Energy justified the inclusion of the parallel provisions into the Storage Regulations and the Petroleum Regulations by stating that the provisions in these regulations concern resource management considerations while the provisions in the Pollution Regulations concern environmental considerations. These considerations are different, and practice has shown (at the Sleipner and Snøhvit storage sites) that the resource authorities also need such rules.

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<sup>12</sup> Jevnaker (fn.10), pp.32-37.

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.

<sup>15</sup> FOR-2014-12-05-1517.

<sup>16</sup> FOR-1997-06-27-653.

<sup>17</sup> FOR-2004-06-01-931.

<sup>18</sup> For general discussions on the Norwegian implementation regime see S F Vold, 'CCS Legislation in Norway - The EU CCS Directive and its Implementation into Norwegian Law' ch. 18 in M M Roggenkamp and C Banet (eds.), 'European Energy Law Report XIII' Cambridge University Press, 2020; C Banet, 'Regulering av karbonfangst, transport og lagring i norsk rett' in H C Bugge (ed.), 'Klimarett' (Universitetsforlaget, 2021).

<sup>19</sup> See: Cabinet Papers, PRE-2014-12-05-1517, PRE-2014-12-05-1518 Gjennomføring av EUs lagringsdirektiv: Forskrift om utnyttelse av undersjøiske reservoarer på kontinentalsokkelen til lagring av CO<sub>2</sub> og om transport av CO<sub>2</sub> 2 på kontinentalsokkelen, og Forskrift om endring av forskrift 27. juni 1997 nr 653 om petroleumsvirksomhet.

This is a surprising justification. The Pollution Regulations are authorized under section 9 of the Pollution Control Act (PCA).<sup>20</sup> While the PCA applies to offshore operations, it does so in a partial manner. Section 4 provides:

“The provisions of this Act also apply, subject to any restrictions deriving from international law and from the Act itself (cf. Chapter 8 [Compensation for pollution damage]), to exploration for and production and utilization of natural subsea resources on the Norwegian part of the continental shelf, including decommissioning of facilities. The provisions of section 7 [Duty to avoid pollution], first paragraph, cf. Chapter 3, *on the duty to obtain a permit* [see s.11] and of section 9 on regulations nevertheless *apply only to those aspects of such activity that regularly result in pollution*. Nor do the provisions of section 7, second paragraph, cf. fourth paragraph, apply to measures to prevent or stop acute pollution.”<sup>21</sup>

Thus, it appears that in principle the PCA and thus the Pollution Regulations apply to offshore activities with respect to ‘operational pollution’ (pollution associated with boring, waste water etc.).<sup>22</sup> Meanwhile, the petroleum framework concerns the specific provisions on accidental pollution by oil or gas.<sup>23</sup>

The focus of the CCS Directive is the specific act of storing CO<sub>2</sub> with its potential consequences<sup>24</sup> and not offshore operations in general. Consequently, the most logical place for implementation is the petroleum law framework, i.e. the Storage Regulations and the Petroleum Regulations. By virtue of section 4 of the PCA, the general offshore aspects of CCS come under the pollution framework automatically, just like the general aspects of petroleum operations do. In this light, the separate implementation into the Pollution Regulations appears to be a legally questionable result of the above-mentioned rivalry between the two Ministries.

A consequence of the double regulation is that the environmental permitting regime is a hybrid system. All CCS operations must obtain a permit from the Ministry of Climate and Environment under section 11 of the PCA with respect to the boring activity and under section 35(4) of the Pollution Regulations for the actual injection and storage. In practice, these two permits are in one document (the ‘environmental permit’).

As regards the resource authorities, operators of CCS connected to a petroleum activity must obtain from the Ministry of Petroleum and Energy an exploitation permit under section 30(e) of the Petroleum Regulations; operators of standalone CCS must obtain the corresponding permit under section 4(1) of the Storage Regulations.

In 2015, Statoil (today Equinor) had to reapply for permits under the new legislation. While the permits under the Pollution Regulations are publicly available, the permits under the Petroleum Regulations have not been made available to the author. In the case of the storage site used by the Longship project, the author has received a copy of the permit under the Storage Regulations. This permit sets out the coordinates of the area in which the CO<sub>2</sub> operation can take place and restates various statutory obligations for the operator with particular attention to

<sup>20</sup> LOV-1981-03-13-6.

<sup>21</sup> Ibid., s.4, emphasis added.

<sup>22</sup> See also: NUT 1977:1 Utkast til lov om vern mot forurensing og forsøpling med motiver, pp. 114-115; NOU 1982:19 Generelle lovregler om erstatning for forurensningsskade, p. 261.

<sup>23</sup> See: Petroleum Act (LOV-1996-11-29-72) ss. 1(6)(a) and 7(1).

<sup>24</sup> See CCS Directive (fn. 7), art. 1.

environmental obligations. By contrast, the environmental permit under the Pollution Regulations has not been issued yet. The application for this permit is expected to be submitted in 2022.<sup>25</sup> It is assumed here that the available permits under the Pollution Regulations of the running projects are indicative of what should be expected in the corresponding permit of the Longship project. Thus, the discussion below will rely on the Sleipner field's environmental permit, which provides illustration of the flexible approach that authorities need to take in order to allow CCS.

## 4. Compliance

### 4.1 Risk assessment

The European framework prescribes a risk assessment as part of the permit application procedure. For the purposes of the risk assessment, an injection phase and a post-injection phase of 50 years have been defined for the Sleipner project.<sup>26</sup> The various risks taken into account have been: migration of CO<sub>2</sub> outside the storage formation, migration of CO<sub>2</sub> to production wells, leakage to the seafloor or the air through the cap rock or faults, damage to the reservoir due pressure increase, leakage through closed exploration wells, leakage to the air from the capture process, and erroneous measurement of the stored CO<sub>2</sub>, and erroneous composition analysis of the CO<sub>2</sub> stream.<sup>27</sup> Two risks were noted in particular: the risk of leakage to the seafloor and a change in water acidity (pH) as a result of the leakage. The former risk was found to have a low probability of 0,0001 during injection and 0,001 in the post-injection period.<sup>28</sup> Likewise, no significant effect on sealife is predicted even in a worst-case leakage scenario. Thus, the two risks combined mean that the environmental risk was deemed low.<sup>29</sup>

### 4.2 Financial security and financial mechanism

In its Article 19, the CCS Directive prescribes that the operator of the storage site must furnish proof that the obligations in the storage permit can be financially met. This is known as the financial security. Further to this, under Article 20 the operator must provide a lump sum payment to the competent authority before the latter takes over responsibility for the storage site in order to cover at least 30 years of monitoring costs and other costs that may arise. This is known as the financial mechanism. The European Commission elaborated further on these two provisions in a guidance document<sup>30</sup> and the Norwegian Environment Agency published further guidelines.<sup>31</sup> In the Norwegian implementation the terms of the financial security are established jointly by the Ministry of Climate and Environment and the Ministry of Petroleum

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<sup>25</sup> Personal correspondence with the Norwegian Environment Agency, dated 19 April 2021.

<sup>26</sup> Miljødirektoratet, 'Tillatelse til lagring av CO<sub>2</sub> ved Sleipner-feltet' ('Sleipner environmental permit'), Ref: 2013/4083, 16. juni 2016, s.4.1.2.

<sup>27</sup> Ibid.

<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Commission (EU), 'Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide – Guidance Document 4 – Article 19 Financial Security and Article 20 Financial Mechanism' (European Commission 2011) (Guidance Document 4).

<sup>31</sup> Miljødirektoratet, 'Nærmere bestemmelser om finansiell sikkerhet for CO<sub>2</sub> lagring - Forurensningsforskriften § 35-15' Veileder M-521, 2016.

and Energy; meanwhile, the administration of the financial mechanism falls under the competence of the Ministry of Petroleum and Energy.<sup>32</sup>

The financial security must be able to cover monitoring obligations, corrective measures, site closure, post-closure obligations, potential emission allowance obligations.<sup>33</sup>

While Statoil noted that it is difficult to predict future prices on a 20 to 25-year time horizon, in 2015 it estimated the related monitoring costs of the Sleipner site to be between 87 and 104 million NOK. Crucially, the environmental permit of the Sleipner field states:

“The cost of emissions allowance obligations were not estimated, but Statoil points to the risk assessment where it concludes that the most likely leakage scenario is in the range of 0,1-100 tons/year. With such leakage rate, the emission allowance obligations will probably not constitute a significant cost even with a high allowance price in the future.”<sup>34</sup>

As for the form of the security, Statoil provided a parent company guarantee. This is a less preferred form of security, but for the encouragement of the industry and the importance of reducing GHG emissions, it was accepted by the Ministry.

The exact modalities of the financial security are decided on a case-by-case basis.<sup>35</sup> Indeed, some of the costs can be estimated or partly confirmed once the storage operation is in place.<sup>36</sup>

Apart from the financial security requirement, the operator must show that it is financially solid and reliable and has professional and technical competence.<sup>37</sup> According to the permit these criteria have been met by Statoil through its earlier experience in the petroleum industry.<sup>38</sup>

#### **4.3 Certain technical points**

At the Sleipner field, the so-called Utsira formation is used for the storage of CO<sub>2</sub>. This formation has been studied in great detail in the past 30 years. Statoil argued that it would be inappropriate to update the models in line with Annex I of the Pollution Regulations due to size of the Utsira formation and because the existing 4D data is better suited to describe the CO<sub>2</sub> plume.<sup>39</sup> This deviation was allowed.

For the monitoring plan, 4D seismic surveys have been chosen as primary method.<sup>40</sup> This can be complemented with gravimetry, and well pressure and temperature during the injection phase.<sup>41</sup>

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<sup>32</sup> Cabinet Papers (fn. 19), s.8.

<sup>33</sup> Miljødirektoratet (fn. 26), s.4.2.5.

<sup>34</sup> Ibid., author's translation.

<sup>35</sup> Miljødirektoratet (fn. 31), p.2.

<sup>36</sup> Ibid.

<sup>37</sup> Pollution Regulations (fn. 17 ), s. 35(4)(d).

<sup>38</sup> Miljødirektoratet (fn. 26), s. 4.1.3.

<sup>39</sup> Ibid., s. 4.1.1.

<sup>40</sup> Ibid., s. 4.2.3.

<sup>41</sup> Ibid.

In the meaning of section 35(8) the CO<sub>2</sub> received for storage must consist *overwhelmingly* of CO<sub>2</sub>. In the case of the Sleipner field this criterion was defined at 96-99 mol% CO<sub>2</sub>, which corresponds to the characteristics of the amine process used for the separation of CO<sub>2</sub>.<sup>42</sup>

The Sleipner operation being part of a petroleum activity, it is subject to a decommissioning plan under ss.43-45 of the Petroleum Act. It has been agreed that the operator would furnish the post-closure plan required by section 30(n) of the Petroleum Regulations at a later stage as part of the decommissioning plan. Since the Longship project is a stand-alone CCS operation, this option will not be available, and a defined post-closure plan should be expected in its environmental permit once issued.

## 5. Compensation in case of pollution damage

In this last section, it is necessary to include a brief a discussion on the environmental liability that may arise from CO<sub>2</sub> storage. In the case of standalone CCS operations, the specific provisions are set out in chapter 8 of the Storage Regulations. The liable person is the permit holder, and the liability attaches regardless of fault. However, the liability provisions are equally applicable to a non-permit holding operator when the Ministry decides so by the authorization of the operator. In such case, claims should be directed against the operator first. If the operator cannot cover the whole claim, the permitholders must cover the outstanding amount in proportion to their share in the permit. In case of *force majeure*, the liability can be reduced as appropriate. The liability is channelled to the permit holder (or operator) who can have a recourse claim against the tortfeasor in case the tort was committed with intention or gross negligence. Chapter 9 of the Storage Regulations contain specific rules on compensation to Norwegian fishermen.

Regarding CCS linked to a petroleum activity, the Petroleum Regulations (including chapter 4a) do not contain provisions on compensation. This is because the related provisions on compensation are in chapters 7 and 8 of the Petroleum Act, the authorizing act of the Regulations. Interestingly, the definition of pollution damage has not been amended in the Petroleum Act.<sup>43</sup> Thus, formally, the relevant provisions would not cover damage caused by CO<sub>2</sub>. It is assumed here that the relevant provisions are intended to cover damage caused by CO<sub>2</sub> as much as by petroleum and an amendment to this effect is recommended.

The Pollution Regulations (including chapter 35) do not contain provisions on compensation either. The corresponding provisions are in chapter 8 of the authorizing legislation, the PCA. In line with the argument made above in section 3, in principle, these compensation provisions should apply to environmental damage arising from offshore operations in general (boring etc.) and not to specific environmental damage caused by leaking CO<sub>2</sub>.<sup>44</sup>

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<sup>42</sup> Ibid., s.4.2.2.

<sup>43</sup> Section 7(1) defines pollution damage as "... damage or loss caused by pollution as a consequence of *effluence or discharge of petroleum* from a facility, including a well, and costs of reasonable measures to avert or limit such damage or such loss, as well as damage or loss as a consequence of such measures ..." (emphasis added). Cf. Storage Regulations, s8(1).

<sup>44</sup> See fn. (22).

## 6. Conclusion

This short paper has described how the European CCS legal framework has been implemented into Norwegian law and the specificities of the related permitting system; it provided some examples of how the framework can be applied to an operation storage site in anticipation of the environmental permit of the Longship project. Finally, a note was made on the related liability provisions.

It follows from the discussion above that the provisions of the CCS Directive could have been implemented in a more logical and efficient way. If revising the whole implementation is not feasible in the current administrative arrangement, at least the minor amendment to the Petroleum Act suggested above should be put in place to achieve a more coherent system.

Regarding the terms of CCS operations, the Norwegian experience coincides with the experience of earlier projects: close cooperation is necessary between the industry and the authorities, and the various legal concepts have to be given a practical interpretation with reasonable and justified estimates. The potential liability for future emissions trading quotas stands out in particular when this approach is taken; it becomes an insurable risk.