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Transboundary Carbon Capture and Storage (CCS) networks in the European context: the "Northern Lights" case study

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Abstract

This thesis focusses on CCS as part of the portfolio of mitigation options available against climate change. Considering the underdevelopment of CCS projects with respect to the targets set in international and European law, the thesis analyses regulation of offshore CCS networks – utilising the "Northern Lights" project as case study - as a potential break-through for the achievement of emission reduction targets in hard-to-abate sectors. The thesis aims at clarifying, through the thorough analysis of primary and secondary sources, how CCS networks such as Northern Lights are regulated within international law of the sea - through UNCLOS, the London Convention and Protocol and OSPAR - and European law, with Directive 2009/31/EC and its Norwegian implementation. Within this framework, the research identifies challenges of existing law and possibilities for the future regulation of CCS networks in Europe.

Abbreviations

CCS	Carbon Capture and Storage
CEF	Connecting Europe Facility
CO2	Carbon dioxide
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EFTA	European Free Trade Association
ETS	Emissions Trading System
GHGs	Greenhouse gases
IEA	International Energy Agency
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
MoU	Memorandum of Understanding
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PCI	Project of Common Interest
UNCLOS	United Nations Convention on the Law of the Sea
UNFCCC	United Nations Framework Convention on Climate Change
VCLT	Vienna Convention on the Law of the Treaties

1 Introduction

1.1 Background and research question

Mitigating climate change can be considered as the century's challenge, a challenge which was first identified when, in the 1960s, scientific consensus on the anthropogenic causes of climate change and the possible consequences of uncontrolled greenhouse gas emissions emerged.[1] Since then, scientific concerns for the future of the Earth – expressed in the work of the Intergovernmental Panel on Climate Change – gradually started to shape the agenda of the international community and led to enhanced commitments to combat climate change.[2] The official formulation of these commitments dates to 1992, when states attending the Earth Summit Conference in Rio de Janeiro jointly recognised the "change in the Earth's climate and its adverse effects" as "a common concern of humankind"[3] and adopted the United Nations Framework Convention on Climate Change (UNFCCC). With the signature of the Convention, states committed to "the stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"[4] and set a framework for the years to come, which included the obligation to adopt climate change mitigation measures to achieve the treaty's objective,[5] as well as the duty to "promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases."[6]

The necessity for mitigation measures and the development of related technologies has been reaffirmed in the UNFCCC's - related agreements and treaties. For instance, the Kyoto Protocol of 1997 established mandatory emission reductions (QELRCs) for Annex I parties[7] in the "first

[1]Navraj Singh Ghaleigh, 'Science and Climate Change Law—The Role of the IPCC in International Decision-Making' in Kevin R. Gray and others (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016) 56.
[2]On the role of the IPCC in international climate change law, see Navraj Singh Ghaleigh, 'Science and Climate Change Law—The Role of the IPCC in International Decision-Making' in Kevin R. Gray and others (eds), *The Oxford Handbook of International Climate Change Law* (Oxford University Press 2016).
[3]United Nations Framework Convention on Climate Change (adopted 9 May 1992, entered into force 21 March 1994) 1771 UNTS 197, preamble.
[4]ibid, art 2.
[5]ibid, art 4(1)(b).
[6]ibid, art 4(1)(c).
[7]Benoit Mayer, *The International Law on Climate Change* (Cambridge University Press 2018) 40

commitment period" from 2008 to 2012, [8] which states would achieve through the implementation of policies including the "research on, and promotion, development and increased use [...] of advanced and innovative environmentally sound technologies."[9] More recently, the Paris Agreement of 2015 set the updated objective for the UNFCCC[10] in terms of limiting "the increase in the global average temperature to well below 2°C" with an aspiration to hold it to 1.5°C, an effort that would "significantly reduce the risks and impacts of climate change"[11] and that has to be driven by the development of technologies aimed at reducing greenhouse gas emissions.[12]

The call for the development of technologies for climate neutrality did not go unheard, as, through the years, a "portfolio of mitigation options" – as defined by the IPCC in 2005 - was developed.[13] The portfolio - aimed at providing both state and non-state actors with diversified means to avoid and control emissions in a 1.5°C scenario - includes measures such as powering energy intensive sectors through renewables, improving energy efficiency, and carbon dioxide removal (CDR) through afforestation and reforestation, as well as mitigation methods of more recent development, such as employing enhanced weathering and ocean alkalinisation. Among the technologies underlying these measures, which present varied "maturity, potentials, costs, risks, co-benefits and trade-offs",[14] we find Carbon Capture and Storage (CCS) technologies, the main subject of this research. Designed to avoid the release of carbon dioxide through the capture at source and storage of CO2 in geological formations – whether offshore or onshore – CCS can be considered as a fundamental component to the portfolio of available mitigation options, especially with regards to sectors that employ fossil fuels in their industrial processes, whose emissions are proving hard to abate.[15]

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[8]ibid, 42.
[9]Kyoto Protocol to the United Nations Framework Convention on Climate Change (adopted 11 December 1997, entered into force 16 February 2005) 2303 UNTS 162, art 2(a)(4).
[10]Benoit Mayer, *The international Law on Climate Change* (Cambridge University Press 2018) 47.
[11]The Paris Agreement (adopted 12 December 2015, entered into force 4 November 2016), art 2(1)(a).
[12]ibid, art 10(1).
[13]IPCC, 'Summary for Policymakers' in Bert Metz and others (eds), *IPCC Special Report on Carbon Dioxide Capture and Storage* (Cambridge University Press 2005) 3.
[14]IPCC, 'Summary for Policymakers' in Valerie Masson-Delmotte and others (eds), *Global Warming of 1.5°C* (WMO 2018) 17.
[15]On the role of CCS for the mitigation of industrial emissions, see Sergey Paltsev, Jennifer Morris, Haroon Kheshgi and Howard Herzog, 'Hard-to-Abate Sectors: The role of industrial carbon capture and storage (CCS) in emission mitigation' (2021) 300 Applied Energy 117322.

The analysis that follows considers the potential of CCS in terms of mitigation and the need to develop extensive CCS chains to decarbonise these hard-to-abate sectors, and, at the same time, the underdevelopment of CCS projects in light of the mitigation goals set by the international regime on climate change described above. These two considerations, which are contextualised in Chapter 2 of this research, give rise to our main research question, which concerns how international and supranational law regulate CCS as a viable technology for climate change mitigation. In answering the research question, the thesis will focus on CCS networks, which are the first attempts to create a market for the disposal of carbon dioxide and, as such, the latest frontier of CCS, with potential to resolve the problem of CCS underdevelopment. For this reason, the Northern Lights project will act as case study for this analysis, as it is one of the first enterprises establishing a transboundary cross-border CCS network in Europe, collecting CO2 from several Northern European countries to the end of storing it on the Norwegian continental shelf. As part of this case study, we will thus analyse, as sub questions, what are the applicable laws at the international and EU level, what are the main legal issues related to the transboundary character of the project and, returning to our main research question, what are or have been some solutions and outcomes of these challenges.

This research is limited in scope. CCS is a complex topic in terms of its legal implications and, as such, it is regulated by several clusters of laws. Among these, the thesis focusses on international law and European law, as they are relevant to our case study. Within international law, we follow the steps of CCS in international law of the sea, in the dumping regime and in international agreements that could derive from it in the next years. To maintain coherence while giving the necessary details on the topic, the analysis of EU law is limited to Directive 2009/31/EC on the geological storage of carbon dioxide, even though other instruments such as Directive 2003/87/EC – the ETS Directive - are clearly involved in the regulation of CCS at the EU level.

1.2 Structure and methodology

The opening of the thesis, Chapter 2, provides readers with an overview on the need for an increased share of CCS in the portfolio of measures available to reach the mitigation goals set by the UNFCCC and the Paris Agreement and, regionally, by the European Union. The chapter

addresses the basic technical characteristics of CCS technologies, the main phases of the process leading to CO2 storage and the status of CCS projects around the globe and in Europe. It then describes the emergence of CCS networks and their potential for increased mitigation efforts. In Chapter 3, this general account of CCS networks is further specified with a contextualisation of the case study, the Northern Lights venture. The chapter outlines the main phases of the project: the characteristics of the capture facilities, the means of transport, the storage location and the respective owners and participants in the venture. Particular attention is put on the project's transboundary plans for expansion through storage of volumes of CO2 provided by third parties. Moreover, the account describes the significance of Northern Lights for Norway, the project's host state, for the European Union and their respective involvement in the process.

Chapter 4 describes the international law relevant to transboundary CCS networks and analyses it in the context of the case study. Specifically, the chapter deals with CCS in relation to the United Nations Convention on the Law of the Sea (UNCLOS), the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, its 1996 Protocol and the 2009 Amendment to the Protocol's article 6. In considering these instruments the chapter identifies the challenges that projects such as "Northern Lights" have faced and face in international law. The Chapter also highlights the significance of the adoption of a resolution allowing for the provisional application of the 2009 Amendment to Article 6 of the Protocol and describes how it can be considered as a breakthrough for the status of CCS with regards to international provisions allowing transport of CO2 for geological sequestration in the seabed. Looking ahead, the potential structure and the contents of agreements between states that could decide to jointly undertake transboundary CCS under the Amendment is also discussed. The regional perspective of OSPAR follows and describes the Convention's process towards regulation of CCS through its complex system of annexes.

In a shift towards a supranational perspective, Chapter 5 of the thesis leaves international law to reflect on European law on CCS. The chapter thus addresses the relationship between Norway – Northern Lights' host state - and the EU, within the EFTA's and the EEA's context. As regards the law relevant to CCS and to the project, the Chapter focusses on Directive 2009/31/EC, the main legal instrument relevant to the matter at the EU level. Its characteristics as a legal framework for CCS are specified. Moreover, the implementation of the Directive in Norwegian law is analysed in the last part of Chapter 5. Final remarks in Chapter VI provide a summary of the main conclusions of the research in light of the research question.

The methodology employed to answer our main research question and sub questions is that of legal doctrinal research consisting of the textual analysis and the interpretation of primary and secondary sources. Primary sources of international and European law are normatively assessed on the basis of the necessity of enhancing transboundary CCS in light of the century's climate goals, which is identified as our main research problem. Secondary sources – from academic books and scientific articles of relevance – are also considered, especially in the assessment of whether current regulation presents regulatory gaps and potential contradictions.

The thesis also draws on climate science and environmental and energy engineering as auxiliary disciplines necessary to the premises of this work. Despite the use of the findings of these disciplines on the nature of climate change and the necessity for CCS enhancement, the thesis will maintain a perspective internal to the law itself. Thus, even though the research might result in a call for changes in the legal framework for CCS, this reform will still be advocated for under the legal system's premises.

2 Carbon Dioxide Capture and Storage (CCS) and transboundary CCS network

Initiated at a large-scale with the Sleipner offshore gas facility in the North Sea in 1991, around at the same time that the Norwegian government imposed its first carbon tax,[16] Carbon Capture and Storage (CCS) is a range of technological processes that aim at avoiding anthropogenic pollution in the form of carbon dioxide (CO2) by capturing potential emissions, and transporting them to a long-term storage location.[17] As a process, CCS is inextricably related to the role it plays in the run to reach the climate targets that nations have set in connection with international law on climate change mitigation and adaptation.[18] Since 2005, the IPCC has included CCS in the "portfolio of mitigation measures" available to stabilise greenhouse gas (GHGs) emissions in the atmosphere, and various scientific reports have reaffirmed the necessity of employing CCS technologies at a higher scale in pathways seeking to limit global warming to 1.5°. Among these, we find the 2018 IPCC Special Report on Global Warming of 1.5°[19] and the International Energy Agency (IEA) reports, which have highlighted how CCS can be used to the decarbonise the "hard to abate" sectors such as the global power systems[20] and suggested policy instruments to accelerate the low-carbon transition through the use of CCS.[21]

To understand the functioning of CCS technologies as transitional tools towards a carbon-neutral future, we can distinguish, based on the initial definition of CCS given above, the three main phases of the process: capture, transport and, finally, isolation of CO2. These phases will represent the basis of our normative inquiry, as each one of them presents unique legal

[16]Sofie Fogstad Vold, 'CCS legislation in Norway: the EU CCS Directive and its Implementation into Norwegian Law' in Martha M. Roggenkamp and Catherine Banet (eds), *European Energy Report XIII* (Intersentia 2020) 369.
[17]IPCC, 'Summary for Policymakers' in Valerie Masson-Delmotte and others (eds), *Global Warming of 1.5°C* (WMO 2018) 3.
[18]ibid, 3.
[19]ibid, 15.
[20]IEA, 'Energy Technology Perspectives 2020' (IEA 2020) 104 <https://www.iea.org/reports/energy-technology-perspectives-2020> accessed 13 February 2022; IEA, 'About CCUS. Playing an important and diverse role in meeting global energy and climate goals' (IEA 2020) <https://www.iea.org/reports/about-ccus> accessed 13 February 2022; IEA, 'CCUS in Power' (IEA 2021) <https://www.iea.org/reports/ccus-in-power> accessed 13 February 2022.
[21] IEA, 'The role of CCUS in low-carbon power systems' (IEA 2020) 6 <https://iea.blob.core.windows.net/assets/ccdcb6b3-f6dd-4f9a-98c3-8366f4671427/The_role_of_CCUS_in_low-carbon_power_systems.pdf> accessed 13 February 2022.

challenges worth of consideration. Moreover, multiple options are available in order to carry out every phase, with varied technology readiness.[22] The first phase of the process, which consists in the separation of CO2 and thus, the capture of potential emissions, can occur in a number of ways, the most common of which is chemical absorption of CO2 through amine-based solvents.[23] With chemical absorption, the CO2 is captured after business-as-usual combustion of carbon fuels, enabling industries to retain their combustion equipment. This makes the method a valuable tool to reduce the often-high costs of installing capture technologies.[24] Once separated, the CO2 is compressed and transported, through various means - from pipelines to ships[25] - to its storage site, the nature of which greatly varies depending on geological and geographical conditions of the chosen area. Currently, the most common option through which to permanently dispose of CO2 is geological storage, which involves sealing emissions in porous rock formations containing non-potable water (saline aquifers) or in fossil fuel reservoirs,[26] where CO2 insertion can contribute to enhanced oil recovery (EOR), with notable economic advantages.[27] Other sealing methods range from ocean storage and storage in terrestrial ecosystems, to storage through mineral carbonation.[28]

Despite the oldest large-scale applications of the technologies described above being operative for more than twenty years now, CCS projects have been overall largely limited in scope and size in contrast to the high hopes that were invested in them at the beginning of the century.[29] Indeed, sources affirm that CCS development is not currently on track with climate change mitigation goals.[30] A series of factors ranging from the costs of CCS technologies and the low

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[22] IEA, 'Energy Technology Perspectives 2020. Special Report on Carbon Capture Utilisation and Storage' (IEA 2020) 93 <https://www.iea.org/reports/ccus-in-clean-energy-transitions> accessed 13 February 2022.
[23]IEA, 'About CCUS. Playing an important and diverse role in meeting global energy and climate goals' (IEA 2020) <https://www.iea.org/reports/about-ccus> accessed 13 February 2022.
[24]Meihong Wang and others, 'Post-combustion CO2 capture with chemical absorption: A state-of-the-art review' (2011) 89 Chemical Engineering Research and Design 1609, 1609.
[25] IPCC, 'Summary for Policymakers' in Bert Metz and others (eds), *IPCC Special Report on Carbon Dioxide Capture and Storage* (Cambridge University Press 2005) 5.
[26] IEA, 'Energy Technology Perspectives 2020. Special Report on Carbon Capture Utilisation and Storage' (IEA 2020) 112 <https://www.iea.org/reports/ccus-in-clean-energy-transitions> accessed 13 February 2022.
[27]Stephen A. Rackley, *Carbon Capture and Storage* (2nd edn, Elsevier Science & Technology 2017) 29.
[28]ibid, 30 – 33.
[29] IEA, 'Energy Technology Perspectives 2020. Special Report on Carbon Capture Utilisation and Storage' (IEA 2020) 18 <https://www.iea.org/reports/ccus-in-clean-energy-transitions> accessed 13 February 2022.
[30]IEA, 'Energy Technology Perspectives 2020. Special Report on Carbon Capture Utilisation and Storage' (IEA 2020) 28 <https://www.iea.org/reports/ccus-in-clean-energy-transitions> accessed 13 February 2022; Stuart R. Haszeldine and others, 'Negative emissions technologies and carbon capture and storage to achieve the Paris Agreement commitments' (2018) 376 Phil. Trans. R. Soc. A 1, 19.

- but existent - risks of CO2 leakage and the potential environmental harm,[31] to the public perception of such risks and costs and the preference for other mitigation options, have contributed to the stagnation of CCS within the portfolio of available tools against climate chnage. However, the urgent need to implement every available technology in that portfolio has never stagnated and has only become more and more compelling considering the present and future consequences of climate change. Hence, the idea of using CCS as a potential set of technologies to contribute to emission reductions towards a 1.5° scenario was never completely abandoned and investments in CCS have witnessed a rebound in recent years, with an "unprecedented growth in the CCS project pipeline" in 2020.[32] In this regard, the Global CCS Institute's Status Report of 2021 describes how governments and fossil fuel industries around the world are partnering up in an effort to enhance CCS, with 135 commercial CCS facilities, 71 of which were added in the first nine months of 2021.[33] The distribution of those facilities is however uneven, as most of CCS – and most of the growth in CCS - occurs in the United States.[34]

In Europe, CCS facilities are mostly concentrated northward. Examples of this trend are for instance the United Kingdom, the Netherlands, Sweden and, as we will see more in depth, Norway.[35] According to a recent report prepared by the Geological Survey of Denmark and Greenland for Clean Air Task Force – part of a research cooperation between the University of Copenhagen and the University of Aarhus - these countries in particular have enormous potential in terms of carbon dioxide storage, whether in saline aquifers or in hydrocarbon fields.[36] It is the exploitation of this potential that has led to the emerging concept of transboundary CCS networks, a concept that lies at the centre of our inquiry. CCS networks aim at unbundling CCS' traditionally vertical integration by enabling industries with their own capacity to capture carbon dioxide emissions to send their captured CO2 to other facilities – in this specific case, abroad – for storage. The economic advantages of unbundling CCS in this

[31]IPCC, 'Summary for Policymakers' in Bert Metz and others (eds), *IPCC Special Report on Carbon Dioxide Capture and Storage* (Cambridge University Press 2005) 12-14.
[32]Global CCS Institute, 'The Global Status of CCS: 2021' (2021) 12 < https://www.globalccsinstitute.com/wp-content/uploads/2021/10/2021-Global-Status-of-CCS-Global-CCS-Institute-Oct-21.pdf> accessed 13 February 2022.
[33]ibid, 14.
[34]Global CCS Institute, 'CO2RE: CCS Facilities Report' (n.d.) <https://co2re.co/FacilityData> accessed 13 February 2022.
[35]ibid.
[36]Karen Lyng Anthonsen and Niels Peter Christensen, 'EU Geological CO2 storage summary' (Geological Survey of Denmark and Greenland 2021) <https://cdn.catf.us/wp-content/uploads/2021/10/20183953/EU-CO2-storage-summary_GEUS-report-2021-34_Oct2021.pdf> accessed 13 February 2022.

way and thus, inserting competition segments in the process, include allocative efficiency, a constant push towards innovation and cost reduction.[37] Moreover, the advantages of unbundling also encompass the exchange of a new service – the disposal of carbon dioxide – and thus the creation of a market between parties that can offer, because of their "natural" availability of storage, and parties that demand such storage. At the forefront of the creation of transboundary CCS networks is Norway, with the Northern Lights Project, our focal point in Chapter 3.

[37]Peter D Cameron, *Competition in Energy Markets* (2nd edn, Oxford University Press 2007) 5.

3 A Norwegian and European attempt at transboundary CCS: Langskip and the Northern Lights JV DA network

The Northern Lights is one of the latest attempts at expanding the commercial potential of the CCS chain through a CCS network. Initially envisioned by Gassnova and Equinor and officially transformed, in 2020, into a Joint Venture Agreement between Equinor ASA, A/S Norske Shell and Total E&P Norge,[38] the project is a fundamental component of the flagship plan Langskip, named after the characteristic Norwegian Viking long-ships as a tribute to Norway's experience in ground-breaking technologies.[39] The Norwegian Ministry of Petroleum and Energy's Report to the country's Parliament – the Storting – presented Langskip as "the first project of its kind" and provided an overview of its main characteristics.[40]

Langskip encompasses the whole CCS chain, from capture, to transport, and storage. The project has different owners for each of these phases, which is meant to ensure flexibility of the venture in the long run to accommodate further developments[41] and, as explained in depth in this chapter, enables industries to develop their capture facilities without being concerned with the other stages of the process, such as transport and storage. In this regard, Gassnova has stated that "Longship has therefore been organized as several individual sub-projects, led and executed by the industrial partners themselves, but within a framework coordinated and integrated".[42] Therefore, in the first stage of the process, CO2 will be captured at two forerunner facilities: Fortum Oslo Varme, a waste incineration facility co-owned by the city of Oslo and the Finnish Fortum Oy,[43] and Norcem, which has produced cement in the Norwegian city of Brevik since 1961, owned by the German HeidelbergCement.[44] Even though the two industries

[38]Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 28 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.
[39]ibid, 3.
[40]ibid, 8.
[41] Bellona Network, 'Norway's Longship CCS Project' (2020) 2 <https://network.bellona.org/content/uploads/sites/3/2020/10/Longship-Briefing_Bellona-1.pdf> accessed 4 March 2022.
[42] Gassnova SF, 'Developing Longship – key lessons learned' (2020) <https://gassnova.no/app/uploads/2020/11/Gassnova-Developing-Longship-FINAL-1.pdf> accessed 4 March 2022.
[43]Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 31-32.
[44]ibid, 30.

agreed to be part of the Longship chain, they are thus retaining ownership of their own capture facilities at their respective plants. In this respect, Norcem has hired Aker Carbon Capture to provide the carbon capture technology necessary for the project,[45] while Fortum Oslo Varme has employed TechnipFMC as contractor and Shell to supply CO2 capture technology.[46]

As already mentioned, Northern Lights is integral part of Langskip and, specifically, it is the project's section concerned with transport and storage. Through Northern Lights, Langskip is said to bring an innovative take on CCS by drafting very ambitious plans for future expansion of both the venture's transport and storage capacities. As a matter of fact, Northern Lights plans for two development phases which will take it from an estimated capacity of 1.5 million tonnes of CO2 a year to 5 million tonnes a year with the possibility of further expansion in a phase three, provided consistent new investments are made.[47] But the ambitious plans for Northern Lights do not end here: the long-term aim is to turn CCS into a transboundary venture. Indeed, Northern Lights plans on being the first project in Europe to revolutionise the concept of CCS by enabling industries from all over Northern Europe to cede their captured CO2 to Northern Lights and thus avoid emissions through the venture's infrastructure, following Norcem's and Fortum Oslo Varme's footsteps.[48] The Report to the Storting highlights thirty-three capture facilities across Europe, at different stages of development, that could consider storing CO2 in the Norwegian territory through Northern Lights in these next years.[49] More recent information refers to Northern Lights JV DA – "a registered, incorporated General Partnership with Shared Liability (DA) owned equally by Equinor, Shell and TotalEnergies"[50] – as the first ever "cross-

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[45] Aker Solutions, 'Aker Solutions Awarded Contract for the Brevik Carbon Capture Project' (2020) <https://www.akersolutions.com/news/news-archive/2020/aker-solutions-awarded-contract-for-the-brevik-carbon-capture-project/> accessed 4 March 2022.

[46] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 33 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 3 February 2022.

[47] ibid, 33-34.

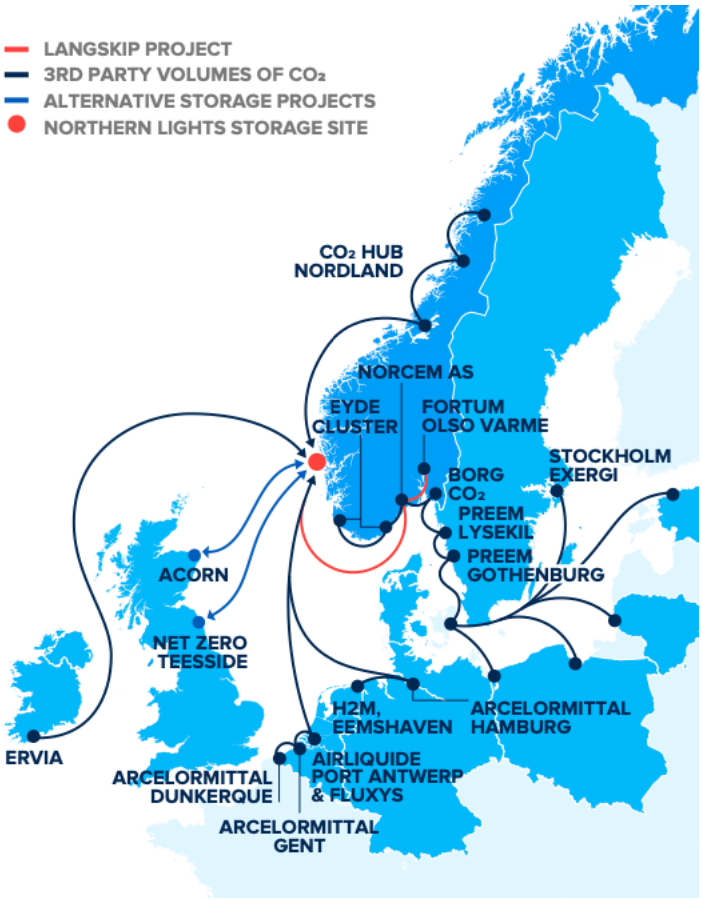
[48] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 36 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022; European Commission, 'Project of common interest:12.4 - PCI fiche' (2021) <https://ec.europa.eu/energy/maps/pci_fiches/PciFiche_12.4.pdf> accessed 24 February 2022.

[49] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 36 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.

[50] Northern Lights, 'Northern Lights awarding ship building contracts' (2021) <https://northernlightsccs.com/news/northern-lights-awarding-ship-building-contracts/> accessed 3 March 2022.

border, open-source CO2 transport and storage infrastructure network" with potential customers "representing 48 Mt of CO2 per year, more than it is currently stored worldwide."[51]

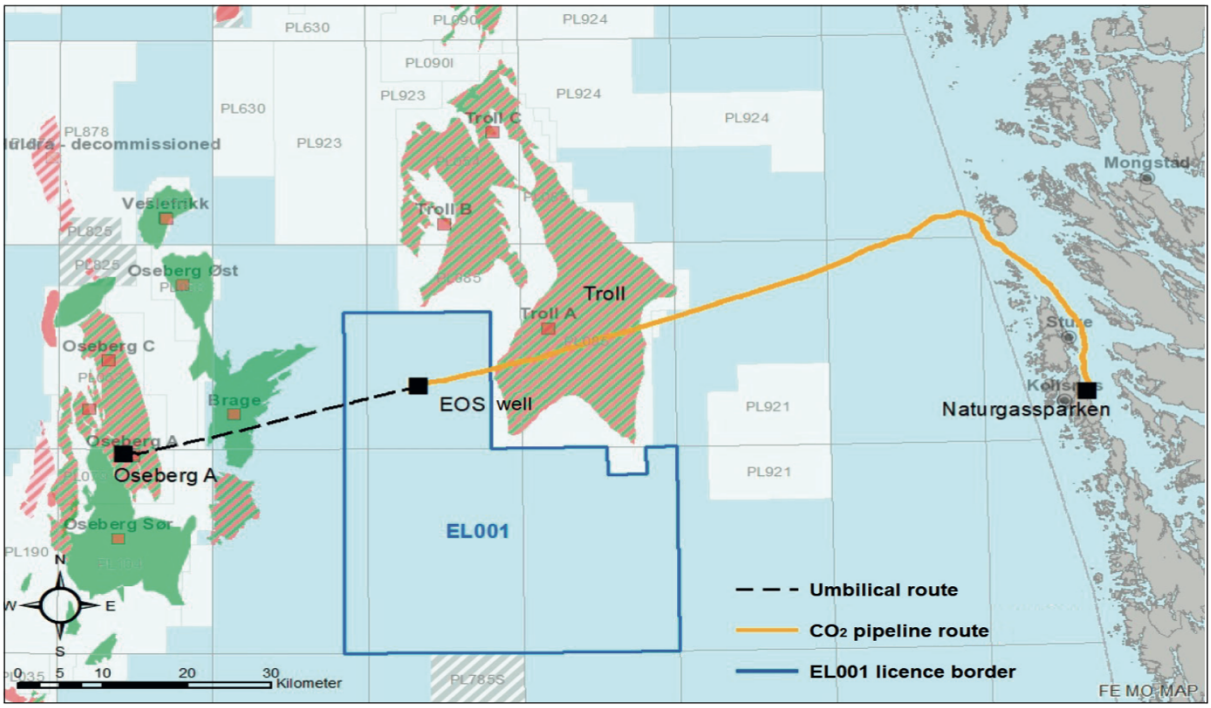
If the potential of the project is realised, captured emissions from all over Europe will thus be shipped to the Northern Lights onshore facilities in Øygarden, on Norway's west coast, for permanent storage. As figure 1 shows by indicating the potential sources of CO2 for Northern Lights according to the Global CCS Institute, the transport network would mainly involve countries in Northern Europe with access to the North Sea or the Baltic Sea.



1: Global CCS Institute, 'The Global Status of CCS: 2020' (2020) 23

Transport of CO2 will occur by ship, which is a revolutionary choice for a project which aims at developing so extensively. Indeed, transport of CO2 by ship has not been tested at large-scale before and Northern Lights would be "the first to transport large quantities of CO2 to an offshore CO2

[51] Northern Lights, 'Northern Lights launches company dedicated to CO2 transport and storage' (2021) <https://northernlightsccs.com/news/northern-lights-launches-company-dedicated-to-co2-transport-and-storage/> accessed 23 February 2022.



2: Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 74

storage site."[52] Once again, the choice of shipping is meant to ensure the project's flexibility and economic feasibility,[53] and it builds upon the similar protocols that carriers follow already for the transport of liquified natural gas (LNG) and liquified petroleum gas (LPG).[54] As part of the project's Phase I, Northern Lights JV DA has commissioned the Chinese Dalian Shipbuilding Industry Co., Ltd. (DSIC) to construct two purpose-built ships, which are going to be delivered by mid-2024.[55] According to Northern Lights, even though the ships' design is inspired by LNG carriers, the commissioned vessels will have unique characteristics because of the higher density, and thus, greater weight, of CO2 compared to LNG.[56] Moreover, to address concerns with respect to the carriers' environmental impact and emissions, the ships

[52] IEA, 'About CCUS. Playing an important and diverse role in meeting global energy and climate goals' (IEA 2020) <https://www.iea.org/reports/about-ccus> accessed 13 February 2022;
[53]Northern Lights, 'What it takes to ship CO2' (2020) < https://northernlightsccs.com/news/what-it-takes-to-ship-co2/ > accessed 4 March 2022.
[54] IEA, 'About CCUS. Playing an important and diverse role in meeting global energy and climate goals' (IEA 2020) <https://www.iea.org/reports/about-ccus> accessed 13 February 2022; Northern Lights, 'What it takes to ship CO2' (2020) <https://northernlightsccs.com/news/what-it-takes-to-ship-co2/> accessed 4 March 2022.
[55] Northern Lights, 'Northern Lights awarding ship building contracts' (2021) <https://northernlightsccs.com/news/northern-lights-awarding-ship-building-contracts/> accessed 3 March 2022.**Error! Hyperlink reference not valid.**
[56]Northern Lights, 'What it takes to ship CO2' (2020) <https://northernlightsccs.com/news/what-it-takes-to-ship-co2/> accessed 4 March 2022.

will be powered by LNG and "wind assisted propulsion system and air lubrication will be installed to reduce carbon intensity by around 34% compared to conventional systems."[57]

With the ships owned by Northern Lights JV DA,[58] registered in Norway and operating under the Norwegian flag,[59] Northern Lights will collect captured emissions to deliver them to the next stage of the process: storage. Once the CO2 reaches Øygarden at the Naturgassparken industrial area's receiving terminal, the pressured CO2 will be temporarily stored at Northern Lights' onshore reception facility, and then transported through a 100-km long pipeline to injection wells connected to the permanent storage area. The latter, named "Aurora", is part of the Johansen formation - surrounded by the "Troll" and "Oseberg" gas fields - on the Norwegian continental shelf.[60] The formation in which the CO2 will be injected lies 2600 metres beneath the seabed.[61] Exploitation rights over the area were awarded by the King in the Council of State on 11 January 2019 through licence EL001, currently held by Northern Lights JV DA.[62] It is estimated that around 100 million tonnes of CO2 could be stored within the licence area, 37.5 million tonnes of which will be injected during Phase I of the project.[63]

But what does the storage potential under Northern Lights and Langskip represent for the Norwegian and European climate strategies? With its ambitious national and cross-border plans, Northern Lights is seeking to realise the main objective of exploiting Norway's geological storage potential and its political willingness to pursue CCS. This Chapter has shown how these two elements have turned Norway, during these last twenty years, into the European epicentre for the development of this often-overlooked mitigation strategy. In line with this, Norway has endorsed the project in several ways, the most significant of which is perhaps the financial support granted to the venture – at least for the CO2 storage phase - for over 80 per cent of its total cost.[64]

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[57] Northern Lights, 'Northern Lights awarding ship building contracts' (2021) https://northernlightsccs.com/news/northern-lights-awarding-ship-building-contracts/ accessed 3 March 2022.
[58] ibid.
[59] ibid.
[60] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 74 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.
[61] ibid, 33.
[62] ibid, 75.
[63] ibid. 77.
[64] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 40

Despite this significant investment in state aid, the government will not be a shareholder in the project (apart from indirect holding through Equinor).[65] The principal reason for the investment is to meet obligations under international and European law to address climate mitigation and adaptation obligations. As a party to the Paris Agreement of 2015, Norway has set ambitious targets for all sectors of its economy and collaborates with the European Union on climate legislation for the period 2021-2030. Norway also participates in the block's Emissions Trading System (ETS),[66] and has adopted even more ambitious climate targets than those of the EU. Indeed, with its Climate Change Act of 2018, Norway has pledged to achieve GHG emissions reductions of 90-95 per cent by 2050, from a baseline year of 1990.[67] To reach this objective, the country plans to increase its commitment to CCS development, especially in the industrial sector.[68]

The EU has also endorsed potential cross-border services offered by the Northern Lights project and has included the project in its 4th List of Projects of Common Interest (PCI).[69] Under Article 7 of Regulation 347/2013 on guidelines for trans-European energy infrastructure, projects listed as PCIs enjoy "priority status" during the permit granting process[70] and are eligible for funding

<https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.

[65] Bellona Network, 'Norway's Longship CCS Project' (2020) 3 <https://network.bellona.org/content/uploads/sites/3/2020/10/Longship-Briefing_Bellona-1.pdf> accessed 4 March 2022.

[66] Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 9 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.

[67] Lov om klimamål (klimaloven) 2018 (NO).

[68] Norway, 'Norway's long-term low-emission strategy for 2050 – An innovative society with attractive towns and communities' (2020) <https://unfccc.int/sites/default/files/resource/LTS1_Norway_Oct2020.pdf> accessed 24 February 2022.

[69] European Commission, 'Project of common interest:12.4 - PCI fiche' (2021) <https://ec.europa.eu/energy/maps/pci_fiches/PciFiche_12.4.pdf> accessed 24 February 2022.

[70] Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 [2013] OJ L 115/39.

from the Connecting Europe Facility (CEF).[71] By the end of 2021, Northern Lights had secured four million euros from CEF to fund expansion studies for its Phase II.[72]

As can be inferred by this overview of the project's main characteristics and the extensive support it has received, both from Norway and from the European Union, Northern Lights offers an example of how CCS could work in the near future, of how similar networks can be used to redress what we have described in this Chapter as the underdevelopment of CCS as a mitigation option. However, projects such as Northern Lights have faced – and still face - in light of their transboundary character, several challenges under both international and supranational law. The next two chapters analyse the law applicable to the project itself, the problematic nodes therein and their possible implications, to the end of unveiling what the future of projects such as Northern Lights could look like in Europe.

[71] European Commission, 'Key cross border infrastructure projects' (n.d.) <https://energy.ec.europa.eu/topics/infrastructure/projects-common-interest/key-cross-border-infrastructure-projects_en> accessed 24 February 2022.

[72] Northern Lights, 'Northern Lights awarded EU funding for expansion studies' (2022) <https://northernlightsccs.com/news/northern-lights-awarded-eu-funding-for-expansion-studies/> accessed 24 February 2022.

4 The Northern Lights and international law of the sea

Several characteristics of the Northern Lights project introduced in Chapter III and IV are relevant for the following legal analysis: CO2 transport by purpose-built ships and offshore storage of CO2 in a geological formation on a state's continental shelf. Moreover, what differentiates Northern Lights from previous CCS projects is its transboundary character. If expansion plans are realised, the CO2 is going to reach the storage site in Norway from other jurisdictions through the Northern Lights network. Even though the viability of offshore CCS networks as a mitigation option is relatively recent - Northern Lights is the first attempt at such a venture - these characteristics of the project fit within a pre-existing legal framework. Indeed, because of its choice of transportation means and by virtue of its offshore storage location, Northern Lights is directly and indirectly governed by various fundamental instruments of international law of the sea.

This next section considers how the 1982 United Nations Convention on the Law of the Sea applies to the different CCS phases of capture, transport, and storage in the context of the Northern Lights project. Particular attention is accorded to the UNCLOS' provisions on the protection of the marine environment. A subsequent subchapter - 4.2 - focusses on the treatment of CCS under the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter – hereinafter, the London Convention – its 1996 Protocol and related amendments.

Section 4.3 describes the events that led to the provisional application to the 2009 Amendment to Article 6 of the 1996 Protocol and its challenges and potential outcomes. This is a significant development for transboundary CCS projects such as Northern Lights.

The final subchapter 4.4, analyses instead the regional approach of the OSPAR Convention in relation to our case study and in particular the work of the Group of Jurists and Linguists (JL) in clarifying the status of CCS under the Convention and the 2007 Amendments to the Convention on CCS.

4.1 The 1982 United Nations Convention on the Law of the Sea

The overarching document dealing with activities at sea in international law is the United Nations Convention on the Law of the Sea (UNCLOS). Drafted in 1982 in response to the perceived inadequacy of post-World War II law of the sea, the Convention is a package-deal whose main function is "establishing [...] a legal order for the seas and oceans". Indeed, parties to the Third United Nations Conference on the Law of the Sea (UNCLOS III), under which the document was negotiated, agreed to produce a single instrument resulting from their numerous compromises, with no reservations allowed. UNCLOS is thus constituted by 320 articles divided in 17 parts, each of which takes either a zonal or thematic approach. Through the zonal character of Parts II-V and XI, UNCLOS defines rules for the delimitation of different areas of the sea – from the territorial sea and its contiguous zone to the exclusive economic zone (EEZ), the continental shelf and the high seas. Parts III, IX, X, XII, XIII, XIV and XV, by contrast, deal more thematically with issues such as the protection and preservation of the marine environment, marine scientific research or the development and transfer of marine technology.

The following sub paragraphs explain how both zonal and the thematic sections of the Convention apply to CCS and to Northern Lights specifically, with the aim of providing a framework of how this legal instrument regulates the project's three main phases of capture, transport and storage. It is important to underline in the first place that, even in relation to Carbon Capture and Storage, UNCLOS retains its character of framework convention, as offshore CCS is not explicitly mentioned anywhere in UNCLOS, but the document nevertheless governs the topic because of its fundamental role for activities at sea. We have described Northern Lights as a project which aims to establish a network that, if fully realised, would transport CO2 through most of the maritime zones that UNCLOS establishes. In such a picture, UNCLOS would shape the entirety of the CO2's path and its "safe return to the underground" by first providing for states' rights and duties at sea.

4.1.1. Where the journey begins: capture of CO2 and transport

In Northern Lights, the journey towards the permanent storage of CO2 on the Norwegian continental shelf starts with capture of potential emissions at a point source. As stated in

Chapter 2, Northern Lights aims to store 3rd party volumes of CO2 captured at several industries located in different states of Northern Europe, such as Germany, Belgium, Luxemburg, Sweden, Ireland, Finland and the United Kingdom. The capture at these locations is onshore, and, therefore, is not a matter governed by UNCLOS but is regulated by national and EU law. However, from the moment Northern Lights' ships are in any of these countries' port and the pressured CO2 is onboard, UNCLOS comes into play.

It is also important to point out that a basic norm of international law of the sea is that ships are granted a flag and thereof, a nationality, by way of registration.[73] In Chapter 3, we have seen how, in Northern Lights' case, the two purpose-built ships commissioned for 2024 will fly the Norwegian flag. It is evident that there is a "genuine link" between the flag state and the ship[74]: Northern Lights JV DA is a company registered and incorporated in Norway.[75]

The Convention recognises the prominent role of the coastal state, which has sovereignty over its internal waters, archipelagic waters and territorial sea, thus according it access over living and non-living resources and significant jurisdiction over most persons, vessels and activities.[76] Moreover, in its capacity as a port state, the coastal state from whose port the CO2 departs has the right to grant or deny access to its ports to vessels and to set conditions for entry and for departure - even if the latter does not occur frequently.[77] Once Northern Lights JV DA's ships are sailing from the port of the coastal state, the jurisdiction of the coastal/port state on vessels concurs with flag state jurisdiction in the territorial sea, under the limits set out by Part II § 3 of UNCLOS.[78] Outside the territorial sea, in the Exclusive Economic Zone (EEZ) up to 200 nautical miles from the baseline, the coastal state has sovereign rights over living and non-living resources.[79] Consequently, even though flag states have the right to operate ships in the area, they can be subject to enforcement regulation by part of the coastal state itself for resource-related purposes.[80] Nevertheless, wherever the ships are located, Norway, as flag state, retains

[73]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 91(1).
[74]ibid.
[75]Northern Lights, 'Accelerating decarbonisation' (n.d.) <https://northernlightsccs.com> accessed 30 March 2022.
[76]Erik Molenaar, 'Port and coastal states' in Donald Rothwell, Alex Oude Elferink, Karen Scott, and Tim Stephens (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015) 295.
[77]ibid, 283.
[78]Richard Barnes, 'Flag States' in Donald Rothwell, Alex Oude Elferink, Karen Scott, and Tim Stephens (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015) 311.
[79]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 56(1)(a).
[80]ibid, art 73(1).

prescriptive and enforcement jurisdiction over its ships[81] and must respect the obligations listed under article 94 of UNCLOS, among which we find the duty to "exercise jurisdiction and control in administrative, technical and social matters over ships flying its flag" and the duty to ensure the safety of its ships through operational standards in compliance with related international law.

Considering that the routes the ships could follow to reach temporary storage facilities in Øygarden are still unknown, it is also important to underline how passage of the project's vessels in the territorial sea of third states would be permitted. Such passage would fall under the right of innocent passage as "not prejudicial to the peace, good order or security of the coastal state."[82] Passage by ship in the EEZ of another coastal state would also be allowed under UNCLOS's article 58(1), which enables all states to enjoy the right of navigation in such area, if exercised in compliance with the laws of the coastal state, the Convention's provisions and other not-incompatible rules of international law.[83]

Instead, explicit consent of the coastal state, by virtue of its sovereign rights, would be required to lay pipelines in the territorial sea of another state. In the EEZ, a state may lay pipelines under article 58(1) of UNCLOS, so long as it has "due regard for the rights and duties of the coastal state". In the continental shelf, too, the coastal state would not be able to prevent other states from laying or maintaining pipelines according to article 79(2) of UNCLOS. However, as highlighted by Bankes, UNCLOS also affirms that due regard still needs to be observed in this case towards "cables or pipelines already in position" and that the coastal state has the right to approve of the route of cables and pipelines.[84] In this respect, it is arguable that the choice of ships as transport means for Northern Lights was, at least in part, motivated by the enjoyment of the right of innocent passage in the territorial sea and the freedom of navigation in the EEZ, which imply the availability of various routes for the CO2's transport to Norway. In this way, Northern Lights ships could reach the Norwegian coast and their temporary storage location from all over Northern Europe.

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[81]Richard Barnes, 'Flag States' in Donald Rothwell, Alex Oude Elferink, Karen Scott, and Tim Stephens (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015) 311.
[82]ibid, art 19(1).
[83]ibid, art 58(3).
[84]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 168-169.

4.1.2. Norway's rights on CCS storage: the coastal state's jurisdiction

Once ships reach Northern Lights' Øygarden onshore reception facilities on the Norwegian west coast, Norway turns from flag state to coastal state under UNCLOS, for the last phase of the project. As previously stated in 4.1.1., Norway, as a coastal state under UNCLOS' article 2(1), retains sovereignty over its internal waters and the territorial sea. As sovereign, Norway has the right to carry out all the activities – within these waters - necessary to the storage of CO2 for Northern Lights, from the construction of the temporary storage facilities in Øygarden, to the installation of pipelines leading to injections wells connected to the permanent storage area "Aurora" in the Johansen formation (EL001).[85] However, the project is partially carried out in the Norwegian EEZ and in the underlying continental shelf, where "Aurora" is located and where, consequently, pipelines and injection wells are also being built and storage activities are taking place. In this regard, it is appropriate to clarify some aspects of UNCLOS' legal framework on these areas. Indeed, with UNCLOS, coastal states assumed a prominent position, in what is referred to as the process of "creeping state jurisdiction".[86] As a result of a gradual expansion of competences, coastal states are not only sovereign over their internal waters and their territorial sea, but, under the Convention, they also have certain sovereign rights over other areas such as the EEZ and the continental shelf, including the extended continental shelf.

UNCLOS III defines the EEZ as the maritime zone up to 200 nautical miles beyond the baseline.[87] The recognition of an EEZ is one of the Convention's key innovations with respect to pre-existing law of the sea. The importance of the area is mainly derived from the large amounts of natural living and non-living resources (e.g. fish stocks, oil deposits, rare minerals) that occur and live in this specific section of the sea.[88] Differently from the territorial sea and its contiguous zone, the EEZ has to be explicitly proclaimed[89] and it retains "a sui generis character" which is neither that attributable to the territorial sea nor that of the high seas.[90] In the EEZ, coastal states have, according to UNCLOS' article 56(1)(a) "sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether

[85]ibid, 166.
[86]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 136.
[87]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 57.
[88]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 134.
[89]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, 75.
[90]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 137.

living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone".[91] In the case of CCS, it is arguable that geological storage capacity can be included in the concept of "natural asset or resource" and is thereof covered by coastal state competences.[92] Moreover, jurisdiction of the coastal state extends to the establishing of "artificial islands, installations and structures"[93] for the purposes stated in article 56(1)(a) and "the exclusive right to construct and to authorize and regulate [their] construction, operation, and use of."[94]

Besides granting the rights above, the Convention also imposes on the coastal state the duty of exercising those rights "with due regard to the rights and duties of other states" in the EEZ and in compliance with the Convention itself.[95] Indeed, in the EEZ, other states on one hand enjoy certain freedoms applicable to the high seas, such as the freedom to navigate overflight, the freedom to lay submarine cables and pipelines in accordance with the Convention,[96] and they are, on the other hand, required to "have due regard to the rights and duties of the coastal State and [...] comply with the laws and regulations adopted by the coastal State"[97] if these are not incompatible with UNCLOS.

UNCLOS not only has a fundamental role in defining the EEZ and setting its rules, but it also deals with the seabed that underlies it and that also holds an important role with respect to CCS: the continental shelf, defined in article 76(1) of UNCLOS as a coastal state's "seabed and subsoil of the submarine areas that extend beyond its territorial sea [...] to a distance of 200 nautical miles from the baselines." As stated, UNCLOS' article 56(1)(a) confirms that the coastal state has "sovereign rights over all the natural resources of its EEZ, including sea-bed resources".[98] The fact is reaffirmed by article 77 of the Convention, which states that the coastal state has exploration and exploitation rights over the natural resources of its continental shelf[99]

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[91]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 56(1)(a).
[92]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 66.
[93]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 56(1)(b)(i).
[94]ibid, art 60(1).
[95]ibid, art 56(2).
[96]ibid, art 58(1).
[97]ibid, art 58(3).
[98]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 123.
[99]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 77(1).

and that other states may only explore and exploit the area with express consent of the coastal state itself.[100] Moreover, the coastal state has the right to install islands, installations and structures in the continental shelf as it had in the EEZ,[101] and it retains the "exclusive right to authorize and regulate drilling on the continental shelf for all purposes."[102] This also applies to the extended continental shelf.[103]

From this analysis of UNCLOS, it is possible to conclude that Norway, in virtue of its rights as coastal state, can authorise the installation and operation of the artificial structures and pipelines described in Chapter III both in the territorial sea and in the EEZ, and can carry out the activities of permanent storage of CO2 in the country's continental shelf. This right is not, however, unrestrained, but it is limited by the due regard that must be paid to other states' rights in the various maritime zones and by the respect of the obligations towards the marine environment that are described in the next subchapter.

4.1.3. States' obligations towards the marine environment under UNCLOS

From the point of view of UNCLOS, Norway - as a flag state and as the coastal state hosting CO2 storage in its EEZ – has rights for both transport and storage, but also responsibilities to comply with the environmental concerns that are enshrined in UNCLOS. Negotiations under UNCLOS III started right after the Stockholm Conference on the Human Environment of 1972, where the Declaration of the United Nations Conference on Human Environment and Development, the Action Plan for the Human Environment and other relevant resolutions were adopted.[104] At the Conference in Stockholm, parties affirmed the importance of "the protection and improvement of the human environment"[105] and set the basis for the emerging body of law that would soon become international environmental law. The Conference expressly concerned itself with the state of the world's seas. On the matter, Principle 7 of the Declaration affirms

[100]ibid, art 77(2).
[101]ibid, art 80.
[102]ibid, art 81.
[103]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 168.
[104]United Nations, 'Report of the United Nations Conference on the Human Environment' (United Nations Publications 1973).
[105]ibid, 3.

that "states shall take all the possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and maritime life, to damage amenities or to interfere with other legitimate uses of the sea." Under the Declaration, damage to the oceans is damage that "affects the common international realm" and, as such, it requires further action by the international community.[106] In this regard, the Action Plan of the Conference also specifically recommends states to fully participate in the upcoming negotiations of UNCLOS III "with a view to bringing all significant sources of marine pollution within the marine environment … under appropriate controls."[107]

Given these premises, it is not surprising that the increased awareness of the need to act to control pollution of the marine environment had considerable influence on the inclusion of environmental protection provisions of UNCLOS.[108] The Convention is therefore permeated with general principles and procedural and substantive provisions related to the protection and preservation of the marine environment, a factor that significantly differentiates it from previous treaties on the international law of the sea.[109] As we have mentioned before, the Convention has parts that present a zonal approach and others that take a more thematic approach, and the element of environmental protection is incorporated in both ways. Indeed, the zonal part of UNCLOS contains several provisions aimed at ensuring respect, at several degrees, towards the marine environment in specific situations.[110] Moreover, UNCLOS includes a dedicated thematic sector of the Convention – Part XII (articles 192 to 237).The Part not only codifies general principles, such as the states' "sovereign right to exploit their natural resources" in accordance with their environmental policies and their obligation to protect and preserve the marine environment,[111] but it also affirms specific duties that are of particular interest to our inquiry on the relationship between CCS and international law of the sea and that regard the theme of pollution.

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[106]ibid, 7.
[107]James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017) 19.
[108]Robin Churchill, 'The 1982 Convention on the Law of the Sea' in Donald Rothwell, Alex Oude Elferink, Karen Scott, and Tim Stephens (eds), *The Oxford Handbook of the Law of the Sea* (Oxford University Press 2015) 29.
[109]James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017) 19.
[110] See, for instance, United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, 21(1)(f); ibid, 56(1)(b)(iii); ibid, 61(2).
[111]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 192-193.

Under article 1(4) of UNCLOS, pollution of the marine environment is defined as "the introduction by man, directly or indirectly, of substances or energy into the marine environment" when such substances may result in "harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities." The sources of marine pollution are multiple and diversified. Churchill and Lowe, for instance, define four different sources: "shipping, dumping, sea-bed activities and land activities."[112] However, the only one among these expressly defined in UNCLOS is dumping, considered as "any deliberate disposal of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea" or disposal of the latter themselves.[113]

As stated, the Convention regulates pollution in several ways that are relevant to our case study. First, according to UNCLOS' article 194(1), Norway, in its dual capacity of flag state and storage site, has - in addition to the rights and obligations described in 4.1.1. and 4.1.2. - the general obligation to "prevent, reduce and control pollution of the marine environment from any source" in all maritime zones. In the territorial sea, coastal states - and, therefore, Norway and potential third states from which the CO2 would depart - have legislative competences. Moreover, passage that entails "any act of wilful and serious pollution" would not be considered innocent under the Convention. As such, it would not have the right to be carried out.[114] The coastal state can set out of the rules concerning innocent passage – to be added to those already present in the Convention – including regulations for the protection of the marine environment, provided that they do not refer to "the design, construction, manning or equipment of foreign ships" except to the extent that they are implementing international standards.[115]

In the EEZ, too, coastal states may legislate for the "protection and preservation of the marine environment"[116] and the same applies to pollution with regards to the continental shelf.[117] According to UNCLOS, the laws adopted with regards to pollution from seabed activities of the continental shelf have to be at least as effective as "international rules, standards and

[112]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 242.
[113]United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 397, art 1(5).
[114]ibid, art 19(h).
[115]ibid, art 21(2).
[116]ibid, art 56(1)(b)(iii).
[117]ibid, art 208(1).

recommended practices and procedures."[118] This not only entails the adoption of legislation dedicated to "drilling and injection activities associated with CCS operations" but also the duty to carry out environmental impact assessments of activities that are reasonably considered as potentially harmful towards the marine environment,[119] such as permanent storage of carbon dioxide in the continental shelf. Added to the legislative competence of the coastal state in certain areas, flag states – such as Norway when operating Northern Lights ships - retain their duty of prescribing legislation regarding pollution for their vessels and enforcing it, irrespectively of where the registered ships are located.[120]

4.2 The debate surrounding dumping: from UNCLOS to the London Convention and the London Protocol of 1996

4.2.1. UNCLOS: CCS and the regulation of dumping

The assessment of the rights and duties of coastal and flag states in section 4.1. helps establishing Norway's role in projects such as Northern Lights from the point of view of international law. However, much of the debate for legal scholars has focussed on the question of whether injecting CO2 in the deep seabed for the purpose of permanent storage from a man-made structure at sea amounts to pollution by dumping under UNCLOS.[121] The discussion around CCS and UNCLOS has often thus revolved around article 210 of the Convention, which refers to pollution by dumping. The article has, according to Harrison's account, three different functions.[122] First of all, article 210 affirms that dumping in the territorial sea, EEZ or

[118]ibid, art 208(3).
[119]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 170.
[120]Robin R. Churchill and Alan V. Lowe, *The Law of the Sea* (Manchester University Press 1988) 255.
[121]For an account on the discussion and potential outcomes, see Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 171-172; David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 401-403; Mark A. de Figueiredo, 'The International Law of Sub-Seabed Carbon Dioxide Storage' (MIT Carbon Sequestration Initiative 2005) 15 <https://sequestration.mit.edu/pdf/international_law_subsea_co2_storage.pdf> accessed 9 March 2022.
[122]James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017) 95-96.

continental shelf cannot be carried out without "express prior approval of the coastal state". Second, it also orders cooperation between the coastal state and potentially affected states in cases of risk of transboundary harm. And third, the article has the effect of requiring "national legislation [of all states] to meet international minimum standards" in exercising their right to legislate on the prevention, reduction and control of dumping. From this description, it is clear that the aim of the article is not concerned with the prohibition of dumping, but it rather with the minimisation and control of instances when dumping is allowed.[123]

The issue of whether the process of CO2 storage in the continental shelf of a coastal state is covered by UNCLOS' definition of dumping and is thus subject to the article 210 and the provisions on pollution and dumping that we have analysed in 4.1.3, is still unsolved. In this regard, scholarly opinions differ. Langlet, for example, in "Exporting CO2 for Sub-Seabed Storage", reports that there are reasonable arguments for and against treating CCS as dumping under UNCLOS.[124] Among the interrogatives that Langlet describes as still open we find the question of whether geological storage in the continental shelf is disposal "at sea" under article 1(5) of UNCLOS or whether the definition's expression refers to disposals that occur in the water column or onto the seabed.[125] Scott and de Figueiredo, instead, predominantly adopt the view that carbon dioxide constitutes waste under article 1(5) – even though "waste" is not defined in UNCLOS - and that its disposal is thus dumping.[126] One of the few conclusions that can be drawn regarding the matter is that the disposal of CO2 in the marine environment for "purposes other than mere disposal" does not fall within dumping as defined under the Convention.[127] While this serves to exclude projects involving CO2 injection for enhanced oil recovery (EOR), it does not offer any certainty with regards to projects such as Northern Lights, whose aim is purely permanent disposal in the continental shelf.

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[123]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 402; Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 172.

[124]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 402.

[125]ibid.

[126]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 73; Mark A. de Figueiredo, 'The International Law of Sub-Seabed Carbon Dioxide Storage' (MIT Carbon Sequestration Initiative 2005) 14 <https://sequestration.mit.edu/pdf/international_law_subsea_co2_storage.pdf> accessed 9 March 2022.

[127]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 74.

In light of this state of uncertainty, we refocus our research towards the London Convention and its Protocol as potential instruments to overcome the uncertainty of CCS' status under UNCLOS, to understand how the Protocol in particular may offer an appropriate regulatory framework for projects like the Northern Lights.

4.2.2. Resorting to the London Convention and the London Protocol

In introducing UNCLOS, we have described it as a framework convention which, to the end of providing a solid legal basis to govern international law of the sea, contains provisions, as Harrison states, of "varying normative strength".[128] Indeed, several of its rules are not meant to be self-executing and are to be followed by implementing agreements, which enable the often general wording adopted by the Convention to take shape and ensure that the document keeps up with the times.[129] Hence, another fundamental characteristic of UNCLOS is the presence of so-called rules of reference, which play a fundamental role with regards to CCS. Rules of reference are defined by Nguyen as "an umbrella term used to refer to instances in which certain UNCLOS provisions allow for the incorporation into the Convention of other rules and standards."[130]

Nguyen's account of the environmental regulatory scope of UNCLOS offers examples of three different forms of rules of reference. In the weakest form, UNCLOS imposes a duty on the state to "take into account" the referenced standards but leaves discretion to state parties on whether to implement them. In the other two forms - characterised by "giving effect", "conforming to" or "having at least the same effect" - the reference is stronger and thus requires states to respect the referenced rules or adopt them as minimum standards.[131] When settling the question of whether UNCLOS considered CCS as dumping, the scholarly discussion thus shifted to article 210(4), a provision that can be considered as a rule of reference with respect to dumping and that affirms the duty of states to "endeavour to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control such pollution." If

[128] James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017) 30.
[129] ibid, 30-31.
[130] Lan Ngoc Nguyen, 'Expanding the Environmental Regulatory Scope of UNCLOS Through the Rule of Reference: Potentials and Limits' (2021) 52 Ocean Development & International Law 419, 421.
[131] ibid, 421-422.

we refer to Nguyen's description, article 210(4) pertains thus to the strongest forms of rules of reference.[132]

In the case of dumping thus, the "referenced agreement" that caught the eye of regulators and scholars as potentially supplementing the Convention was an instrument that was already in place before UNCLOS itself: the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter - hereinafter, the London Convention. The Convention is widely considered as extending UNCLOS' account on the question of dumping,[133] as it provides harmonised norms for state parties on the matter.[134] Because it presents a similar definition of dumping as that subsequently adopted by UNCLOS [135] - which does not expressly mention to the seabed, as it refers to dumping *at sea*[136] - the applicability of the agreement to the seabed was thus questioned, in the first place in the debate regarding the disposal of radioactive waste.[137] However, after several resolutions of parties to the London Convention on the matter - the decisive one being Resolution LC.51(16) of 1993 – it was possible to come to the conclusion that "the 1972 London Convention should be interpreted as applying to deliberate disposal activities at sea irrespective of the ultimate resting place of the waste."[138]

To the end thus of regulating ocean dumping in *all* maritime zones, the Convention adopts a system based on annexes, to better substantiate the general definition of what counts as dumping under the instrument's article 3(1)(a). According to the 1972 Convention, the dumping of substances listed in Annex I is prohibited, Annex II substances require a "special permit" while "all other wastes" need "a prior general permit."[139] As CO2 is never mentioned in the Convention, the substance's classification under the London Convention is still blurred

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[132]ibid, 422.
[133]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 173; Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 74.
[134]James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017) 97.
[135]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 173.
[136]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 138, III(1)(a).
[137]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 74-75.
[138]ibid, 76.
[139]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 138, IV.

according to most sources,[140] even though a plausible option is to consider it as "industrial waste", which would make its dumping prohibited under the Convention's Annex I.[141] Further developments on CCS and international law followed, however, with the adoption of the 1996 Protocol to the London Convention (LP). [142] The Protocol completely replaces the Convention for those States who choose to join it and states can decide to ratify the Protocol without being parties to the Convention first.[143] It is important to specify that for those states that have ratified the Convention but have yet to join the Protocol, the question of whether CO2 is classified as "industrial waste" and thus, prohibited, is still open.

For those states who chose to ratify it, the Protocol and its subsequent amendments have now largely resolved the difficult interpretive issues discussed above. In terms of applicability to the seabed, states inserted article 1(4)(3) in the Protocol, which expands the definition of dumping so as to include "any storage of wastes or other matter in the seabed and the subsoil thereof from vessels, aircraft, platforms or other man-made structures at sea." Therefore, the Protocol is most definitely applicable to CCS activities. It is also important to note that the document incorporates a stronger formulation of the precautionary approach with respect to the Convention, as it imposes a general ban on dumping until the requirements of the Protocol are not satisfied. [144] Exceptions to the general prohibition of dumping of article 4(1)(1) are listed under Annex I. At the outset this list did not include CO2. However, with an amendment to Annex I of 2006 – supported by Australia, the UK, Norway, France and Spain[145] - CO2 from CCS was included in the annex as waste that can be potentially considered for dumping. The Protocol states that the substance's dumping may be permitted if it complies with the following cumulative criteria: "(a) disposal is into a sub-seabed geological formation (i.e., not into the water column); (b) the CO2 stream is of high purity, containing only incidental amounts of

[140]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 404; UNFCCC 'Transboundary carbon capture and storage project activities: technical paper' (1 November 2012) TP/2012/9, 6.
[141]UNFCCC 'Transboundary carbon capture and storage project activities: technical paper' (1 November 2012) TP/2012/9, 6.
[142]1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 7 November 1996, entered into force 24 March 2006) <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/PROTOCOLAmended2006.pdf > accessed 9 March 2022.
[143]James Harrison, *Saving the Oceans Through Law: The International Legal Framework for the Protection of the Marine Environment* (Oxford University Press 2017), 107.
[144]ibid, 107-108.
[145]Tim Dixon, Sean T. McCoy and Ian Havercroft, 'Legal and Regulatory Developments on CCS' (2015) 40 International Journal of Greenhouse Gas Control 431, 434.

associated substances; and (c) no waste or other matter has been added for the purpose of disposal."[146]

With the aim of updating the original Convention,[147] the Protocol managed to turn the tables for CCS; Carbon Capture and Storage within a state's maritime zones officially became permitted under the international regime on dumping. As a result of the amendment, states like Norway, who are parties to the protocol and wish to authorise sub-seabed geological storage of CO2 in its EEZ, can do so, provided that the storage and the CO2 flow satisfy the criteria above and the requirements under Annex II of the Protocol.[148] Indeed, Annex II represents an added safeguard with respect to those occasions when dumping is allowed under Annex I, as it advocates for reducing "the necessity of dumping"[149] by providing for a set of norms that enable states to consider options alternative to dumping and to evaluate environmental concerns when determining when and what to dump.

State parties to the London Protocol have also developed additional guidance for the Annex II safeguards in the form of the "Risk Assessment and Management Framework for CO2 Sequestration in Sub-Seabed Geological Structures (CS-SSGS)" [150] and the "Specific Guidelines for the Assessment of Carbon Dioxide for Disposal into Sub-Seabed Geological Formations" of 2006, amended in 2012.[151] The Risk Assessment Frameworks was adopted in 2006 to "provide generic guidance" to parties on the risks of CCS in geological formations to the marine environment and to gather information relevant to managing these risks and

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[146]UNFCCC 'Transboundary carbon capture and storage project activities: technical paper' (1 November 2012) TP/2012/9, 6.

[147]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 404.

[148]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 175.

[149]1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (adopted 7 November 1996, entered into force 24 March 2006), Annex II (1) <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/PROTOCOLAmended2006.pdf > accessed 9 March 2022.

[150] Report LC/SG-CO2 1/7 of the Meeting of The SG Intersessional Technical Working Group on Co2 Sequestration (adopted 3 May 2007) Annex 3 <https://docs.imo.org/Documents/Detail.aspx?did=36994> accessed 6 April 2022.

[151]Report LC 34/15 of The Thirty-Fourth Consultative Meeting and The Seventh Meeting of Contracting Parties (adopted 23 November 2012) Annex 8 <https://docs.imo.org/Documents/Detail.aspx?did=75687> accessed 6 April 2022.

uncertainties.[152] It identifies issues related to CO2 disposal in geological formations that had already been highlighted in the IPCC Special Report on Carbon Dioxide Capture and Storage of 2005,[153] among which we find questions on the reliability of geological formations for long term storage, on the potential effects of leaking CO2 on the marine environment and on the necessity to monitor sealed CCS sites for "much longer periods than those associated with [...] most other human activities."[154] To help states address and identify these issues, the framework defines the fundamental criteria to classify and select a site for CCS in geological formations.[155] Moreover, it lists information that needs to be gathered for each potential site, such as its "history, current status and age" and, importantly, its proximity to "potable, irrigation or industrial water producing wells".[156] The Specific Guidelines draw on this more general framework to expand on Annex II of the London Protocol, they establish criteria on monitoring and risk management with eventual mitigation plans for leakage[157] and describe in detail elements of the permit procedure for CCS in geological formations.[158]

4.3 The provisional application of the 2009 Amendment to the LP

4.3.1. The 2009 Amendment and the events that led to the provisional application

The recognition of the legitimacy of offshore storage within a state's territorial sea and EEZ undoubtedly represented a step forward to clarify CCS' status under international law. However, what is particularly significant to our inquiry is that projects contemplating any transboundary movement of CO2 were still prohibited by article 6 of the London Protocol.

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[152] Report LC/SG-CO2 1/7 of the Meeting of The SG Intersessional Technical Working Group On Co2 Sequestration (adopted 3 May 2007) Annex 3, para 0.1. <https://docs.imo.org/Documents/Detail.aspx?did=36994> accessed 6 April 2022.
[153] IPCC, 'Summary for Policymakers' in Bert Metz and others (eds), *IPCC Special Report on Carbon Dioxide Capture and Storage* (Cambridge University Press 2005) 11-15.
[154] Report LC/SG-CO2 1/7 of the Meeting of The SG Intersessional Technical Working Group On Co2 Sequestration (adopted 3 May 2007) Annex 3, para 1.5. <https://docs.imo.org/Documents/Detail.aspx?did=36994> accessed 6 April 2022.
[155] ibid, Appendix 1 <https://docs.imo.org/Documents/Detail.aspx?did=36994> accessed 6 April 2022.
[156] Ibid, Appendix 2.
[157] Report LC 34/15 of The Thirty-Fourth Consultative Meeting and The Seventh Meeting of Contracting Parties (adopted 23 November 2012) Annex 8, para 8 <https://docs.imo.org/Documents/Detail.aspx?did=75687> accessed 6 April 2022.
[158] ibid, para 9.

Indeed, article 6 stated – and still states to this day - that it is prohibited, for contracting Parties, to "allow the export of wastes or other matter to other countries for dumping or incineration at sea."

In order to facilitate debate with regards to article 6, the parties established a Legal and Technical Working Group on Transboundary CO2 Sequestration Issues to examine the merits of the article in light of the issue of transboundary CCS.[159] In its Report,[160] the Working Group analysed whether two possible cases of "transboundary movement of CO2 streams" would fall under the article. Case 1 entailed the cross-border transfer of CO2 before its injection in the seabed, while Case 2 dealt with transboundary movements, either deliberately or not deliberately, that might occur after injection.[161] Evidently, our inquiry is interested in Case 1, as Northern Lights pertains to this first category: the cross-border transfer of CO2 would occur by ship before the injection in the Norwegian continental shelf. Delegations considered that Case 1 was covered by article 6's prohibition and included movements between contracting parties, but also between a contracting party and a non-contracting party.[162] This was an explicit and straightforward interpretation definitively banning the export of CO2 for the purposes of storage under the Protocol. It was thus evident that without an amendment, CCS networks such as Northern Lights could not be allowed to the extent that they would draw CO2 from jurisdictions beyond the coastal state. The Report itself presented the option of amending article 6 together with the conditions for the amendment to be submitted, adopted and, finally, enter into force.[163]

With regards to these conditions, it is fundamental to recognize the distinction that the Protocol makes between amendments to the Annexes versus amendment to the Protocol itself. An amendment to an Annex enters into force for all parties who do not issue a contrary declaration.[164] However, the threshold to amend an article of the Protocol itself is higher: a 2/3

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[159]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 407.
[160]Report LP/CO2 1/8 of the 1st meeting of the Legal and Technical Working Group on Transboundary CO2 Sequestration Issues (adopted 3 March 2008) <https://docs.imo.org/Category.aspx?cid=579&session=1> accessed 6 April 2022.
[161]ibid, para 3.3.
[162]ibid.
[163]ibid para 7.
[164]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 410.

majority is needed both for adoption and for entry into force.[165] Therefore, the addition of CO2 to the list of substances that could be considered for dumping in Annex I of the Protocol was a relatively expedited solution to allow CCS within the territorial sea and the EEZ of a state. Removing instead article's 6 prohibition of export of CO2 in international law proved difficult and time-consuming, because the article was part of the text of the Protocol. Under these premises, parties to the Protocol adopted an amendment Resolution LP.3(4) with regards to article 6,[166] an amendment that did not enter into force for ten years, as the two-thirds majority needed for the entry into force was never reached. Resolution LP.3(4) introduces, in paragraph 2 of the article, an exception to the general prohibition of "export of wastes or other matters" for the purposes of dumping at sea, by stating that CO2 export for these purposes "may occur, provided that an agreement or arrangement has been entered into by the countries concerned."[167] The amendment also sets out further requirements for these agreements, which we will examine in the next subchapter.

Several factors contributed to the lack of ratifications of the amendment to Article 6, among which we find the low interest of a number of countries towards CCS.[168] In this regard, Garret and McCoy reported that at the time of the amendment, only half of the forty-two parties to the Protocol participated in some way in the main CCS initiatives at the international level.[169] Given this it is perhaps not surprising that, as of 2019, only Norway, the UK, the Netherlands, Iran, Finland and Estonia had ratified the 2009 amendment.[170] As early as 2011, the IEA's working paper "Carbon Capture and Storage and the London Protocol: options for enabling transboundary CO2 transfer" was already referring to the slow progress on the entry into force of the amendment as a "significant challenge".[171] The paper recommended enhancing CCS as a mitigation option for hard-to-abate sectors and removing regulatory challenges such as the

[165]ibid.
[166]Resolution LP.3(4) on the Amendment to Article 6 of the London Protocol (adopted 30 October 2009) <https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/LCLPDocuments/LP.3(4).pdf> accessed 9 March 2022.
[167]ibid, Annex.
[168]David Langlet, 'Exporting co2 for Sub-Seabed Storage: The Non-Effective Amendment to the London Dumping Protocol and its Implications' (2015) 30 The International Journal of Marine and Coastal Law 395, 411.
[169]Justine Garret and Sean McCoy, 'Carbon Capture and Storage and the London Protocol: Recent Efforts to Enable Transboundary CO2 Transfer' (2013) 37 Energy Procedia 7747, 7749.
[170]Report LC 41/17 of the Forty-First Consultative Meeting and The Fourteenth Meeting of Contracting Parties (adopted 17 October 2019) para 6.2. <https://docs.imo.org/Documents/Detail.aspx?did=119699> accessed 6 April 2022.
[171]IEA, 'Carbon Capture and Storage and the London Protocol: options for enabling transboundary CO2 transfer' (IEA Working Paper 2011) 12 <https://iea.blob.core.windows.net/assets/a0a0ee83-6842-4c28-b64d-a01df895bee8/CCS_London_Protocol.pdf> accessed 6 April 2022.

London Protocol's prohibition.[172] To do so, the paper explored several options, one of which was the provisional application of the 2009 amendment.[173] Indeed, according to article 25(1) of the VCLT, treaties – and their amendments - can be applied before their entry into force, if the treaty provides for it or if the state parties have agreed so. In this case, as there is no specific provision in the London Protocol to that effect, the available solution was to allow for provisional application for parties who agreed to do so.[174] To pass a resolution to provisionally apply the amendment to the treaty would then mean that willing states could export and import CO2 without violating international law.

In the IEA's eyes, this option was by far the least problematic solution to the slow progress in obtaining the necessary ratifications to amend Article 6. The only - but still significant - obstacle that the Report found was the possibility that the contracting parties might not agree to the provisional application itself.[175] Alternative options - such as concluding a subsequent agreement through an additional treaty or modifying or suspending relevant aspects of article 6 that prohibited export of CO2 for the purposes of CCS – would still have required more time and efforts than provisionally applying the amendment.[176] The remaining possibility, an interpretative resolution to the end of directly excluding CCS activities from the prohibition of article 6, was also ruled out. Indeed, parties had already established an interpretation of article 6 as including transboundary CCS activities through the conclusions of the Legal and Technical Working Group on Transboundary CO2 Sequestration Issues of 2007. The latter's interpretation would thus have been "difficult to reconcile" with a contrary interpretative resolution.[177]

Years passed before parties seriously considered provisionally applying the 2009 amendment. However, in 2019, a relevant proposal by Norway and the Netherlands was brought forward.[178] The proposed resolution reaffirmed the necessity of CCS projects to meet the goals of the Paris

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[172]ibid, 6.
[173]ibid, 14.
[174]ibid, 16.
[175]IEA, 'Carbon Capture and Storage and the London Protocol: options for enabling transboundary CO2 transfer' (IEA Working Paper 2011) 22 <https://iea.blob.core.windows.net/assets/a0a0ee83-6842-4c28-b64d-a01df895bee8/CCS_London_Protocol.pdf > accessed 6 April 2022.
[176]ibid.
[177]ibid.
[178]Proposed resolution LC 41/6 on the provisional application of the 2009 amendment to article 6 of the London Protocol (adopted 9 August 2019) <https://docs.imo.org/Documents/Detail.aspx?did=118424> accessed 6 April 2022.

Agreement and quoted the benefits of sharing infrastructures, including "the reduction of costs through risk sharing and economies of scale."[179] Finally, the proponents presented the proposal as a provisional solution necessary because of the urgency and importance of the matters at hand[180] and as an option that would only bind states who were willing to deposit a declaration to that effect.[181] The proposed resolution was successful; at the fourteenth meeting of the parties to the London Protocol, state parties concluded that there was "overwhelming consensus" for the proposed provisional application.[182] Resolution LP.5(14) was adopted at the meeting, allowing the 2009 Amendment to be applied provisionally "pending its entry into force" for parties that issue a declaration to the Depositary this end.[183]

Looking back on the amendment's long journey, it seems clear that Northern Lights was one of the main transboundary CCS projects that caused Norway to co-sponsor the proposed resolution for the provisional application of the amendment. In Chapter 3, we described how the state's involvement in the project, in terms of funding, risk bearing and political support, has been significant. In 2019, while this support was being granted by the Norwegian Parliament,[184] the resolution was co-sponsored and adopted by the parties to the London Protocol, permitting Northern Lights to give more certainty to its transboundary expansion plans. Other projects will also benefit from the possibilities of the provisional application. In this regard, data from the Global CCS' Institute shows a clear expansion in the number of CCS networks in Europe, with projects between France and the Netherlands, Belgium and the Netherlands, Wales and England and others in development, where potential customers are being assessed.[185] In the next subchapter, our aim will be to analyse how the provisional

[179]ibid, para 11-12.
[180]ibid, para 17.
[181]ibid, para 16.
[182]Report LC 41/17 of the Forty-First Consultative Meeting and The Fourteenth Meeting of Contracting Parties (adopted 17 October 2019) para 6.14. <https://docs.imo.org/Documents/Detail.aspx?did=119699> accessed 6 April 2022.
[183]Report LC 41/17/Add.1 of the Forty-First Consultative Meeting and The Fourteenth Meeting of Contracting Parties (adopted 29 October 2019) Annex II < https://docs.imo.org/Documents/Detail.aspx?did=119760 > accessed 6 April 2022.
[184]See Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.
[185]Global CCS Institute, 'The Global Status of CCS: 2021' (2021) 69 <https://www.globalccsinstitute.com/wp-content/uploads/2021/10/2021-Global-Status-of-CCS-Global-CCS-Institute-Oct-21.pdf > accessed 13 February 2022.

application will be implemented between states that are willing to establish CCS networks, with a particular focus on Northern Lights as the forerunner in the implementation process.

4.3.2. Implementing a provisional application: Northern Lights' quest

The amendment to article 6 of 2009, with its provisional adoption by participating states, sets the basis for any agreement to export CO2 streams for the purposes of permanent disposal in geological reservoirs. The amendment establishes two main requirements for exports between state parties to the Protocol: (a) the entry into force of an agreement between exporting and importing countries, and (b) the inclusion, in such an agreement, of conditions related to the "confirmation and allocation of permitting responsibilities" in accordance with the safeguards of the Protocol and related international law. For export to non-contracting states, the amendment establishes that the agreement's provisions must be at least equally effective as those contained in the Protocol, including the rules on the issuance of permits in Annex II, as they act as safeguards towards the marine environment.[186]

Contracting parties who wish to enter in an agreement as above must thus first notify their intentions through a formal declaration to the Secretary-General of the International Maritime Organization (IMO). In the implementation, parties can utilise the two sets of guidelines – the "Risk Assessment Framework" and the "Specific Guidelines" - that we have analysed in 4.3.1., which remain relevant even in the case of export. Moreover, parties can also rely on the "Guidance on the Implementation of Article 6.2 on the Export of Co2 Streams for Disposal in Sub-Seabed Geological Formations for the Purpose of Sequestration" drafted in 2013. At a time when the 2009 amendment was not yet provisionally applied, the latter were concerned with the assistance of parties in implementing the amendment once it entered into force.[187] To this end, the document specifies that an agreement is a binding legal act such as a treaty or a memorandum of agreement and not, for instance, a memorandum of understanding (MoU)[188] and it interprets the language of the amendment as to better define involved states'

[186]Resolution LP.3(4) on the Amendment to Article 6 of the London Protocol (adopted 30 October 2009) Annex <https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/LCLPDocuments/LP.3(4).pdf> accessed 9 March 2022.
[187]ibid.
[188]ibid, 3.2.

responsibilities. According to the guidance, which reflects article 9(2) of the London Protocol, the contracting state – in this case the coastal state from which the CO2 departs – is responsible for the permit which allows the CO2 to be "loaded onto a vessel in its territory".[189] The coastal state would also likely be in a better position to characterise the CO2 stream and share that data with the importing state. At the same time, the importing state would have responsibilities related to the storage site and the relevant risk assessment and management.[190] Responsibilities would thus need to be allocated according to the different positions of states with regards to the project. The adoption of the agreement must be notified to the Secretary-General of IMO as above.[191]

To this day, there are no examples of agreements under the 2009 amendment. In Northern Lights' specific case, an agreement between Norway, as importing state, and any potential exporting state among those identified by Chapter 3, has yet to be concluded. However, the situation seems to be rapidly changing. A collaboration on CCS in this direction between Norway and the Netherlands was announced in November 2021 and the two governments signed a MoU to "promote bilateral cooperation in the field of carbon capture and storage (CCS) and exploring future areas of energy cooperation related to the North Sea."[192] The MoU expressly refers to this cooperation being finalised in 2022 with a formal agreement that will address "the requirements of the London Protocol".[193] With regards to Sweden, too, a potential agreement could be concluded soon. SINTEF Energy Research published, at the beginning of 2022, a Project Report on the "Legal and regulatory framework for Swedish/Norwegian CCS cooperation".[194] It is significant that the Report was officially commissioned by Gassnova,

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[189]IEAGHG, 'Exporting CO2 for Offshore Storage – The London Protocol's Export Amendment and Associated Guidelines and Guidance' (TR02 2021) 5 <https://www.club-co2.fr/files/2021/04/IEAGHG-2021-TR02-Exporting-CO2-for-Offshore-Storage-The-London-Protocol-s-Export-Amendment-and-Associated-Guidelines-and-Guidance.pdf> accessed 6 April 2022.

[190]ibid.

[191]Kristin Jordal and others, 'Project Report: Legal and regulatory framework for Swedish/Norwegian CCS cooperation' (SINTEF Energy Research 2022) 13 <https://sintef.brage.unit.no/sintef-xmlui/bitstream/handle/11250/2984155/PreemCCS%20-%20D4.2_Legal%20and%20Regulatory_final.pdf?sequence=1> accessed 7 April 2022.

[192] Government.no, 'The North Sea as a platform for the Clean Energy Transition ' (2021) <https://www.regjeringen.no/en/aktuelt/the-north-sea-as-a-platform-for-the-clean-energy-transition/id2886207/> accessed 7 April 2022.

[193]Memorandum of Understanding to promote bilateral cooperation in the field of carbon capture and storage (CCS), and exploring future areas of energy cooperation related to the North Sea (adopted 11 November 2021) <https://www.regjeringen.no/contentassets/4d3db439c11748c3be985a5b357eedf6/final_memorandum-of-understanding_ccs_nl-and-no.pdf> accessed 7 April 2022.

[194]Kristin Jordal and others, 'Project Report: Legal and regulatory framework for Swedish/Norwegian CCS cooperation' (SINTEF Energy Research 2022).

Energimyndigheten – the Swedish Energy Agency - and Preem AB, who are, respectively, developer, regulatory authority and potential customer of the Northern Lights. Norway and the United Kingdom also just recently announced an agreement between the two countries that would enable the UK to store "CO2 emissions from London's household rubbish" as part of Northern Lights. Indeed, Cory – a large waste management company operating in London – and Northern Lights announced a MoU to this end in May 2022.[195] However, there is still no trace of a formal agreement between the two countries to meet within the terms of the provisional application of the 2009 Amendment to Article 6 of the London Protocol.

The international community will thus need to wait for further developments to be able to really assess what an agreement under the 2009 amendment to the LP may look like. The guidelines offer some guidance, but the amendment still leaves considerable discretion to the particular parties, although that discretion must be exercised within the framework of international law that we have described throughout Chapter 4.

4.4 A regional perspective: the OSPAR Convention and Northern Lights

4.4.1. The OSPAR Convention and pollution of the marine environment

A regional source of obligations with regards to CCS is the 1992 Convention for the Protection of the Marine Environment of the North-East Atlantic – hereinafter, OSPAR. The Convention is worth further specification in this subchapter because its subject matter touches upon CCS. OSPAR applies not only to all maritime zones in its area of competence, but also to the seabed and the subsoil, where activities related to storage operations take place.[196] Moreover, as regards our specific case study, its parties are states that are or could be potentially involved in the Northern Lights project. Indeed, the Convention includes sixteen contracting parties which constitute the OSPAR Commission. Among them, we find Norway, the host state for Northern

[195] Regjeringen.no, 'Cory and Northern Lights announce pioneering international carbon partnership' (2022)<https://www.regjeringen.no/contentassets/a8c1aa28204841b3b41641c31e1ee16b/announcement-cory-and-northern-lights-13-may-2022.pdf > accessed 14 May 2022.
[196]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 80.

Lights, and other potential host states for CO2 storage such as Denmark, the United Kingdom and the Netherlands, but also potential exporters of CO2, such as Belgium, Finland, France, Germany, Luxembourg, and Sweden.[197] Thus, the Convention has a broad "geographical mandate", which is defined in its Article 1 and covers the internal waters, territorial sea, EEZ, seabed and subsoil of the contracting parties within the limits set by the Convention.[198]

The OSPAR Convention replaces the pre-existing 1972 Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft and the 1974 Convention for the Prevention of Marine Pollution from Land-Based Sources and its main purpose is to establish a framework for "comprehensive regional co-ordination for the protection of the marine environment in the North-East Atlantic."[199] To do so, the contracting parties undertook the general obligation to "take all possible steps to prevent and eliminate pollution" and "to protect the maritime area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected."[200] The general principles that govern the Convention are the precautionary principle and the polluter pays principle,[201] which set the basis for the Convention's provisions regarding the prevention and elimination of pollution.

The Convention utilises three annexes, each dealing with different types of pollution: pollution from land-based sources (Annex I), pollution by dumping or incineration (Annex II) and pollution from offshore sources (Annex III). OSPAR defines pollution in article 2(1)(a) as "the introduction by man, directly or indirectly, of substances or energy into the maritime area" that result or might result in hazards to "human health [...] living resources and marine ecosystems." In terms equivalent to those of UNCLOS' article 1(5)(a), pollution by dumping is defined as "any deliberate disposal in the maritime area of wastes or other matter (1) from vessels or aircraft; (2) from offshore installations."[202] Pollution from land-sources is regulated rather than prohibited under the Convention: all state parties have the obligation to prevent it and eliminate

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[197]OSPAR Commission, 'About OSPAR' (n.d.) <https://www.ospar.org/about> accessed 13 April 2022.
[198]Convention for the Protection of the Marine Environment of the North-East Atlantic (adopted 2 September 1992, entered into force 28 March 1998) 2354 UNTS 67, art 1(a).
[199]Meagan S Wong, 'The Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') (and Annexes I, II, III, IV)' in Malgosia Fitzmaurice, Attila Tanzi (eds.), *Multilateral Environmental Treaties* (Edward Elgar Publishing Limited 2017) 190.
[200]Convention for the Protection of the Marine Environment of the North-East Atlantic (adopted 2 September 1992, entered into force 28 March 1998) 2354 UNTS 67, art 2(1)(a).
[201]ibid, art 2(2).
[202]ibid, art 1(f).

it according to article 3, and all point sources that eventually discharge at sea require an authorisation of the competent authorities in compliance with article 2 of Annex I. Pollution from vessels and from offshore installations is generally prohibited under OSPAR.[203] Exceptions to the prohibition are set out in article 3 of Annex II for dumping from vessels and aircrafts, and in article 3 of Annex III for offshore installations.

4.4.2. The OSPAR Convention and CCS activities

The original text of the Convention made no reference to CO2 injection in the seabed for geological storage in any of the different pollution regimes and this gave rise to several questions. First, it was not clear if CO2 was regarded as waste under the Convention and thus if its dumping constituted pollution.[204] Second, it was consequently difficult to determine whether CCS activities were prohibited or were instead included in the exceptions set out for each type of pollution in the respective annex.[205] This was mainly due to the fact that, under OSPAR, the different ways in which the CO2 is originated, transported and injected into the seabed determine which pollution regime and which annex would apply to a case at hand. Even small details can make a difference.

In this context of uncertainty, it is necessary to refer to the 2004 work conducted by the Group of Jurists and Linguists (JL), a subsidiary body within the OSPAR Commission. The Group was asked to consider CCS in relation with the Convention and produced the Report on Placement of Carbon Dioxide in the OSPAR Maritime Area.[206] After due consideration, the Report confirms that CO2 is covered as pollution under the Convention. The Report analyses five methods of placement of CO2, listed at paragraph 13: "(a) a pipeline pure and simple; (b) a pipeline working with a structure in the maritime area; (c) shipment in a vessel for placement from the vessel; (d) placement from a structure in the maritime area; (e) placement from an offshore installation." Categorising a project under one of these methods helps deciding which

[203]See ibid, art 3(1) Annex II for pollution by dumping; ibid, art 3(1) Annex III for offshore pollution.
[204]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 80.
[205]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 180.
[206]OSPAR Commission, 'Annex 12: Report 04/23/1-E from the Group of Jurists and Linguists on Placement of Carbon Dioxide in the OSPAR Maritime Area' (Summary Record OSPAR 2004).

regulatory regime applies among OSPAR's three annexes. As for method (a) - in the case of "a pipeline pure and simple" – the Report confirms at paragraph 16 that activities of this type would fall under Annex I for land-based sources, while for method (c), the relevant annex is Annex II on dumping. As for the other methods, instead, categorisation is less straightforward, because much depends on what can be considered as an "offshore installation" under the Convention. An offshore installation, in OSPAR's terms, is defined as "any man-made structure, plant or vessel or parts thereof, whether floating or fixed to the seabed, placed within the maritime area for the purpose of offshore activities."[207] Offshore activities are defined as "activities carried out in the maritime area for the purposes of the exploration, appraisal or exploitation of liquid and gaseous hydrocarbons."[208]

Northern Lights is a good example of how difficult it could be to classify a project under the methods and annexes of the original OSPAR Convention. In principle, the 2004 Report states at paragraph 6(b) that the Convention establishes three different and distinct regimes through its annexes and that no overlap is supposed to take place between these regimes. However, all three annexes seem to be relevant to our projects for several reasons. At a first glance, the Convention's main relevant provision seems to be Article 4, according to which parties shall take "all possible steps to prevent and eliminate pollution by dumping or incineration of wastes or other matter" in accordance with Annex II. Indeed, CO2 disposal at sea fits under the definition of dumping reported in 4.4.1. However, even Annex I and Annex III seem to be relevant at a closer look. As mentioned in Chapter 3, permanent disposal of pressured CO2 is achieved in Northern Lights through pipelines, running from the onshore facilities in Øygarden to reach injection wells collocated offshore and connected to the seabed. From this perspective, Northern Lights' plan seems to reflect the second method of placement envisioned by the Report at paragraph 13(b). The method refers to the placing of CO2 in the seabed with "a pipeline working with a structure in the maritime area: a pipeline could take the CO2 from somewhere on land and deliver it to a structure placed in the maritime area, from where it could then be pumped to the point of placement in the maritime area". If the structure – in this case, the wells injecting the CO2 in the "Aurora" storage site – is an offshore installation, Annex III

[207]Convention for the Protection of the Marine Environment of the North-East Atlantic (adopted 2 September 1992, entered into force 28 March 1998) 2354 UNTS 67, art 1(l).
[208]ibid, art 1(j).

of OSPAR on offshore dumping is applicable, while if it is not, then we ought to refer to Annex I on land-based pollution.

Northern Lights' wells, in our understanding, were built ex novo with the sole purpose of injecting CO2, and thereof, cannot be considered as offshore installations under the definition reported above, as they were never used for hydrocarbons-related purposes. Following the reasoning of Purdy and Macrory, "a Contracting Party could in theory build a platform or other form of fixed structure [...] for the specific purpose of disposing of CO2. Activities such as these would therefore not fall within the more restrictive provisions of the Convention and would be regulated by the provisions contained in Annex I as they would be a land-based source."[209] This is also confirmed by Scott, who states that "release from an installation erected for the sole purpose of CO2 disposal appears to fall outside the scope of Annex III regulation"[210] and that "land-based sources of pollution include only those installations that are in some way attached to land, such as by a pipeline."[211] In this case, the well is attached to land with a pipeline and, as such, it seems that Annex I on land-based pollution would apply, or at least be relevant, to the project and that it would therefore be regulated rather than prohibited.

The analysis gets more complicated if we think that the well in question would be attached to Oseberg A (OSA), one of the platforms of the Oseberg Field Centre – an "offshore installation" within the meaning of the Convention - which is located just west of EL001 "Aurora" and would "function as host installation" for the well, controlling it through an "system that transmits electric power, fibre optic signals, hydraulic control fluid."[212] Needless to say, the attachment is an additional element which would make it even more difficult to understand whether land-based pollution provisions under Annex I or offshore pollution provisions under Annex III would apply. If we considered the attachment as meaning that Northern Lights would be subject to offshore pollution provisions, the Report states in this regard that offshore CO2

[209]Ray Purdy and Richard Macrory, 'Geological carbon sequestration: critical legal issues' (Tyndall Centre for Climate Change Research 2004) 31.
[210]Karen Scott, 'The day after tomorrow: Ocean CO2 Sequestration and the Future of Climate Change' (2005) 18 Georgetown International Environmental Law Review 57, 82.
[211]ibid, 84.
[212]Northern Lights, 'EL001 Northern Lights - Receiving and permanent storage of CO2. Plan for development, installation and operation Part II - Impact Assessment' (2019) 73 <https://northernlightsccs.com/wp-content/uploads/2021/03/RE-PM673-00011-02-Impact-Assessment.pdf> accessed 20 April 2022.

disposal for the purpose of geological storage did not fit into any exception as set out in article 3 of Annex III. As such, it would have been prohibited under the Convention.[213]

4.4.3. The amendments of 2007: how OSPAR regulated CCS

As stated before, our attempt to define Northern Lights under OSPAR offers just one example of how unclear the status of CCS was in the Convention's terms. To address the problem, in 2007, parties adopted a package of measures that explicitly regulated CCS projects and resolved some of the key uncertainties. The most significant of these measures was similar to that taken by the parties to the London Protocol: amend the Annexes to the Convention. In particular, the annexes were modified to introduce exceptions to the prohibition on dumping (Annex II) and of dumping from offshore installations (Annex III), provided that "(a) disposal is into a sub-soil geological formation; (b) the streams consist overwhelmingly of carbon dioxide. [...] (c) no wastes or other matter are added for the purpose of disposing of those wastes or other matter; (d) they 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." This last condition reflects the specific objective underlying the whole Convention: the protection of the marine environment.[214] Moreover, with the inclusion of paragraph 4 to article 3 of Annex III, parties to the Convention must now ensure that, in the case of offshore dumping, the disposal of streams that meet the conditions above is authorised or regulated by dedicated authorities.

Besides passing the amendment, the contracting parties also took additional action to ensure a high level of control and precaution with regards to CCS activities, as to respect the objectives of the Convention. This was achieved through Decision 2007/1, which prohibits the storage of CO2 in the water column and on the seabed due to its potential and ascertained adverse effects on the marine environment,[215] and Decision 2007/2, which expands on article 4 Annex III's

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[213]OSPAR Commission, 'Annex 12: Report from the Group of Jurists and Linguists on Placement of Carbon Dioxide in the OSPAR Maritime Area' (Summary Record OSPAR 2004) para 23.
[214]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 181.
[215]OSPAR Commission, 'OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed' (Summary Record 2007).

requirement to ensure that an authorisation is given to CCS projects. The latter states the elements necessarily present in such authorisation – among which we find a risk management plan[216] - and lays out the obligation to "review the authorisation at regular intervals".[217] The Decision also establishes that any authorisation needs to be in conformity with the OSPAR Guidelines for Risk Assessment and Management of Storage of CO2 Streams in Geological Formations (FRAM). The Commission adopted the latter in the form of a decision – binding under the OSPAR Convention[218] - "to assist in the management of storage of CO2 streams in geological formations."[219] They are equivalent to the Specific Guidelines adopted by the parties to the London Protocol.[220]

This brief analysis of OSPAR and CCS has illustrated the difficulties that would have been encountered trying to fit CCS projects into the Convention's original text. In sum, before 2007, only CCS projects that fit the definition of land-source pollution under OSPAR could be considered for regulation. With the amendments, OSPAR allows regulation of CCS even in cases of dumping from vessels or from offshore installations, provided the conditions set out in the annexes, the decisions and the guidelines adopted are respected. It is thus necessary to state that, nowadays, OSPAR does not represent an obstacle to projects such as Northern Lights - notwithstanding how they might be classified under the Convention's system of annexes. The Convention offers thus a high level of protection for the marine environment both through its already existing general principles and through the ad-hoc decisions adopted for CCS.

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[216]OSPAR Commission, 'OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations' (Summary Record OSPAR 2007) para 3.2.
[217]ibid, para 3.3.
[218]ibid.
[219]OSPAR Commission, 'OSPAR Guidelines for Risk Assessment and Management of Storage of CO2 Streams in Geological Formations' (Summary Record OSPAR 2007) para I(3).
[220]Nigel Bankes 'Carbon Capture and Storage and the Law of the Sea' in Elise Johansen, Signe Veierud Busch and Ingvild Ulrikke Jakobsen (eds), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge University Press 2020) 181.

5 The Northern Lights and European law

The previous chapters explored how Northern Lights is governed by several instruments of international law, from UNCLOS to the London Protocol, and the regional OSPAR Convention. This chapter focuses instead on European law, as this cluster of laws is particularly relevant to understand more about the regulation of Northern Lights and CCS development in Europe. As the project's process of geological storage of CO2 takes place in Norway's seabed, this chapter will also highlight the country's stand towards European law and CCS.

To these ends, in 5.1., the chapter first analyses Norway's status under the European Free Trade Agreement and the European Economic Area. We describe Norway's adhesion, through the EEA, to some relevant EU Directives on the environment and climate change and, finally, on carbon capture and storage.

In 5.2. the Chapter concentrates on the fundamental piece of legislation on CCS at the EU level: Directive 2009/31/EC on the geological storage of carbon dioxide, which is also applicable to EEA member states. In this regard, the chapter lies out the objectives, subject matter, and the scope of application of the Directive in the context of the EU. Moreover, it explores its main provisions following the generic phases of CCS projects set out by the Directive itself: selection of storage sites and exploration permits, storage permits, operation and closure and post-closure obligations. The chapter then shifts to the application of certain provisions of the Directive that are particularly relevant to the Northern Lights project: third party access and transboundary cooperation in CCS projects. Subchapter 5.3. follows, giving an overview of Norway's implementation of Directive 2009/31/EC, which occurred through both the modification of existing instruments and the creation of a new regulation specifically on the matter of CCS.

5.1 Norway's ties with the EU: from the EFTA to the EEA

Norway is not a member state of the European Union, but it does have close ties with the EU block on several levels. As stated by the Norwegian Ministry of Petroleum and Energy's Report to Norway's Parliament on Langskip and Northern Lights, the European Union is the country's

"most important trade partner and its closest climate partner".[221] Clarifying the relationship between the EU and Norway on these different levels is thus necessary before diving more in depth on the EU's approach on CCS in relation to our case study.

5.1.1. First steps: the EFTA Convention of 1960 and the EEA Agreement

Norway - together with Switzerland, Iceland, and Liechtenstein - is part of the European Free Trade Association (EFTA). The Stockholm Convention establishing EFTA was signed and entered into force in 1960.[222] As described by Norberg and Johansson, the Convention affords the parties "the basic provisions needed in order to arrange for full free trade in industrial goods".[223] EFTA prohibits custom duties[224] and quantitative restrictions[225] on imports and export and charges having any equivalent effect, it establishes rules of origin and administrative cooperation between the member states[226] and rules on sound competition.[227] In its most updated version, the Convention is based on the objective of establishing closer economic relationships between its member states through the free trade of goods, the progressive liberalisation of the free movement of persons, and trade in services and investments.[228]

EFTA has always constituted a way for member states to develop closer economic ties not only with each other, but also with the European Communities (EC) and - from the Maastricht Treaty of 1993 - with the European Union. The Preamble of the EFTA Convention itself reaffirms "the privileged relationship" between EFTA member states and the willingness to continue "their

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[221]Norwegian Ministry of Petroleum and Energy, 'Report to the Storting – White Paper: Longship – Carbon capture and storage — Meld. St. 33' (2019 – 2020) 9 <https://www.regjeringen.no/contentassets/943cb244091d4b2fb3782f395d69b05b/en-gb/pdfs/stm201920200033000engpdfs.pdf> accessed 23 February 2022.

[222]Convention establishing the European Free Trade Association (adopted 4 January 1960, entered into force 3 May 1960) 370 UNTS 3. Consolidated version available at: <https://www.efta.int/sites/default/files/documents/Vaduz_Convention_Agreement_Updated_1_November_2021.pdf> last accessed 30 April 2022.

[223]Sven Norberg and Martin Johansson, 'The History of the EEA Agreement and the First Twenty Years of Its Existence' in Carl Baudenbacher (ed.), *The Handbook of EEA Law* (Springer International Publishing Switzerland 2016) 9.

[224]Consolidated version of the Convention establishing the European Free Trade Association (adopted 4 January 1960, entered into force 3 May 1960) 370 UNTS 3, art 3. Available at <https://www.efta.int/sites/default/files/documents/Vaduz_Convention_Agreement_Updated_1_November_2021.pdf> accessed 31 May 2022.

[225]ibid, art 7.

[226]ibid, art 5.

[227]ibid, art 18.

[228]ibid, art 2.

respective good relations with the European Union, which are based on proximity, long-standing common values and European identity."[229]

In 1992, the Agreement on the European Economic Area (EEA) was signed, solidifying strong economic relationships between EFTA and EU member states. At present, the parties to the EEA are three of the four EFTA states - Iceland, Liechtenstein, and Norway - the European Union and the member states of the European Union itself. The EEA's main scope is to "promote a continuous and balanced strengthening of trade and economic relations" between the parties,[230] with the free movement of goods, persons, services and capital[231] and with the establishment of common rules regarding competition and state aid.[232] However, Article 78 of the EEA Agreement also envisions cooperation between parties on other areas of competence such as research and technological development, the environment, social policy and consumer protection.

Within the EEA's framework, decision making is based on two pillars: the EFTA member states' pillar and the EU's member states pillar. Institutions of both sides join four bodies specifically created by the Agreement: the EEA Council, the EEA Joint Committee, the EEA Joint Parliamentary Committee and the EEA Consultative Committee. Of particular relevance to our inquiry are the EEA Council, where EFTA member states, the Council of the EU and the European External Action Service (EEAS) sit together to provide the "political impetus" within the Agreement, and the EEA Joint Committee. In the latter, the EFTA Standing Committee and the EEAS are concerned with the "ongoing management of the EEA Agreement".[233] Participants to the EEA Joint Committee take consensus decisions on the incorporation of EU legislation into the EEA acquis.[234] A fundamental concept contained in the EEA Agreement and relevant to the incorporation work of the Joint Committee is that of homogeneity, which consists in safeguarding both homogeneous legislation and homogeneous implementation and interpretation of legislation adopted under the EEA.[235] In Holter's words, homogeneity is a

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[229]ibid, Preamble.
[230]Agreement on the European Economic Area [1994] OJ L 1/3, art 1(1).
[231]ibid, art 1(2).
[232]ibid, Part IV.
[233]Georges Baur, 'Decision-Making Procedure and Implementation of New Law' in Carl Baudenbacher (ed.), *The Handbook of EEA Law* (Springer International Publishing Switzerland 2016) 48.
[234]EFTA, 'EEA Joint Committee' (n.d.) <https://www.efta.int/eea/eea-institutions/eea-joint-committee> accessed 31 April 2022.
[235]Dag Wernø Holter, 'Legislative Homogeneity' in Carl Baudenbacher (ed.), *The Fundamental Principles of EEA Law* (Springer International Publishing Switzerland 2017) 2.

"prerequisite" that enables the extension of the EU's internal market to the EFTA states within the EEA. The internal market itself is based on "a homogenous legal area as far as laws, regulations and standards of relevance to the free movement of goods, services, capital and persons are concerned."[236]

Within this homogeneous area, different provisions apply depending on which topic of cooperation is concerned. For instance, Parts II-V of the Agreement deal with cooperation on legislation on the four freedoms - the free movement of goods, services, capital and persons – while Part VI of the Agreement deals instead with cooperation on additional areas. For all areas, incorporation of new EU law considered as EEA-relevant occurs through Decisions of the Joint Committee, which amend the Agreement's original text. Part VII, Chapter 2 of the EEA Agreement sets out the detailed procedure that leads to amendments of the Annexes or Protocol. In general terms, incorporation of a new law requires consensus of all parties involved in the EEA's Joint Committee.[237] Depending on the constitutional requirements of the single state parties, this might require parliamentary approval of the JCD's decision before the latter enters into force.[238] Once incorporated – with the due changes[239] - in the relevant Annex or Protocol of the EEA Agreement, legislation can be considered binding under international law for state parties.[240]

5.1.2. EEA cooperation on the environment, climate change and CCS

Norway had already started cooperating on environmental issues with the European Communities as part of EFTA in the 1970s,[241] but cooperation became closer with the signature of the EEA Agreement. In the Agreement, actions of parties "relating to the environment" and

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[236]ibid.
[237]Norwegian Ministry of Foreign Affairs, 'Meld. St. 5 Report to the Storting (White Paper): The EEA Agreement and Norway's other agreements with the EU" (2012-2013) <https://www.regjeringen.no/globalassets/upload/ud/vedlegg/europa/nou/meldst5_ud_eng.pdf> accessed 31 April 2022
[238]EFTA, 'The Basic Features of the EEA Agreement' (n.d.) <https://www.efta.int/eea/eea-agreement/eea-basic-features> accessed 31 April 2022.
[239]Norwegian Ministry of Foreign Affairs, 'Meld. St. 5 Report to the Storting (White Paper): The EEA Agreement and Norway's other agreements with the EU" (2012-2013) 16 <https://www.regjeringen.no/globalassets/upload/ud/vedlegg/europa/nou/meldst5_ud_eng.pdf> accessed 31 April 2022.
[240]ibid, 14.
[241]Małgorzata Agnieszka Cyndecka, 'EEA Law and the climate change. The case of Norway' (2020) 9 Polish Review of International and European Law 107, 116.

within the area of the four freedoms has several objectives: the preservation, protection, and improvement of the quality of the environment, the contribution towards the protection of human health and the prudent and rational utilization of natural resources.[242] EU legislation aimed at these objectives is incorporated in Annex XX of the Agreement. Legislation on the environment which is instead classified as cooperation under Article 78 on additional areas - besides the four freedoms - is incorporated in Protocol 31 of the Agreement. It is necessary, for the scope of our inquiry, to further state that cooperation on climate change mitigation and adaptation was not explicitly included in the EEA Agreement at the time of its drafting. However, in time, the agreement has incorporated legislation on these matters considered to be relevant at the EEA level, enabling Norway to take part in the EU's environmental and climate policy at several levels.

Directive 2003/87/EC – the EU Emission Trading System's (ETS) Directive – is among the most important documents incorporated in Annex XX.[243] Since 2008, its incorporation has enabled Norway to participate in the EU's ETS.[244] In 2019, Decision 269 of the EEA's Joint Committee has confirmed that Norway and Iceland will continue cooperating with the EU to jointly fulfil their emission reduction obligations under the Paris Agreement for the period from 2021 to 2030.[245] This was also confirmed by Norway's updated Nationally Determined Contribution (NDC), drafted under the Paris Agreement in 2020.[246] Decision 269 has also expanded the scope of the cooperation between the EU and Norway on combatting climate change, incorporating - in Protocol 31 - Regulation 2018/841 on the inclusion of greenhouse

[242] Agreement on the European Economic Area [1994] OJ L 1/3, art 73.
[243] Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide 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 [2009] OJ L 140/114.
[244] EEA Joint Committee, Decision No 146/2007 (adopted 26 October 2007) <https://www.efta.int/sites/default/files/documents/legal-texts/eea/other-legal-documents/adopted-joint-committee-decisions/2007%20-%20English/146-2007.pdf> accessed 11 May 2022.
[245] EEA Joint Committee, Decision No 269/2019 (adopted 25 October 2019), 1 <https://www.efta.int/sites/default/files/documents/legal-texts/eea/other-legal-documents/adopted-joint-committee-decisions/2019%20-%20English/269-2019.pdf> last accessed 31 April 2022.
[246] UNFCCC, 'Update of Norway's nationally determined contribution' (2020) <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Norway%20First/Norway_updatedNDC_2020%20(Updated%20submission).pdf> accessed 31 April 2022.

gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework.[247]

The incorporation of the ETS Directive into the EEA system marked the first significant alignment between Norwegian and European policies on climate change. This alignment now extends to other related areas including cooperation on CCS. Given Norway's leadership role in the employment of CCS technologies it is not surprising that the country - despite not being an EU member state - was involved in the first stages of drafting of the most important document on CCS at the EU level: Directive 2009/31/EC on the geological storage of carbon dioxide.[248] The Directive was incorporated in the EEA Agreement without modifications on the 15th of June 2012, amending Annex XX on the environment.[249]

5.2 Directive 2009/31/EC on the geological storage of carbon dioxide

Directive 2009/31/EC on the geological storage of carbon dioxide was the first legal document specifically designed for CCS regulation at the European level. As a premise relevant to its genesis, it is thus important to recall that the EU is a "multifaceted system"[250] and that, as we have highlighted in Chapter 2 of this analysis, Carbon Capture and Storage has not played as important a role in other member states as it has in Norway. Rather, the main point from which we started our thesis was the general underdevelopment of CCS as a policy tool to mitigate climate change with respect to the emission reduction targets set in international law. Through Chapter 4, we have also noted how the lack of state interest towards CCS and the geological unsuitability of several countries has delayed the entry into force of relevant legislation at the

[247] EEA Joint Committee, Decision No 269/2019 (adopted 25 October 2019), art 1 <https://www.efta.int/sites/default/files/documents/legal-texts/eea/other-legal-documents/adopted-joint-committee-decisions/2019%20-%20English/269-2019.pdf> last accessed 31 April 2022.

[248] Norwegian Ministry of Foreign Affairs, 'Meld. St. 5 Report to the Storting (White Paper): The EEA Agreement and Norway's other agreements with the EU" (2012-2013) 11 <https://www.regjeringen.no/globalassets/upload/ud/vedlegg/europa/nou/meldst5_ud_eng.pdf> accessed 31 April 2022.

[249] EEA Joint Committee, Decision No 115/2012 (adopted 15 June 2012), art 1 <https://www.efta.int/sites/default/files/documents/legal-texts/eea/other-legal-documents/adopted-joint-committee-decisions/2012%20-%20English/115-2012.pdf> accessed 31 April 2022.

[250] Israel Araujo Lacerda de and others, 'Chapter 8: Carbon Capture and Storage in International Energy Policy and Law' in Arlota Carolina, and Costa Hirdan Katarina de Medeiros (eds.), *Carbon Capture and Storage in International Energy Policy and Law* (Elsevier 2021)156.

international level. Even within the European Union, member states have always had different views on whether to sustain and invest in CCS and, consequently, on the extent of legislative action that the topic required.[251]

Despite these different positions, EU member states still agreed upon several common points, that led to the necessity to consider CCS as a mitigation option that needed to be regulated through a dedicated directive. According to the Preamble of Directive 2009/31/EC, member states were aware that it was necessary to consider all available mitigation options in face of the gravity of the potential consequences of climate change and that achieving climate goals required the use of a package of measures.[252] Member states were considering the significant potential of CCS, which in 2009 was estimated to contribute to 15% of emission reductions by 2030.[253] Some already existing instruments were suitable to regulate certain aspects of CCS. For instance, Directive 2008/1/EC concerning integrated pollution prevention and control, regulated CCS "in respect of certain industrial activities, the risks of CO2 capture to the environment and human health" and Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment, was instead applied to CO2 capture and transport.[254] However, the member states were also conscious that a specific framework containing fundamental provisions specific to CCS was lacking, which is the main reason why Directive 2009/31/EC was deemed necessary in the first place. At the same time, in its proposal for the Directive, the Commission justified the choice of a directive as a legal instrument by stating that, as a binding instrument, a directive would ensure an adequate level of environmental protection, while at the same time leaving "discretion on implementation to member states."[255]

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[251]ibid.
[252]Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide 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 [2009] OJ L 140/114, Preamble (3).
[253]ibid, Preamble (5).
[254]ibid, Preamble (17)
[255]Proposal for a Directive of the European Parliament and of the Council on the geological storage of carbon dioxide and amending Council Directives 85/337/EEC, 96/61/EC, Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC and Regulation (EC) No 1013/2006 {COM(2008) 30 final} {SEC(2008) 54} {SEC(2008) 55} <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008PC0018&from=EN> accessed 7 May 2022.

5.2.1. A framework directive to regulate CCS in Europe

5.2.1.1. Subject matter, objectives, and scope of application

In the words of its article 1, Directive 2009/31/EC was thus designed as a framework that would provide member states willing to employ geological carbon capture and storage with the necessary standards to do so in an environmentally safe way, "to contribute to the fight against climate change." In terms of objectives, it is important to underline that the Directive was adopted in accordance with the ordinary legislative procedure set out in article 294 TFEU (ex 251 TEC) to achieve the objectives of the EU's policy on the environment under article 191 (ex 174 TEC). These objectives are the protection of the quality of the environment and of human health, the prudent and rational utilisation of natural resources and the promotion of "measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change."[256]

To contribute to the achievement of these objectives, Directive 2009/31/EC is structured in several chapters, which cover the fundamental elements of the life-cycle of CCS projects: storage-site selection and exploration permits, storage permits, operation, closure and post-closure obligations. The directive is also concerned with the definition of key terms on the matter of CCS, third party access, general provisions on competent authorities, transboundary cooperation, reporting and penalties. This chapter follows the Directive's structure to give an overview of its provisions for the various phases of CCS projects.

We have stated that article 1 affirms that the subject matter of the Directive is CCS aimed at climate change mitigation. It is notable that the article also emphasises the concept of "environmentally safe geological storage of CO2" as "permanent containment [...] 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." This emphasis is compatible with the general objectives of the Union's policy on the environment set out in article 191. A high level of protection of the environment and in particular of the marine environment is also expressed

[256]Consolidated version of the Treaty on the Functioning of the European Union [2012] OJ C 326/47, art 191(1).

by the Directive's prohibition of storage in the water column.[257] This ban is analogous to the ban adopted by the OSPAR Convention a few years earlier.

The Directive limits its scope of application to "the territory of member states, their exclusive economic zones and on their continental shelves within the meaning of the United Nations Convention on the Law of the Sea."[258] The storage site has to be completely included in the areas of application, otherwise CCS activities would not be permitted.[259]

5.2.1.2. Selection of storage sites and exploration permits

According to Directive 2009/31/EC, the member states have the right to indicate areas that may host storage sites. They also have the power to decide not to host any storage site, thus not allowing geological storage of carbon dioxide in their whole territory or in parts of it.[260] In sum, the Directive recognises the sovereign rights of member states on their natural resources and territory, allowing them to choose whether to employ CCS as a mitigation option or not.

For states that are willing to host storage sites, the Directive's article 4 affirms that competent authorities must evaluate their storage capacity in the selected areas, "including by allowing exploration pursuant to Article 5." Member states may thus choose other methods to assess the storage capacity of its sites, but an exploration phase within the meaning of article 5 is still mandatory under the Directive. Besides an assessment of the storage capacity, this preliminary stage must also include an evaluation of the suitability of the sites in light of the geological storage of CO2. In this sense, the Directive stresses that a site may be chosen for storage if it is has been determined that there is "no significant risk of leakage, and if no significant environmental or health risks exist."

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[257]Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide 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 [2009] OJ L 140/114, art 2(4).
[258]ibid, art 2(1).
[259]ibid, art 2(3).
[260]ibid, art 4(1).

To determine the suitability of a storage sites, member states must make use of the criteria contained in Annex I,[261] which structures the assessment in three steps. The first step is data collection, in which parties must gather information on the potential storage site's geology and physics, hydrogeology (including data on possible storage reservoirs of "water intended for consumption), seismicity and potential leakage pathways. At this stage, parties must also gather information on the region surrounding the complex: the population in the area, the proximity of the storage site to "valuable natural resources", its vicinity to other offshore activities and others. Based on this information, the second step of the assessment consists in the creation of a three-dimensional static earth model; here, any uncertainty related to the model must be assessed by exploring various scenarios that will be taken into account in the storage site's choice. Besides a static model, during the third step of the assessment parties must also develop a dynamic model of the site, including hypothesis on its modelling in the short term and in the long term, potential CO2 injection rates and a risk assessment.

Once the preliminary assessment has been completed, state parties may issue exploration permits in accordance with article 5 of the Directive. Exploration cannot occur without a permit issued by the member states' competent authorities.[262] The permit process should be open to "all entities possessing the necessary capacities" and the permits should be granted using "objective, published and non-discriminatory criteria."[263] If granted, the permit must be valid for a precise period of time – even though it might be renewed – and in relation to a "limited volume area" of the site.

5.2.1.3. Storage permits

The Directive's indications on storage permits are more extensive and detailed than the ones given for exploration permits. As for exploration, storage cannot occur without a permit, awarded to only one operator for each storage site,[264] based on "objective, published and

[261]Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide 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 [2009] OJ L 140/114, art 4(3).
[262]ibid, art 5(1).
[263]ibid, art 5(2).
[264]ibid, art 6(1).

transparent criteria."[265] Even if the procedure for storage permits is, in principle, open to all parties with the "necessary capacities", priority in the procedure for the storage permits is to be given to parties that have already received an exploration permit and have complied with the conditions set out by the permit.[266]

The procedure for granting a storage permit should be initiated with an application to the member states' competent authorities. The application must include the information set out in article 7 of Directive 2009/31/EC, including information regarding the operator such as name, address and proof of technical competence, but also on information on the site gathered in accordance with the three-step procedure set out in Annex I as described above. Moreover, the permit application must also include a "proposed monitoring plan", a "proposed corrective measures plan" and a "proposed post-closure provisional plan".

In order to determine whether to grant a storage permit, member states must follow the procedure set out in article 8 of the Directive. First, they have to ensure that the application complies with the Directive and with other relevant EU legislation and second, they should only grant the permit if the operator is financially and technically able "to operate and control the site". Finally, the member states must consider the opinions of the Commission, which are exchanged according to the procedure set out in the Directive's article 10.[267] Indeed, notification to the Commission of any storage application must occur "within one month after receipt."[268] The Commission, within the following four months, may then draft an opinion. The latter is not binding but, when member states depart from it, they must express their reasons for doing so.[269] In Northern Lights' case, it seems that the Commission has refrained from giving an opinion or is still in the process of doing so. At the moment, the only opinions available regard "the permanent storage of CO2 offshore on the Dutch continental shelf" and "the depleted Goldeneye gas condensate field on the United Kingdom Continental Shelf."[270]

When eventually granted, the storage permit must contain the information set out in article 9 of the Directive: the name and address of the operator and relevant information on the storage

[265] ibid, art 6(2).
[266] ibid, art 6(3).
[267] ibid, art 8(2).
[268] ibid, art 10(1).
[269] ibid.
[270] European Commission, 'Implementation of the CCS Directive' (n.d.) <https://ec.europa.eu/clima/eu-action/carbon-capture-use-and-storage/implementation-ccs-directive_it> accessed 11 May 2022.

site's "precise location and delimitation" and on the composition of the CO2 stream in accordance with article 12. In this regard, we recall that both the London Protocol's amendments and the OSPAR Convention's amendments enabling CCS emphasised the importance of only allowing storage of a CO2 stream with specific characteristics. The same characteristics are also indicated in the Directive at its article 12(1): a CO2 stream must "consist overwhelmingly of carbon dioxide" and the presence of other substances may only occur accidentally. Even so, the quantity of these substances must be marginal, below levels that would pose any harm to the storage site, to the transport infrastructure, to human health and the environment.[271] To avoid potential harm, the operator is only allowed to inject CO2 in the storage site if an "analysis of the composition [...] of the streams" and "a risk assessment" have been carried out and the stream respects the conditions set out in article 12(1). In any event, the operator must register quantity and characteristics of the injected CO2.[272] It is also important to underline that the responsibility to ensure that the operator complies with these requirements is in the hands of member states.[273]

5.2.1.4. Operation, closure and post-closure obligations

Besides respecting the conditions on the CO2 stream's composition set out above, CCS facilities for geological storage must be monitored in accordance with the procedure established by article 13 of Directive 2009/31/EC. The monitoring process is necessary to study the real behaviour of CO2 once injected, in comparison with the three-dimensional models built for the exploration and storage permits.[274] Moreover, monitoring can detect risks related to the injection or ongoing leakage, and it can gather important information to modify "the assessment of the safety and integrity of the storage complex in the short and long term."[275]

The requirements for the monitoring plan, which must be updated every five years, are set out in Annex II of the Directive itself. The Annex refers to step three of the procedure for the

[271]Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide 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 [2009] OJ L 140/114, art 12(1).
[272]ibid, art 12(3)(b).
[273]ibid, art 12(3).
[274]ibid, art 13(1)(a).
[275]ibid, art 13(1)(g).

characterisation and assessment of storage sites described in Annex II, as the risk assessment conducted then acts as a basis for the establishing of the monitoring plan. In accordance with the high standards of protection that form the basis of environmental policy at the EU level, the centre of interest for the monitoring is the potential leakage from geological storage sites. In order to avoid "fugitive emissions", the monitoring plan must include, among others, the control of parameters such as the reservoir's pressure and the CO2's pressure and volume at the injection wells.[276] The data gathered on these parameters is then used to update the monitoring plan, which must be approved by the member states' authorities.[277]

Part of the monitoring is also the reporting by the operator of updated relevant information regarding the CCS activity at hand. In this regard, article 14 of the Directive sets out the minimum requirements for the reporting. Operators must report at least once a year to the competent authorities of the member state hosting the storage activity, and reports must include: all results of the monitoring plan as described above by article 13, the quantitative and qualitative characteristics of the CO2 stream and the proof of financial security that enables the operator to carry on with the project.[278] The Directive also leaves a certain degree of discretion to the competent authorities of member states, by enabling them to request "any other information" they might consider relevant to assess compliance with the storage permit.[279] Also, in order to assess compliance, member states have the responsibility of ensuring that the competent authorities set up a routine of inspections, occurring "at least once a year until three years after closure and every five years until transfer of responsibility to the competent authority has occurred."[280]

In case of "leakages or significant irregularities", the Directive's procedure set out in article 16 indicates that member states are responsible for ensuring that operators notify the competent authorities and adopt measures to protect human health.[281] In this case, a "corrective measures plan" is approved by the competent authority, and the Directive gives the authority the possibility to require compliance by the operator "at any time" or, if the operator does not

[276]ibid, Annex II(1).
[277]ibid, art 13(2).
[278]ibid, art 14.
[279]ibid, art 14(4).
[280]ibid, art 15(3).
[281]ibid, art 16(1).

comply, to take the corrective measures itself.[282] The costs derived from the application of corrective measures lie with the operator.[283]

With regards to the closure of CCS storage sites, Directive 2009/31/EC states that this may occur with an explicit and motivated request by the operator to the competent authorities, in the event of a withdrawal of the storage permit in accordance with article 11(3), or if conditions contained in the storage permits have been fulfilled.[284] A post-closure plan must be prepared by the operator of the site, as the latter "remains responsible for monitoring, reporting and corrective measures [...] and for all obligations relating to the surrender of allowances in case of leakages."[285] Sealing of the storage site and removal of the injection wells and related equipment is also in the hands of the operator.[286] In case of site closure derived from a withdrawal of the storage permit, however, the competent authority replaces the role of the operator, drafting the post-closure plan and fulfilling the obligations set by article 17 of the Directive.[287]

The final phase as regards post-closure is the transfer of responsibilities occurring from the operator to the competent authority. The cumulative conditions for the transfer are described in detail by the Directive under article 18: "all available evidence" should indicate that the storage is permanent within the meaning of the Directive, a period of at least 20 years has passed from the granting of the storage permit, financial obligations have been fulfilled and the site has been sealed and the wells removed. The Directive stresses the fulfilment of the first condition and requires the operator to draft a report "demonstrating, at least: (a) the conformity of the actual behaviour of the injected CO2 with the modelled behaviour; (b) the absence of any detectable leakage; (c) that the storage site is evolving towards a situation of long-term stability."[288] The process of transfer of responsibilities also involves the Commission, which issues a non-binding opinion on the matter. The power to make the final decision on the transfer still lies with the authorities of member states, which, however, must take the Commission's opinion into account.[289] It is important to underline that, even when the authority allows the transfer of

[282]ibid, art 16(3-4).
[283]ibid, art 16(5).
[284]ibid, art 17(1).
[285]ibid, art 17(2).
[286]ibid, art 17(2).
[287]ibid, art 17(4).
[288]ibid, art 18(2).
[289]ibid art 18(4-5).

responsibilities, the operator remains financially liable in case of fault "including cases of deficient data, concealment of relevant information, negligence, wilful deceit or a failure to exercise due diligence."[290]

5.2.1.5. Third party access and transboundary cooperation

Article 21 of Directive 2009/31/EC guarantees third-party access to CCS transport networks and storage sites. According to the article, member states are responsible for ensuring that "potential users are able to obtain access to transport networks and to storage sites." The Directive states that, in granting access, the basic principles of transparency and non-discrimination aimed at "fair and open access" are to be applied. Article 21(2) also prescribes factors that member states need to take into account when granting access: (a) the transport and storage capacity that can be "reasonably" made available, (b) the CO2 reduction obligations that the state is bound to in international and EU law, (c) the eventual technical incompatibility of projects "which cannot be reasonably overcome", and (d) the relevant "duly substantiated reasonable needs" of the parties involved (e.g. the owner or operator of the storage site and of transport services). The right of third parties to access CCS transport networks and storage sites is thus restricted by these conditions. In addition, article 21(3) affirms the right of transport network operators and operators of storage sites to refuse access "on the grounds of lack of capacity" through "duly substantiated reasons". Notably, in these cases, member states have the duty to address the refusal due to lack of capacity, by ensuring that the operators make the changes necessary to eventually transport and store the needed quantity of CO2, provided this does not result in dangers for the environmental security of transport.[291]

Disputes might arise in the context of third-party access to transport networks and storage sites. In these cases, article 22 prescribes that member states have to establish "dispute settlement arrangements" with an independent authority "with access to all the relevant information." The Directive thus gives minimum indications on how the dispute settlement procedure is supposed to be carried out: it has to be "settled expeditiously" and in accordance with the factors listed in article 21(2) above.[292] If the dispute involves parties in different countries, the applicable law

[290]ibid, art 18(7).
[291]ibid, art 21(4).
[292]ibid, art 22(1).

is that of the state having jurisdiction over the transport network and storage activities. If these activities are covered by more than one jurisdiction, the involved states must hold consultations to ensure the correct application of the Directive.[293]

The Directive envisions that states may cooperate in CCS activities and that CO2 may be transported from one state to another for the purpose of permanent geological storage. Therefore, article 24 of the Directive states that, in cases of transboundary transport of CO2, the competent authorities of involved member states hold the responsibility to "jointly meet" the standards set by the Directive and relevant EU law. In this regard, Shogenova and others suggest that article 24 was intended to "encourage bilateral agreements between countries to arrange for transboundary CO2 transport in order to circumvent the London Protocol prohibiting the export of CO2 as waste."[294] It is perhaps more accurate to state that Directive 2009/31/EC declined to give further guidance on transboundary CCS due to the uncertain classification of CO2 under the London Protocol. Indeed, at the time of drafting of the proposal for the Directive, the Legal and Technical Working Group on Transboundary CO2 Sequestration Issues established by the parties to the London Protocol to clarify the status of CO2 with regards to the prohibition of transport in article 6 had not yet concluded its work.[295] Even in the event of a potential incompatibility between the sources of law involved, we can safely state that the provisional application of the amendment to Article 6 of the London Protocol in 2019 has resolved any doubts as to the legality of transboundary CCS at the international – and EU – level provided that the relevant states comply with the measures for provisional application.

5.3 Norway's implementation of Directive 2009/31/EC

As stated when introducing this chapter, the EEA's Joint Committee Decision 115 incorporated Directive 2009/31/EC on the 15th of June 2012 in the EEA Agreement without substantial

[293] ibid, art 22(2).
[294] Alla Shogenova and others, 'Implementation of the EU CCS Directive in Europe: Results and Development in 2013' (2014) 63 Energy Procedia 6662, 6665.
[295] The Proposal for Directive 2009/31/EC was concluded on the 23rd of January 2008, and the Report of the Legal and Technical Working Group on Transboundary CO2 Sequestration Issues was only published on the 3rd of March 2008.

modifications. As such, the Directive must be implemented in Norwegian law. In this case, implementation occurs by "transformation", as legislators give effect to the text of the Directive into national law.[296] In the case of Norway, the implementation of the Directive in national law had challenges typical to Norway's political and administrative context and its division into several counties and municipalities, as described by Bugge and Ueland in their case study on the implementation of Directive 2009/31/EC in Norway.[297]

Norway chose to implement the Directive through the modification of existing instruments: the "Regulations to Act relating to petroleum activities" (hereinafter, the Petroleum Regulation)[298] and the "Regulations relating to pollution control" (Pollution Regulation).[299] Moreover, Norway also adopted the new "Regulations relating to exploitation of subsea reservoirs on the continental shelf for storage of CO_2 and relating to transportation of CO_2 on the continental shelf" (Storage Regulation).[300]

As a new instrument, the Storage Regulation aims to contribute to "sustainable energy generation and industrial production" through clearer measures dedicated to CCS activities.[301] In line with the provisions of UNCLOS, § 1-2 of the Regulation reaffirms the exploitation rights of the Norwegian state over "the subsea reservoirs on the continental shelf". In terms of scope, the new Storage Regulation is only concerned with CCS activities unrelated to "petroleum activities" - as those activities are instead subject to the Petroleum Regulation's provisions.[302] The Regulation is divided in twelve chapters which cover most of the phases of the life-cycle of CCS activities. The structure is similar to that of Directive 2009/31/EC, as the Regulation deals with survey licensing (Chapter 2), exploration licensing (Chapter 3), exploitation licensing (Chapter 4) and the cessation of injection and storage (Chapter 7). Chapter 5 is also relevant to the Directive's implementation, as it contains general provisions on the injection

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[296]Hans Christian Bugge and André Lamark Ueland, 'Case studies on the implementation of Directive 2009/31/EC on the geological storage of carbon dioxide' (University College London Centre for Law and the Environment, Carbon Capture Legal Programme 2011) 14.
[297]ibid, 16-17.
[298]Forskrift 27 juni 1997 nr. 653 (Petroleumsforskriften - Regulations to Act relating to petroleum activities).
[299] Forskrift 1 juni 2004 nr. 931 (Forurensninsforskriften - Regulations relating to pollution control).
[300]Forskrift om utnyttelse av undersjøiske reservoarer på kontientalsokkelen til lagring av CO2 og om transport av CO2 på kontientalsokkelen, forskrift 5 desember 2014 nr. 1517 (Lagringsforskriften - Regulations relating to exploitation of subsea reservoirs on the continental shelf for storage of CO_2 and relating to transportation of CO_2 on the continental shelf).
[301]ibid, § 1-1.
[302]ibid, § 1-3.

and storage of CO2 that reflect the principles of continuous monitoring of the injection site,[303] regulatory supervision through inspections[304] and provisions regarding corrective measures in case of leakages or "significant irregularities".[305] In these instances, the Regulation employs the same terms of the Directive, while adding specific procedural indications relevant to national law. Importantly, the Regulation indicates that the national authority competent for the regulatory supervision and to which the responsibilities for the CCS storage will be eventually transferred to is the Norwegian Ministry of Petroleum and Energy.[306] The Regulation also adopts more stringent and detailed regulation in Chapter 8 regarding the liability for pollution damage, either from ships for the transport of CO2 or from facilities dedicated to the storage phase[307] and additional safety and emergency measures for CCS activities.[308] Moreover, the Regulation provides a compensation scheme for Norwegian fishermen, who may lose fishing grounds due to the transport and storage of CO2.[309]In her analysis of Norway's implementation of the CCS Directive Vold reports that modifications to the Petroleum Regulation were instead relatively limited and mainly consisted in the inclusion of definitions related to CO2 transport and storage. An additional chapter - 4a - was also added to the Regulation, and its content reflects the content of the Storage Regulation described above. [310]

Thus, the Norwegian implementation puts in place a two-tier system: the Petroleum Regulation concerns CCS activities related to hydrocarbon extraction, and the Storage Regulation applies to non-hydrocarbon related activities. In both cases, however, the Pollution Regulation applies, enabling Norway to maintain a high standard of protection with regards to the environment and marine living resources. Vold also reports that environmental standards dedicated to CCS activities in Directive 2009/31/EC were included in the Pollution Regulation.[311] The Pollution Regulation applies to all CCS activities, whether they are related to petroleum activities or not, and it adopts a system of permits which is, at least on paper, autonomous from those of the Petroleum Regulation or the Storage Regulation. Vold assesses that there is close cooperation

[303] See for instance ibid, § 5-4, § 5-5.
[304] ibid, §5-5.
[305] ibid, §5-6.
[306] ibid, §5-5.
[307] ibid, §8-1.
[308] ibid, Chapter 10.
[309] ibid, Chapter 9.
[310] Sophie Fogstad Vold, 'CCS legislation in Norway: the EU CCS Directive and its Implementation into Norwegian Law' in Martha M. Roggenkamp and Catherine Banet (eds), European Energy Report XIII (Intersentia 2020) 383
[311] ibid, 384.

between the authorities granting these permits and respect for the Pollution Regulation's standards is fundamental to the grant of any permit under the other two regulations.[312]

6 Concluding remarks

In introducing this research, we first considered the problem of the underdevelopment of CCS projects with respect to the climate targets set by international and European law. We also underlined a recent contrary trend: the spike in the number of CCS projects in Northern Europe and the potential of CCS networks to create a market for CO2 aimed at reaching emission reduction goals. To that end, we concentrated on the Northern Lights project as a case study to establish how international and supranational law regulate CCS networks in Europe.

Chapter 2 established the technical characteristics of CCS, and highlighted the phases of capture, transport and storage and the different ways in which each of them can be carried out. Chapter 3 applied the analysis of the different phases to the Northern Lights project, which has been described as one of the first transboundary networks for CCS in Europe. The project has several stages of development and the potential to store large amounts of emissions from third-parties in different countries. The project is strongly supported by both Norway through state aid and by the EU through funds provided to Projects of Common Interests (PCIs). This support expresses the high level of expectations for the project.

Chapter 4 described the fundamental instruments of international law of the sea and applied them to the Northern Lights project. The analysis concludes that international law establishes a framework for CCS activities focussed on ensuring preservation of human health and environmental protection. As for CCS networks such as Northern Lights, a fundamental component in this sense is the attribution of rights and duties among countries that export, transport and import CO2. Our findings in Chapter 4 have explained how every phase – from capture, to transport and storage - of CCS networks is covered by the provisions contained in UNCLOS. The text remains a staple of offshore CCS regulation due to its character as a framework convention for the law of the sea, as it contains the basic provisions related to the

[312] ibid.

responsibilities and rights of coastal states, flag states and third states in CCS projects at sea. Its provisions on the preservation of the marine environment from pollution and dumping are complemented, indirectly, by the amended versions of the London Protocol and, regionally, of the OSPAR Convention (also analysed in Chapter 4).

Fundamental conclusions from the analysis of UNCLOS include the exclusive right of coastal states – Norway, in this case - to authorise the installation and operation of artificial structures and pipelines in their territorial sea, in their EEZ, and to carry out the activities of permanent storage of CO2 in their continental shelf. Other states' rights in the various maritime zones and obligations regarding the protection of the marine environment as described by UNCLOS itself impose some qualifications on this right, including the duty of due regard.

Our attention then shifted towards the more specific London Convention, the London Protocol and, as relevant to Northern Lights, the OSPAR Convention. In analysing these instruments, we saw that international law has only started to expressly regulate CCS activities relatively recently. Prior to that, the lack of explicit mention of CO2 as a substance subject to the dumping regime made it challenging to establish with certainty the status of CCS activities under the existing instruments and created doubts as to whether geological storage of CO2 was prohibited or regulated under these instruments. Around 2005 however, when the IPCC Special Report on CCS expressed the potential of the technology and included it in the portfolio of mitigation options, the interest in CCS activities seemed to spark. Milestones in the regulation of CCS followed, as states considered amendments to existing international treaties and new instruments described in Chapter 4 and 5 of this thesis: the 2006 amendment to Annex I of the London Protocol, the 2007 package of amendments to the OSPAR Convention, and finally, the European Union's Directive 2009/31/EC.

According to our research, two main factors contributed to the clarification of the status of CO2 in international law. First, the work of expert groups such as the London Protocol's Legal and Technical Working Group on Transboundary CO2 Sequestration Issues and the OSPAR Commission's Group of Jurists and Linguists (JL) was fundamental to allow for further developments in the regulation of CCS. Second, both the parties to the London Protocol and the parties to the OSPAR Convention employed guidelines in order to complement the respective treaties with important indications on risk assessment, risk prevention and risk management. These guidelines now constitute the basis for regulating and managing the

different phases of CCS projects, as they provide criteria for the pre-selection of the site, the actual injection of CO2 and the post-closure phase.

Our research also finds that once the amendments entered into force, the status of CCS in international law became much clearer. Both in the London Protocol and in OSPAR, CCS activities are defined as a regulated form of dumping – whether from vessels or from offshore installations - in light of the contribution that CCS may make to the mitigation of climate change. Authorisation is provided under strict conditions, due to the potential risks of CCS in terms of the marine environment and its living resources. These requirements deal with the storage area, which must be of geological nature, and the composition of the CO2 flow, which must be as pure as possible. OSPAR imposes an additional layer of caution, as its conditions include the permanency of CO2 within the geological formations and the lack of significant adverse consequences for the marine environment and human health. In this sense, the EU's approach in Directive 2009/31/EC is equally protective.

In Chapter 4, our focus on Northern Lights as a transboundary CCS network also revealed that the amendments described above covered the geological storage of CO2 within the territorial sea, the contiguous zone and the EEZ (i.e. all the areas in which the coastal state has exploitation rights). But slow ratification of the 2009 Amendment to article 6 of the London Protocol - which prohibited the export of wastes for the purpose of dumping or incineration – left residual challenges for the development of transboundary CCS networks. These challenges were finally resolved in 2019 with the adoption of a resolution by the parties to the Protocol permitting the provisional application, under specific conditions, of the 2009 amendment.

Our analysis of European law and Directive 2009/31/EC in Chapter 5 provided an outline of the procedures set out by the directive. The directive contains both general principles and specific provisions regarding the permit system for exploration and storage permits, operation and post-closure obligations including the transfer of responsibilities to the competent authorities. For all these phases, the Directive constitutes a regional framework adaptable by all EU member states and, as with Norway, for EFTA states participating in climate cooperation based on the EEA. Norway's implementation of the Directive is detailed and reflects the timelines and procedures set out by Directive 2009/31/EC. Moreover, it gives space to additional protection towards the environment, through a double permit-system that includes both the Storage and Petroleum Regulation and the Pollution Regulation.

Our concluding reflection on this multilayer framework of international and supranational law is that the parties have been able to resolve potential conflicts between CCS activities and instruments such as UNCLOS, the London Protocol, and OSPAR through the adoption of amendment to the Protocol and OSPAR and the resolution on the provisional application of the export amendment to the Protocol in 2019. The latter, in particular, marks the beginning of a new era for CCS and for the potential creation of an international market and international infrastructure for CO2 disposal. The remaining part of the puzzle relates to the implementing agreements required by parties who seek to take advantage of the export amendment to Article 6 of the Protocol. As stated in Chapter 4, third parties with capture facilities located outside Norway will need to have their host state conclude an implementing agreement with Norway should they seek to participate in the Northern Lights project. We have yet to see an example of such an agreement but, as stated in Chapter 4, announcements to date suggest that Norway will need agreements with at least Netherlands, UK and Sweden. Indeed, according to the timeline of the project as described in Chapter 3, injection as part of Northern Lights is supposed to start in 2024. Due to the great amount of interest that the project is receiving and the rising number of potential third-parties, it is likely that we will see the first implementing agreement before then; and indeed we must see them before there is any export of CO2 for the purposes of sub-seabed disposal.

At that time, an accurate analysis of these implementing agreements will be necessary, to understand for instance how parties have distributed responsibilities and liabilities. Moreover, it is likely that the first agreement will set the tone for the following ones, and it will be interesting to see whether agreements within the same project - but between different states – differ, or whether they follow a standard template (perhaps imposed by Norway as the common party and as the host state). As for now, we can affirm that any implementing agreement will need to be looked at as part of the framework described in this thesis, a framework which aims at guaranteeing safe CCS and at enhancing CCS projects as part of the fight against climate change.

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