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Carbon Capture, Transport and Storage Under the EU Emissions Trading System – Accommodating Mobile CO_2 Transport

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1 Introduction

1.1 Research question and its significance for CCS in Europe

The research question of this thesis is whether the economic incentive set forth by the European emissions trading system ('ETS') to avoid emissions by means of carbon capture and storage ('CCS') technology is available for a CCS process that employs mobile CO_2 transport. This section provides a brief overview of the topic and why there is an urgent need for this analysis.

The threat posed by global warming prompts a dire need for greenhouse gas (GHG) emission reductions. To meet this need, the European Union (EU) legislator has adopted several legal instruments to obligate and incentivise emission reductions. The legal cornerstone of this climate policy is the European emissions trading system.[1] The ETS is the world's first and largest market for trading emission allowances.[2] Its prime objective is to incentivise cost-effective emission reductions efforts.[3]

The ETS is based on the 'cap and trade' principle, where a cap is set on the total amount of GHGs that may be emitted by the activities subject to the scope of the market.[4] Any operator that seeks to perform these activities must obtain an emission permit ('ETS operators'). The cap is divided into emission allowances that are allocated to participants in the market, primarily by auctioning, and may subsequently be freely traded. The 'cap' is reduced over time in order to reduce total emissions. The ETS operators are required to surrender allowances equal to the total emissions from the preceding year, thus 'paying' for the GHGs emitted. The market mechanism incentivises emission reduction efforts where that cost less than acquiring allowances.

Employing CCS is one option for avoiding emissions under the ETS. The CCS process consists of 'the capture of carbon dioxide (CO_2) from industrial installations, its transport to a storage site and its injection into a suitable underground geological formation for the purposes of permanent storage'.[5] ETS operators of industrial installations may thus reduce the amount

[1] Directive 2003/87/EC as amended, COM(2019) 640 final p. 6-5, European Commission a (nd).
[2] Although others exist, see generally Newell *et al* (2013). China recently announced that 2020 will see a breakthrough for its efforts to establish a national carbon trading system, see Reuters (2020).
[3] Directive 2003/87/EC as amended, Article 1.
[4] See chapter 2 for a comprehensive overview of the ETS.
[5] Recital 4 to Directive 2009/31/EC.

of allowances to be surrendered by employing a CCS process sanctioned and promoted by the ETS.[6]

Large-scale European CCS projects have been anticipated by the EU legislator for some time without success.[7] There is therefore great expectations connected with the now forthcoming large-scale CCS projects in Europe. The two furthest progressed projects are the Norwegian 'full-scale project' and the Dutch 'Porthos project'.[8] A key feature of these projects is the ability to employ *mobile transport modalities*, such as ships and trucks, to connect decentralised capturing points to a pipeline network that sends the CO_2 to permanent storage ('cluster projects'). Employing mobile connections allows for flexibility and enhances cost-efficiency depending on the distance travelled and volumes transported.[9]

These are the first large-scale CCS projects in Europe that aim to benefit from the economic incentive provided for by the ETS for emission reductions by CCS. It is therefore a paradox that the ETS legal framework appear to solely enable CO_2 transport by *pipelines*, when the long-awaited forthcoming CCS projects rely on a business model that include mobile transport connections within the CCS process. It is this disparity that prompts the acute need for an analysis of the ETS legal framework and its application to mobile CO_2 transport within a CCS process.

The aim of the CCS-specific rules under the ETS is to provide a clear economic incentive to reduce emissions by means of CCS, while simultaneously ensuring the environmental integrity and effectiveness of the process. The latter is sought ensured by imposing liability for any emissions associated with the separate phases of the CCS process. The current legislative design fails, however, to account for the mobile CO_2 transport connecting the separate CCS installations. A literal interpretation of the monitoring and reporting rules on CO_2 transfers, therefore, suggest that *all* CO_2 transferred to a mobile transport provider will be counted as liable 'emissions' under the ETS. This is because the wording of those rules does not facilitate monitoring, reporting and verification of CO_2 onboard a mobile transport modality. This legal effect – essentially imposing liability for avoided emissions – would deprive the forthcoming CCS cluster projects of the economic incentive provided for CCS under the ETS.

[6] Directive 2003/87/EC as amended, Article 12 nr. 3a.
[7] See generally COM(2013)180, and Lupion & Herzog (2013).
[8] See section 1.2.2 below. Porthos is currently planned with pipelines, but envisage mobile transport if possible. Tamme (2020).
[9] IPCC (2005), p. 5, Seglem (2020).

This conundrum prompts the fundamental question of what 'emissions' the ETS imposes liability for: Does the ETS solely impose liability for CO_2 that is *definitively released into the atmosphere* or also CO_2 that *'leaves' the ETS scope of liability* in order to account for all potential release into the atmosphere?

The EU Court and the European Commission appear to be in disagreement with regard to this fundamental question. The Court interprets the ETS Directive to impose liability for release of CO_2 into the atmosphere *only*, presupposing an implementing framework that manages to identify *actual* emissions. The Commission, which is tasked and empowered to facilitate harmonised implementation of the ETS, has, however, adopted rules that impose liability on all CO_2 leaving the scope of the ETS, without regard to whether that CO_2 is ever released or not. This is why CO_2 transferred to a mobile CO_2 transport modality in a CCS process seems to be treated as 'emissions' by those implementing rules – despite the fact that the transport is undertaken as a necessary step in an emission reduction process.

It thus appears that the wording of the Commission rules on CO_2 transfers are in conflict with the superior norms set forth by the ETS Directive. This raises the question of the validity of those implementing rules, as they appear to entail content beyond that which the Commission is empowered to adopt. However, merely identifying this conflict within the hierarchy of norms does not address the pressing need for a solution that accommodates the forthcoming projects and their reliance on the economic incentive set forth by the ETS.

This thesis proposes a teleological interpretation that accommodates the use of mobile CO_2 transport in a CCS process within the current ETS legal framework. The current framework does not positively *enable* mobile CO_2 transport, but may arguably *accommodate* it. By employing a broad interpretation of the scope of an 'installation' performing a CCS-activity subject to liability under the ETS, the CO_2 transferred to the mobile transport phase will not entail an exit from the scope of the ETS. The proposed interpretation thus solves the existential threat posed to the forthcoming CCS cluster projects, and furthermore resolves the conflict within the ETS hierarchy of norms with respect to the subject matter of mobile CO_2 transport.

No available literature provides an in-depth analysis of the ETS and its application to CCS processes with mobile transport modalities.[10] The Commission has been asked to give its opinion on this issue concerning the forthcoming Norwegian CCS project, but no answer has been provided as of June 2020.[11] The only pieces of legal opinion that briefly address this issue, conclude that a transfer of captured CO_2 to a mobile transport modality instigates liabil-

[10] As far as I have been able to research.

[11] The letter was sent in August of 2019. Norwegian Environmental Agency (2019).

ity for not emitted CO_2.[12] By considering a broader scope of relevant legal sources, I reach a different conclusion. However, as the wording of the current ETS legal framework prompts diverging conclusions, there is a strong case for a revision of this framework in order to promote legal certainty for future CCS projects.

1.2 Background and topicality

1.2.1 Climate mitigation and the role of CCS

As explained above, the role and function of the forthcoming CCS 'cluster projects' are intrinsically linked to the urgent need for emission reductions efforts to mitigate climate change. This section briefly introduces the role of CCS in the global fight against climate change (1.2.1), before the subsequent section presents the role of mobile CO_2 transport in the forthcoming European CCS cluster projects (1.2.2). The ETS and CCS frameworks are thoroughly introduced in chapter 2.

The Paris Agreement acknowledges the need to mitigate global warming to 'well below' 2 degrees compared to pre-industrial levels.[13] It further recognises that halting the temperature increase to every fraction of a degree closer to 1.5 degrees is likely to induce consequences considerably less perilous for humans and the environment.[14] At the time of writing this thesis, the world is experiencing the COVID-19 pandemic with its detrimental consequences for human health and the global economy. Employing efforts to mitigate climate change is crucial for, *inter alia*, decreasing the risk of future pandemics.[15]

A variety of measures to mitigate climate change should be taken within all sectors of society in order to rein in the temperature increases.[16] Among these possible mitigation measures are also CCS technologies.[17] The interest in carbon capture, transport and storage technologies is driven by the need for emission reduction efforts that may be reconciled with the global econ-

[12] A high-level legal report by Global CCS Institute & Bech-Bruun (2012), reiterated briefly in Global CCS Institute (2019), p. 33, and a recent master thesis that consult the wording of the framework, but not the implications of the case law and hierarchy of norms. O'Brien (2019), p. 21-22, O'Brien (2020)

[13] Paris Agreement Article 2(a), UNFCCC (2019), The Paris Agreement of 2015 is the most recent treaty in the United Nations Framework Convention on Climate Change (UNFCCC).

[14] UNFCCC (2019), COM(2018) 773 final, p. 2, endorsed by European Parliament 2019/2582(RSP).

[15] On the anticipated relation between climate change and infectious diseases see Dunne (2020), Harvell *et al* (2002) and Altizer *et al* (2013). WHO (n.d.).

[16] For a range of envisaged measures see the EU policy framework set forth for climate and energy between 2020-2030 in COM(2014) 15 final.

[17] See Millar & Allen (2020) on the role and science of CCS in meeting the ambitious climate goals.

omy's reliance activities which produce GHG emissions.[18] Both the International Energy Agency ('IEA') and the International Panel on Climate Change includes CCS as an important part of different viable pathways to mitigate dangerous climate change.[19]

For European leaders, the idea of CCS has gone from representing a purely transitional tool for the continued use of fossil fuels, to being a part of the long-term solution in order to produce hydrogen, decarbonise industries where the production of CO_2 is inevitable, and to achieve negative emissions with CCS applied to biogenic sources.[20] CCS now constitutes one of seven pillars in the vision for a climate neutral Europe by 2050 published by the European Commission.[21]

The CCS process is sometimes referred to as the 'CCS value chain' or 'full-scale CCS'; there is no agreed upon definition of these different terms, but they both refer to the three-phase process of capture, transport and permanent storage.[22] The emission sources form a CCS process include both emissions from leakage of captured CO_2 ('leakage emissions') and emissions from the operation of the process itself ('operative emissions').

Carbon capture and utilisation (CCU) is another type of emission reduction option associated with capture technology.[23] Some CCU technologies aim to store permanently some, or all, of the CO_2 used, thus representing a *form* of CCS, or 'CCUS'.[24] The term 'CCU' will be used in this thesis as it is the term adopted by the legal frameworks. The appeal of CCU relates to how the CO_2 may be sold as raw material rather than simply stored, making a stronger business case for the potential emission reductions.[25] This thesis focuses on the CCS processes and related transport options. However, the analyses demonstrate how the obstacle posed to using mobile CO_2 transport mirror the obstacles to deployment of CCU for emission reduction purposes.

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[18] COM(2008) 18 final, para. 1.

[19] IPCC 2014 *summary for policymakers*, IPCC 2018 *summary for policy makers* for an overview of the potential role of CCS in the viable pathways to towards the 2-degree and 1,5-degree targets respectively. And IEA (2016) for an overview of CCS application so far and its future role. IAMC (2018-2019) for a compilation of the emission scenarios for curbing global warming to 1,5 degrees. See also Haszeldine & Ghaleigh (2018), p. 30 making the case that no CCS = no 2-degree target, similarly Cicero (2020), CSLF (2017), p. 1.

[20] Roggenkamp (2018) p. 245 on the role of CCS as a transitional tool, COM(2018) 773 final, p. 15.

[21] COM(2018)773 final, p. 15. See also the role of CCS envisaged as part of the EU Green Deal in COM(2019) 640 final p. 6 and 8.

[22] Recital 4 to Directive 2009/31/EC, See Holwerda (2014) p. 18-32 for a succinct overview of CCS – the concept and technology, and Bui & Dowell (2020) for a comprehensive scientific overview of CCS.

[23] For an overview of the different types of CCU/CCUS see Ramirez (2020).

[24] Also referred to as CCUS (carbon capture utilisation and storage), see Monteiro (2018) however, as the term 'CCU' is the one used by the ETS legal framework, this is also the term used in this thesis.

[25] IOGP (2019).

1.2.2 CCS in Europe and the role of mobile CO_2 transport

The three phases of CCS are separate but related. When regulating these phases, therefore, it is important to take into account both their interdependence and the different manners in which a CCS process may be designed, including the use of transport modalities.

In terms of CO_2 transport, there are a variety of transport options technically available. This includes trains, trucks, pipelines, marine tankers (shipping), compressed gas cylinders, or a combination of them all.[26] However, of these options it is transport by pipelines and shipping that are perceived to have the greatest potential.[27] Safety concerns, public opinion and lack of suitable storage sites on land have altered the current focus from onshore to offshore storage possibilities.[28] This change prompts a shift in focus from pipeline transportation to shipping, as marine transport becomes cost-competitive with pipelines over longer distances, depending on the volume transported.[29] If the storage site is far away from the capturing facility it may even be economically *more* attractive to ship the CO_2 at least part of the distance. [30] In addition to the cost-advantage from reduced infrastructure cost, the mobile transport modalities of ships and trucks allows for flexibility in routes and no need for large-scale excavations to the detriment of on- or offshore environment.

The two CCS projects already in operation in Europe capture CO_2 in conjunction with the production of natural gas and LNG at the offshore petroleum platforms in the Barents Sea, off the coast of Norway.[31] The CCS operation at Sleipner has been in operation since 1996, while the operation at Snøhvit started in 2008.[32] Both operations transport the captured CO_2 to the storage fields by pipelines only, which best facilitates the transport of CO_2 from a single source CO_2 production unit to the geological storage sites.[33] The two projects are commercially viable due to the imposition of the Norwegian CO_2-tax that applies to mineral products and therefore the production of natural gas.[34] These CCS processes do not concern emissions that

[26] CSLF (2017), p. 18 and Holwerda (2014), p. 23-24.
[27] Ibid., Woerdman *et al* (2015), p. 183.
[28] Roggenkamp (2018), p. 246.
[29] See estimate made in 2005 by the IPCC Special Report on Carbon dioxide Capture and Storage, IPCC (2005), p. 5 and p. 192. Seglem (2020). See also CSLF (2017), p. 18-19, reviewing, *inter alia*, the potential for a combination of ships and pipelines, a likely design for cluster-projects with off-shore storage.
[30] Roggenkamp (2018) p. 257.
[31] Norsk Petroleum a. (2020).
[32] Ibid.
[33] Ibid. Sleipner Vest (2014/2020). Snøhvit/Hammerfest LNG (2014/2020).
[34] The gas from the field contains a high amount of CO_2, of which large parts must be separated in order to obtain the desired composition of natural gas, making the CO_2 tax highly effective in incentivising CCS, see Norsk petroleum b. (n.d). Regjeringen.no (2020). NOU 2015:15, p. 63 on the effect of a carbon tax in petroleum industries. COM(2013)180 final, p. 14-15. See also Banet (2017) on the effectiveness in climate regulation of this concomitant imposition of two regulatory instruments that put a price on carbon.

are subject to liability under the ETS.[35] The projects are therefore not eligible for the economic incentive set forth under the ETS to employ CCS.

The price of CCS has, compared to the price of paying for emissions under the ETS, so far been a deterrence to deploying other types of large-scale CCS projects in Europe.[36] However, prompted by the rising price of CO_2 allowances under the ETS[37] in combination with widespread determination to cut emissions from national authorities and private entities, there is more traction for CCS in Europe at the moment. There are currently 10 large-scale CCS projects under way in Europe, all at various stages of development.[38]

The main focus for these novel initiatives is to facilitate 'cluster projects' where a common transport and storage infrastructure can receive CO_2 from different capturing points that can individually connect, by different transport modalities, to the network injection area.[39] This cluster-focus helps reduce the unit costs and storage efficiency of the projects and fit well with the main objective of the ETS to let the market mechanism enable cost-effective emission reductions [40] The two most advanced projects are the Norwegian full-scale project, currently furthest progressed, and the Porthos project in the Netherlands. Both projects are recognised as 'Projects of Common Interest' by the European Commission.[41]

The Norwegian full-scale project is a collaboration between the Norwegian Government, Equinor, Shell, Total, Fortum Oslo Varme and Norcem.[42] There is an investment decision in place for the 'Northern Lights'-transport and storage venture between Equinor, Shell and Total, while the investment decision by the government is expected this autumn (2020) as part of the 2021 budget decision.[43] The aim of the project is to 'induce new projects that may benefit from technology development and cost reductions through use of shared infrastructure.'[44]

The design of the CCS process in the Norwegian full-scale project currently comprises the following phases: two decentralised points for the capture of CO_2, transfer to a proximate har-

[35] It is only CO_2 captured from activities included under Annex I of the ETS that may lead to subtraction from the total emissions of an installation, see Commission Regulation No 601/2012 as amended, Article 49.
[36] European Parliament (2019). COM(2013)180, p. 14-15.
[37] The price of emitting one tonne of CO_2 has steadily been rising since the fluctuations after the 2008-financial crises. Although the price plummeted pursuant to the first corona-epidemic shock, the price is, as of 18. June 2020 steadily on the rise, for live and historic price overview see Markets Insider (2020).
[38] Global CCS Institute (2019), p. 43.
[39] Tamme (2020), CSLF (2017), p. 18-19.
[40] Directive 2003/87/EC as amended Article 1. Global CCS Institute (2019), p. 43.
[41] SWD(2019) 395 final p. 10. (section 12.4 – Northern Lights), and Port of Rotterdam (2019), p. 2.
[42] CCSNorway (2020a), Norwegian Environmental Agency (2019), p. 1.
[43] Equinor (2020), Hovland (2020).
[44] Norwegian Environmental Agency (2019), p. 2..
[44] Ibid., p. 1. Regjeringen (2020)b.

bour by pipeline or mobile transport, intermediate storage, transport by ship about 700 km to a receiving terminal onshore at the West coast of Norway, intermediate storage in pressurized tanks, before the CO_2 is injected in a pipeline network that sends it into one or more injection wells located on the seafloor.[45] From these currently planned capturing facilities there is a potential of capturing 400 000 tonnes of CO_2 per year.[46] The transport network and storage field retain the capacity to receive CO_2 from about 1,5 million tonnes per year in the first phase of the project.[47] The plan is therefore to scale up the number of capturing plants as the project evolves.[48]

The two currently planned capturing plants comprise the cement production facility at Brevik operated by Norcem, and a waste incineration plant at Klemetsrud operated by Fortum Oslo Varme.[49] The short transport segment, connecting the capturing facilities to a proximate harbour, will be handled by the capturing facilities themselves. At the moment it is most likely that the waste incineration plant will use trucks for intermediate transport, while the cement production facility will use a pipeline network.[50] The rest of the process, the shipping, pipeline network and storage facility, is handled by Equinor and partners.[51] The key point to note for the analysis below is that the envisaged CCS process may involve several mobile transport segments, depending on the nature of the project, and that it will be commercially handled by different operators. Offering to pick up CO_2 from a harbour proximate to the capturing plants is a central part of the Northern Lights business model and cost-effective design.[52]

The Porthos project was initiated by the Port of Rotterdam Authority, EBN and Gasunie.[53] 'Porthos' is short for Port of Rotterdam CO_2 Transport Hub and Offshore Storage. The plan is to capture CO_2 from industry plants at the port of Rotterdam and transfer the captured CO_2 through a collective pipeline that runs through the port area.[54] The project is expected to store somewhere between 2-2,5 million tonnes of CO_2 per year.[55] If the final investment decision is

[45] For an overview of the Norwegian full-scale project see *CCSNorway (2020a).*
[46] Ibid.
[47] Equinor (2020a).
[48] Equinor, as the main operator of the transport and storage phases, has already signed memoranda of understanding with five additional industrial partners to develop value chains in 'CCUS' (carbon capture, utilization, and storage) In addition to Fortum Oslo Varme and Norcem/HeidelbergCement this includes: Air Liquide, ArcelorMittal, Ervia, Fortum Oyj, HeidelbergCement AG, Preem, Stockholm Exergi, see Equinor (2019).
[49] CCSNorway (2020a).
[50] Norcem (2020a).
[51] In collaboration with Total and Shell. CCSNorway (2020a).
[52] Feasibility report for transport made for Equinor by Gassco who on behalf of Gassnova, Seglem (2020).
[53] Port of Rotterdam (2019), p. 2.
[54] Rotterdam CCUS (n.d). Port of Rotterdam (2019), p. 2.
[55] Ibid.

made by 2021, the project may be operational by end 2023.[56] Porthos is currently planned with pipeline transport only. However, there are industries around the Rotterdam area that would be interested in sending their CO_2 to Rotterdam by non-pipeline transport.[57]

1.3 Legal context, sources and methodology

1.3.1 The role of the ETS within EU climate policy and the EEA Agreement

The ETS constitutes the central legislative tool to achieve the EU's increasingly ambitious emission reduction targets to mitigate climate change.[58] The ETS is thus part of the legislative regime set forth to attain the annual emission reductions needed to meet the Paris Agreement commitments.[59] The unique nature and functioning of the ETS is presented in chapter 2 below.

The original goal of reducing GHG emissions by at least 40 % by 2030 was proposed increased to 55 % in the recently published EU Green Deal.[60] Expanding the ETS to cover new sectors constitutes an integral part of that proposal.[61] On March 4th 2020, the European Commission proposed to adopt a 'European Climate Law' that commits the EU to a carbon neutral economy by 2050.[62]

The legal instruments aimed at climate mitigation are adopted on the basis of Article 192(1) of the Treaty on the Functioning of the European Union (TFEU), which aims to realise the EU environmental policy set forth by TFEU Article 191 (1).[63] Combating climate change is one of the four overarching objectives of the EU environmental policy set forth by that provision. It holds that '[u]nion policy on the environment shall contribute to pursuit of the following objectives [including] promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change'.[64]

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[56] Ibid.
[57] Tamme (2020)
[58] Established by Directive 2003/87/EC.
[59] Recital 2 to Regulation (EU) 2018/842.
[60] Compared to pre-industrial levels, shared between both ETS and non-ETS sectors, see COM(2014) 15 final, p. 5. European Parliament (2019) COM(2019) 640 final, p. 4. Main climate legislation: Regulation (EU) 2018/841, Regulation (EU) 2018/842, Directive 2003/87/EC as amended.
[61] COM(2019) 640 final, p. 4.
[62] COM(2020) 80 final 2020/0036 (COD), COM(2019) 640 final, p. 2. European Parliament 2019/2582(RSP).
[63] European Parliament (2019).
[64] This was added to the EC Treaty by the Treaty of Maastricht, corresponds to Article 174 of the Treaty of the European Union.

Most of the EU climate legislation is incorporated in the European Economic Area (EEA) Agreement, aligning the climate mitigation measures across the EU and European Free Trade Area (EFTA) member states.[65] The ETS legal framework was included in the EEA Annex XX by the decision nr. 146/2007 of the Joint EEA Committee.[66] Aligning climate policies within the EEA enables the internal market due to how disparate environmental standards could distort competition.[67] The extension of the ETS to include the EFTA States is significant for the ability to employ pan-European CCS cluster projects, such as the Norwegian full-scale project.

1.3.2 Legal sources and methodological considerations

This thesis exposes an inherent uncertainty regarding whether the current ETS framework accommodates mobile CO_2 transport in a CCS process. A contextual and teleological interpretation is proposed which resolves that uncertainty.[68] The analysis presupposes basic knowledge of the distinctive EU 'legal order' and the fundamentals of EU legal methodology.[69] This section is limited to specific methodological issues and significant aspects of the scope of legal sources addressed.

EU legal methodology is characterised by its emphasis on the systematic inner and outer context of the legislation set forth and the objectives it pursues.[70] These methodological features are particularly important when interpreting the ETS, considering the complex and 'closed' nature of that legal ecosystem. The directive-specific legal definitions and concepts of the ETS Directive facilitate coherent application within the ETS. There is consequently limited

[65] EFTA (2015), see Jaeger (2020). Though 'climate change' is not an explicit objective set forth in Article 73 of the EEA Agreement, which is otherwise similar to TFEU 191, it is unlikely to have any 'practical effect' on the commitments to the EU secondary law concerning climate action explicitly incorporated under Annex XX to the EEA Agreement, see to that end Arnesen et al (2018), p. 717.

[66] On the inclusion of the ETS to the EEA see EFTA (2012), for reflections made prior to the inclusion see Nordic Council of Ministers (2007), p. 39-44, and on the specific relation between Norway and the ETS see NOU 2012:2 p. 567.

[67] Arnesen et al (2018), p. 713.

[68] The basics of EU legal methodology set forth by the European Courts of Justice is summarised succinctly as " 'beginning with the ordinary meaning to be attributed to those terms in their context and in the light of the objectives of the Treaty', see i.e. case C-53/81 *Levin v Staatssecretaris van Justitie,* para 9, repeated in settled case law thereafter.

[69] Case 26/62 *Van Gend & Loos* para. 3. For a comprehensive overview of European legal methodology see Riesenhuber (2017), in particular pages 233-259 on the interpretation of EU secondary law.

[70] For an overview of the importance of the contextual and teleological interpretation of EU secondary law see p. Riesenhuber (2017) p. 241 and 249-254, Fredriksen & Mathisen (2019) p. 396, 404-405 and 410-412. Also referred to as 'meta-teleological interpretation', see Gerards (2012), p. 34.

utility to draw from other EU secondary law instruments.[71] The legal sources in this thesis therefore primarily consist of the ETS 'legal framework' which comprises the ETS Directive as amended and the implementing regulations adopted by the Commission on the basis of powers conferred by the ETS Directive.[72] These instruments are thoroughly introduced in chapter 2.

The hierarchy of norms within the ETS legal framework dictates that the subordinate norms of the Commission's implementing regulations must be interpreted within the legislative context and boundaries set by the ETS Directive. The importance of adhering to the specific boundaries of secondary legislation is key to upholding the basic principle of subsidiarity and conferral, as set forth by Treaty of the European Union (TEU) Article 5(2) and (3) and emphasised by the access to judicial review of legality of measures that lack competence pursuant to TFEU Articles 263 and 267.[73] The area of environmental policy set forth by TFEU Article 191, is subject to the categorisation of 'shared powers' pursuant to TFEU Article 4(2) e). Wherever the EU has exercised its legislative power within the area of the environment, such as with the ETS, this legislative effort pre-empts competing member state action, as set forth by TFEU Article 2(2).[74] However, this pre-emption only reaches as far as the limits of the specific secondary legislation enacted. Thus, the boundaries of the ETS Directive determine where the member states' competence is still intact. This means that if an implementing act, such as the Commission monitoring and reporting regulation under the ETS, expands the scope of the ETS Directive, then the Commission has illegitimately pre-empted a broader scope of the shared powers within the area of environmental policy.

One of the findings in this thesis is that a literal interpretation of the Commission implementing rules on CO_2 transfers, significant for whether the economic incentive to employ CCS under the ETS is available for projects that employ mobile CO_2 transport, appears to breach the limits of the powers conferred upon the Commission to adopt those rules. This thesis argues that it is possible to apply a teleological interpretation of the relevant provisions that resolves this conflict.

[71] Such as the Environmental Liability Directive (Directive 2011/92/EU), as that Directive concerns pollution and 'emissions' within a different legal context.

[72] Directive 2003/87/EC as amended, with implementing regulations, including but not limited to: Commission Regulation (EU) No 389/2013, Commission Regulation (EU) No 601/2012 as amended, Commission Implementing Regulation (EU) 2018/2067.

[73] See generally Craig & de Búrca (2015) chapter 14 and 15 on the access and grounds of consideration of review of legality.

[74] Ibid., see generally p. 83-86 on shared competences and implications of pre-emption and retained powers.

The forthcoming CCS cluster projects that rely on both mobile and pipeline transport raise novel legal questions that have yet to be considered before either the CJEU or EFTA court. There are, however, two cases from the CJEU that considers two of the central directive-specific concepts central to the interpretation. Case-460/15 (*Schaefer Kalk*) addresses the directive-specific definition of 'emissions' and its implications for the rules on the Commission implementing level, as similarly addressed in this thesis. The second case, Case C-158/15 *EPZ*, provides guidance on the interpretation of the ETS directive-specific definition of an 'installation' in ETS Directive Article 3(f). There are other cases that consider this definition, but only the *EPZ* that considers the nature of a 'directly associated activity' within the installation definition, as is the relevant consideration in this thesis. It is anticipated that Case C-617/19 *Granarolo*, currently pending before the CJEU, will provide additional guidance to this interpretation when the ruling and associated opinion are delivered.[75]

As is the common trait for CJEU case law, these preliminary rulings are limited in detail. The associated Advocate General Opinions are therefore discussed as part of the analysis in order to shed light on the ruling insofar as the courts rely on the reasoning of the Advocate General opinion.[76]

There are a few relevant Commission guiding documents on the interpretation of the ETS legal framework. Commission guiding documents are considered part of the EU 'soft law', generally defined as 'rules of conduct which have no binding legal force but which nevertheless may have practical effects'.[77] Although not formally binding, it was stated quite clearly in already in the Case C-322/88 *Grimaldi* case that soft law 'cannot be regarded as having no legal effect,' and that national courts are urged to 'take into consideration' relevant soft law.[78] Whenever specifically or generally relevant soft law instruments induce harmonised praxis it will be particularly important to consider by the courts and national authorities to attain uniform application of community law.[79] The guiding documents and its suggested application of the secondary law it concerns are therefore important to consult, but do not prevail if it comes to a clear conflict with the relevant provisions they interpret. There are also a few supplementary guiding documents issued by the national authorities that enforce the ETS, though these

[75] Case C-617/19 *Granarolo* (pending).

[76] Craig and De Búrca (2015), p. 61. See also comment on how AG opinions influence the workings of the EFTA Court in Skouris (2014), p. 10-12. Fredriksen & Mathisen (2019) p. 417-418.

[77] Definition proposed by Snyder (1993), p. 32. Soft law includes not only opinions and recommendations, but also resolutions, declarations, action programmes and plans, communications, notices, guidelines and inter-institutional arrangements, see Stefan (2013) for a comprehensive overview of EU soft law in court.

[78] Case C-322/88 Grimaldi, para 18.

[79] See generally Kovács et al (2016), Stefan (2012), Stefan (2013) Chapters 6-8.

do not elaborate on the relevant concepts in this thesis beyond that of the Commission guiding documents.[80]

The forthcoming Commission opinion requested by the Norwegian Environmental Agency in August 2019, was long an anticipated source of reference for the analysis in this thesis.[81] That opinion is expected to address the issues raised in this thesis in relation to the forthcoming Norwegian full-scale project. This opinion retains no binding legal effect on its addressee,[82] and is considered a 'soft law' instrument. However, it does retain a certain practical 'self-binding' effect upon the Commission itself, as a consequence of the fundamental legal principles that direct and contain the use of executive power.[83] According to settled case law, the principles of, *inter alia*, protection of legitimate expectations, non-discrimination and legal certainty, denote that the Commission may only deviate from soft law instruments that it issues if there is a sufficiently good reason and the deviation does not breach the general principles.[84]

As the Commission is not competent to instigate proceedings with regard to the application of the ETS legal framework within the EFTA member states, the 'self-binding'-effect will not have practical implications in relation to Norwegian authorities. It could, however, become relevant if the Commission pursued proceedings in relation to the Dutch Porthos project, provided that the subject matter is sufficiently similar.[85] In terms of the application of the opinion in an encounter between ESA and the Norwegian authorities, it is clear that ESA is free to interpret the legal framework independent of the Commission. However, the two institutions are likely to find common ground in their efforts to achieve regulatory homogeneity within the EEA.[86]

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[80] Danish authorities refer to the Commission documents, see Danish Energy Agency (n.d). UK issues their own guidance, which mostly consist of a simplified version of the Commission guiding documents, see Environemental Agency UK (2018). The emission permits issued by Norwegian authorities refer to the Commission MR Guidance Document 1, see inter alia, Sleipner Vest (2014/2020), p. 24.

[81] Norwegian Environmental Agency (2019)

[82] TFEU Article 288(5).

[83] See Kovács *et al* (2016), p. 67.

[84] See inter alia, C-189/02 P *Dansk Rørindustri* para. 209-211 and C-167/04 P *JCB* para. 207 with further references. For a general overview of the conditions of deviation see Stefan (2013), p. 201-227.

[85] TFEU Article 258(2) provides the Commission with broad powers to bring infringement proceedings against member states in case the process for achieving an amicable solution pursuant the amicable procedure in Article 258(1), see Craig & De Búrca chapter 12. The EFTA Surveillance Authority retains similar powers in respect of incompliance by EFTA States pursuant to the SCA Article 31.

[86] The Commission and ESA retain the same objective of surveying the internal market and are even obliged to cooperate within the area of competition, see EEA Agreement Article 58, and Arnesen *et al* (2018), p. 566-567.

The letter from the Norwegian Environmental Agency to the Commission outlines a potential way of accommodating the mobile transport segments under the ETS legal framework. The reasoning of this outline is sparse, as the letter is not meant as a final opinion from the Agency, but as a request for an opinion from the Commission on the correct interpretation.[87] As this letter is neither a final legal opinion nor an illustration of actual praxis, and therefore not a legal source, I will only refer to it where it contributes to the discussions in my analysis. Within the scope of this thesis, the main function of this letter is how its existence demonstrates the uncertainty associated with the application of the ETS to mobile CO_2 transport modalities and how there is a consequent need for an in-depth consideration of this subject matter.

This thesis is solely concerned with the interpretation and application of EU law. It falls outside the scope of this thesis to consider any nuances that may arise from the application of the ETS within the EFTA pillar. It is, however, unlikely that the interpretation and application of the ETS will retain any notable differences within the two legal orders due to the common objective of attaining judicial homogeneity within the EEA.[88] Both the CJEU and the EFTA Courts have repeatedly confirmed the principle of homogeneity by adopting uniform application of the relevant EEA law.[89] Uniform application of the ETS legal framework within both the EU and EFTA pillars is imperative for the well-functioning of the EEA Single Market and similarly for the forthcoming pan-European CCS projects.[90]

1.4 Outline

This thesis aims to answer the question of whether the economic incentive set forth by the ETS to employ CCS is available for CCS projects that use mobile CO_2 transport. This question may only be answered by reference to the nature and functioning of the ETS legal framework and its application to CCS. These general, but necessary, points of departure are introduced in chapter 2.

Chapter 3 analyses the prerequisites that operators involved in a CCS process must observe in order to attain the economic incentive of not having to surrender emission allowances for cap-

[87] Norwegian Environmental Agency (2020).
[88] Recital 15 to the EEA agreement, Article 6 EEA Agreement and Art 3(2) SCA.
[89] These cases demonstrate how the principle of homogeneity prompts the convergence of interpretation of the EU and EFTA courts: E-9/07 and E-10/07 *L'Oréal*, E-28/15 *Jabbi*, E-4/19 *Campbell* and finally C-897/19 *I.N.* See generally Skouris (2014) on EEA and the Role of the CJEU. There is, however, a possibility for *ultra vires* challenge of the Committees decision to include the ETS under the EEA Agreement, as settled by Case E-6/01 *CIBA* para. 33, see generally Arnesen et al (2018), p. 917.
[90] Skouris (2014), p. 5.

tured and stored CO_2. The analysis in that chapter identifies the main legal issues posed to employing mobile CO_2 transport, relating to how the implementing transfer rules only accommodate monitoring and verification of CO_2 transfers to CO_2 transport by pipelines. The wording of those rules seems to imply liability CO_2 transferred to a mobile transport provider on its way to permanent storage. This legal effect deprives the stakeholders in such a process of the economic incentive to reduce emissions by CCS. It also appears to imply a conflict within the hierarchy of norms of the ETS.

Chapter 4 proposes an interpretative solution that resolves the issues identified in chapter 3 within the current legal framework. The proposed interpretation makes the economic incentive set forth for CCS under the ETS available for CCS processes that employ mobile CO_2 transport, while at the same time ensuring the integrity of the system through monitoring and control with emissions. The proposed interpretation includes a mobile CO_2 transport segment within the scope of liability of one of the CCS installations it connects. This inclusion implies that any leakage of the captured CO_2 is accounted for within the ETS scope of liability. It also prompts the related question of whether the operator now responsible for the mobile CO_2 transport phase also incurs liability for the operative emissions of the mobile transport. This question is addressed separately in chapter 4.

Chapter 5 provides a summary of conclusions, recommendations for how the ETS may be amended to enable mobile CO_2 transport and some final reflections on the ETS and its ambition to facilitate emission reductions.

The legal issues addressed in this thesis could be presented in many ways. I have chosen this structure to emphasise the inherent problems in the system and to demonstrate the possible interpretative solution available within the current framework.

2 The ETS legal framework and its application to CCS

2.1 Introduction

Since its simple beginnings in 2005, the ETS has become a large and complex legal 'eco-system' developed through distinct trading phases.[91] It was adopted to aid the EU in meeting its Kyoto Protocol emission reduction targets,[92] and now represents a cornerstone of the EU's contribution to the emission reduction targets of the 2015 Paris Agreement.[93] The ETS' scope and efficiency will be reviewed in conjunction with each global stocktake under the Paris Agreement.[94]

The scope and obligations of the ETS are thoroughly revised with each new trading phase.[95] The first ETS Directive provided for the two introductory phases of the ETS: the first 'trial and error' trading phase form 2005-2007, and the second trading phase from 2008-2012.[96] The ETS is currently in phase three (2013-2020), which came with the 2009-amendment of the ETS Directive.[97] The 2018-amendment of the ETS Directive mainly prepares for the fourth trading phase commencing in January 2021.[98] The subsequent trading periods will each last seven years.[99]

CCS was not a reduction emission option explicitly enabled by the ETS until the commencement of the third trading phase.[100] When eventually included under the ETS, the CCS process was introduced into a compliance regime based on the idea of emissions from distinct industrial installations – not a framework designed to accommodate an integrated emission reduction process. It is through this disparity that the challenges posed to CCS processes employing mobile CO_2 transport arise. In order to correctly interpret and provide suggestions as to how

[91] Directive 2003/87/EC as amended. See for a general introduction to the Kyoto Protocol within the EU see Massai (2011).
[92] Recitals 1-5 to Directive 2003/87/EC.
[93] Recitals 1-4 to Directive (EU) 2018/410. European Commission (2015), p. 8. See Ellerman *et al* (2016) for an overview of the history and evolution of the ETS.
[94] Paris Agreement Article 14, recital 24 and Article 1(37) of Directive (EU) 2018/410 amending Article 30 of Directive 2003/87/EC (the ETS Directive), European Commission b (n.d); first stocktake expected to take place in 2023.
[95] European Commission (2015), p. 4. Zeben (2014), p. 109.
[96] Directive 2003/87/EC amended by Directive 2004/101/EC, the 'linking directive', establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms.
[97] Directive 2009/29/EC amending Directive 2003/87/EC.
[98] Directive (EU) 2018/410 , European Commission b. (n.d)
[99] Van Calster (2017), p. 258. (no official reference found)
[100] Directive 2009/29/EC amending Directive 2003/87/EC.

the ETS may accommodate the forthcoming CCS cluster projects it is therefore necessary to introduce the main elements and mechanisms set forth by the complex ETS system.

This chapter explains the main elements of the ETS legal framework by, firstly, introducing the ETS Directive as the constituting legislative act (2.2), and thereafter the subordinate Commission regulations that implement the ETS through a rigorous system of monitoring, reporting and verification of emissions (2.3). Finally, I go on to explain the legislative effort to pave the way for CCS in Europe: by the adopting rules on the safe geological storage of CO_2 in the CCS Directive, and the amendment of the ETS legal framework to accommodate CCS as an emission reduction option (2.4).

2.2 Establishing the Emissions Trading System through the ETS Directive

2.2.1 Overview

The ETS Directive as amended sets forth the ambitious legal framework that establishes the EU emissions trading market.[101] The main objective is to 'promote reductions of greenhouse gas emissions in a cost-effective and economically efficient manner' and to escalate emission reductions 'as to contribute to the levels of reductions […] necessary to avoid dangerous climate change'.[102]

As the title suggests, the commodity traded on the market is emission allowances. One 'allowance' gives the permission to emit one tonne of CO_2.[103] A 'cap' is set for the total amount of GHG emissions that may be emitted by the activities subject to the scope of the ETS.[104] This cap is divided into allowances, distributed among the operators of the activities within and subsequently be freely traded.[105] This is known as the 'cap and trade' approach of emissions trading.[106]

Each operator is obligated to 'pay' for the emissions that fall within its scope by annually surrendering a number of allowances corresponding to the total GHGs emitted.[107] The default

[101] For further literature on the ETS see, inter alia, Woerdman et al (2015) chapter 3, Spinelli (2017), chapters 1 and 4. Krämer (2019), chapter 9. Weishaar (2009), Zeben (2014), Ellerman *et al* (2010).
[102] Directive 2003/87/EC as amended Article 1.
[103] Directive 2003/87/EC amended Article 3(a).
[104] European Commission a (n.d).
[105] Ibid.
[106] Woerdman *et al* (2015), p. 48.
[107] Directive 2003/87/EC as amended, art. 12 nr. 3.

method for distribution of allowances is through auctioning.[108] Ensuring compliance with this basic obligation is key to attaining the emission reductions that the ETS aims to facilitate. Compliance is motivated by the heavy fine imposed on the operators that fail to surrender the requisite number of allowances.[109]

The scope of liability of each ETS operator is facilitated by subjecting the *installations* that perform *activities* listed in the Directive's Annex I to liability. As of the start of the ETS in 2005, no operator of an installation may perform an Annex I activity without holding an emission permit issued by the relevant national authority.[110] That emission permit includes 'an obligation to surrender allowances equal to the total emissions of the installation in each calendar year […]'.[111] In other words, participation in and adherence to the ETS is mandatory for the operation of activities within the scope of the ETS.

The environmental integrity and effectiveness of the ETS is ensured by requiring stringent monitoring and reporting of all relevant emissions. Submitting a comprehensive monitoring and reporting plan is therefore decisive for obtaining the emission permit. Article 6 nr. 1 of the ETS Directive requires that the competent authority may only issue such a permit if 'it is satisfied that the operator is capable of monitoring and reporting emissions'.[112]

Depending on the nature of the activity performed, the possible emission reduction options include changing from fossil fuels to renewable energy sources, becoming more energy efficient, storing CO_2 in products (CCU) or employing CCS.[113] This underscores the ambition to facilitate emission reduction technologies, including CCS, in a neutral manner.[114] As long as GHGs are not emitted, then there is no obligation to surrender allowances, regardless of which emission reduction option is used. In addition to this neutral economic incentive, however, the ETS also facilitates funding of low-carbon technology, such as CCS.[115] One could

[108] Recital 8 to Directive (EU) 2018/410. See Weishaar (2009) for an analysis of the transition towards auctioning from a law and economics perspective, and Ellerman et al (2007) for an introduction to the previous system of allocation within the ETS.

[109] Directive 2003/87/EC as amended, art. 16.

[110] Ibid., Article 4. 'Greenhouse gas emission permit' defined by art. 3(d) as the permit issued in accordance with Articles 5 and 6.

[111] Ibid., Article 6(e).

[112] Ibid., as amended Article 5(a), (c) and (d).

[113] Recital 14 to Directive (EU) 2018/410, see also Woerdman *et al* (2015), p. 47.

[114] COM(2008) 16 final, p. 49: 'In order to exploit the potential of CCS in the longer term, the further development of CCS to contribute to mitigating GHG emissions under economic conditions is necessary. Economic incentives have to be provided, which help to advance CCS in a technology neutral manner'.

[115] Directive 2003/87/EC as amended Article 10a(8). European Commission f(n.d). Money for the Innovation Fund comes from the revenue of the ETS, as well as any unspent funds from the previous ETS fund called the NER300 programme. Commission Delegated Regulation (EU) 2019/856 (on the operation of the innovation fund).

question whether the principle of advancing emission reductions in a technology neutral manner is inhibited by such additional funding, though it falls outside the scope of this thesis to pursue that discussion.[116]

In order to reduce emissions over time, the cap is reduced at an annual rate of 1,74 %, which will increase to 2,2 % in January 2021 when the fourth trading phase commences.[117] If a company holds more allowances than they need to surrender, they may keep them for the next year or sell them on the market.[118]

A general problem for the functioning of the ETS is the existence of allowance surplus resulting in lower prices than intended to attain the requisite emission reductions.[119] This has come about due to unexpected downturns in emissions during the 2008-financial crisis, and the possibility to use international credits.[120] A Market Stability Reserve (MSR) was therefore introduced in 2019 to handle unexpected surpluses. The MSR addresses the current surplus of allowances, but also 'improves the systems resilience to major shocks by adjusting the supply of allowances to be auctioned'.[121] It seems that the ETS allowance price has passed the COVID-19 'stress test' as the price of an allowance is now rising after a sharp fall in mid-March 2020.[122] This resilience is attributed to the recent reinforcements made to the ETS, including the introduction of the MSR.[123]

2.2.2 Key definitions

The ETS centres on three key definitions in order to facilitate liability and thus induce emission reductions from industrial installations: the aim is to induce reduction of 'emissions'

[116] This funding is meant to bridge the gap between the price of an allowance and the price of storing CO_2, effectively undermining the short-term cost-effectiveness of the ETS, in this regard see Woerdman *et al* (2015), p. 188.

[117] Article 1(11) of Directive (EU) 2018/410 amending Directive 2003/87/EC.

[118] European Commission a (n.d).

[119] A criticism of the ETS has been that the low allowance prices fails to induce emission reductions. A recently published paper explains how the ETS has successfully induced emission reductions, despite low prices, see Bayer & Aklin (2020).

[120] Decision (EU) 2015/1814 as amended, see also European Commission c (n.d). For more information on the use of international credits from the Kyoto Protocol Clean Development Mechanism and Joint Implementation mechanism under the ETS for the remainder of the third trading phase, and information on how ETS may constitute part of international flexible mechanisms under the Paris Agreement Article 6, see European Commission g (n.d).

[121] European Commission c (n.d).

[122] Markets Insider (2020).

[123] Hatherick (2020).

from sources in an 'installation' by holding a designated 'operator' liable for those emissions. These definitions represent a central part of the analyses in chapters 3 and 4.

ETS Directive Article 3(b) defines this directive-specific concept of 'emissions' to mean 'the release of greenhouse gases into the atmosphere from sources in an installation or the release from an aircraft performing an aviation activity listed in Annex I of the gases specified in respect of that activity'. This definition of emissions limits the liability of an ETS operator, other than aviation, to the scope of the *installation* it is responsible for.

The directive-specific definition of 'installation' includes two elements: firstly, the 'stationary technical unit where one or more activities listed in Annex I are carried out', and, secondly, 'any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution.'[124] The inclusion of responsibility for the emissions from the 'associated activities' to the main ETS activity ensures the environmental effectiveness of the carbon market by subjecting all emissions necessary for the operation of the Annex I activities to the scope of liability.

An ETS operator is 'any [physical or legal] person, who operates or controls an installation or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the installation has been delegated'.[125] The broadly phrased definition allows for flexible transposition into the context of existing national frameworks while retaining the main aim of ensuring compliance for the obligations set forth by the ETS. The Commission guidance documents on the interpretation of the ETS explicitly states that in order to accommodate diverging national transpositions it does not provide guidance on the 'operator'-term.[126] This thesis focuses on what entity may be the designated operator of an installation with reference to its scope and nature.[127]

The ETS allows an emission permit to cover 'one or more installations on the same site operated by the same operator'.[128] By providing a broad definition of the term 'operator' and no definition of the term 'site', the framework aims to facilitate different national procedures for issuing greenhouse gas emission permits.[129] The main obligation for the member states com-

[124] Directive 2003/87/EC as amended, Article 3e).
[125] Articles 3(f)-(g) of Directive 2003/87/EC as amended.
[126] European Commission (2010), p. 4.
[127] See section 4.3.2 below. See Feiring (2019), p. 11-15 for a discussion of the Norwegian transposition of the term 'operator' related to the similar definition of an operator of a storage site under the CCS Directive (Directive 2009/31/EC) Article 3(10).
[128] Directive 2003/87/EC as amended Article 6(1), second subparagraph.
[129] European Commission (2010), p. 4.

petent authorities is therefore to ensure that all 'emissions' associated with the scope of an 'installation' are accounted for by one designated operator that retains practical or economic control over that installation.[130]

2.2.3 Core principles and objectives

This section address three core principles and objectives pursued by the ETS and how they are used in this thesis: cost-efficiency, environmental integrity and effectiveness, and the polluter-pays principle.

Firstly, by setting a price on emissions, the market mechanism induces emission reduction efforts that represent a cheaper alternative than buying allowances. This design promotes the objective of *cost-efficiency* by allowing the market mechanism to decide how and where it costs the least to cut emissions.[131] This is an important principle in international climate law found in the UN Convention on Climate Change through, inter alia, the flexible mechanisms facilitated through Article 6 of the Paris Agreement.[132]

Although it seems that ETS uses the term 'cost-effectiveness' to describe the aim of reducing emissions at the lowest possible cost, it is by associated literature referred to as cost-efficiency and efficiency properties.[133] In thesis I use the term 'cost efficiency' to refer to the same ultimate objective: attaining emission reductions at the lowest possible cost.[134]

Secondly, in order to ensure effective climate mitigation through market-based mechanisms, such as the ETS, it is imperative to adopt rules that observes *the principles of environmental integrity and environmental effectiveness.*

There is no set definition of the principle of environmental integrity in relation to carbon markets, but it is often interpreted as a requirement for environmentally robust accounting.[135] Within the ETS the principle is used to refer to the needed legislative design to ensure com-

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[130] European Commission (2010), p. 4.

[131] Woerdman *et al* (2015), p. 50 on the concept of cost-efficiency in emission trading schemes.

[132] See generally Gupta (2009) on Clean Development Mechanism (CDM) under the Kyoto Protocol, and Olsen et al (2018) on lessons learned from the CDM for adoption of flexible mechanisms under Paris Agreement Article 6.4.

[133] Directive 2003/87/EC as amended Article 1 uses the terms 'cost-effective and economically efficient manner', it is however, clear from the legislative context that the aim of the market based approach is to cut emissions where it costs the least to cut.

[134] As referred to in Woerdman *et al* (2015) p. 50.

[135] For the role of this principle, see, inter alia, Schneider & Theuer (2019) and Warnecke (2014)..

pliance with the fundamental obligation to surrender allowances for relevant liable emissions.[136]

The consideration of environmental effectiveness can refer to both the broader question of expanding the scope of the ETS to include new emission sources in order to increase total reductions, but also more narrowly to how 'effectively' the ETS attains the emission reductions it aims at.[137] The latter is ensured by promoting environmental integrity within the legislative design. In this thesis I will refer to the considerations of environmental integrity and effectiveness in this latter sense – ensuring environmental integrity in order to effectively attain the emission reduction targets set by the current scope of liability.

Thirdly, the ETS aims to fully implement the *'polluter-pays' principle* by gradually moving from free allocation to auctioning of emission allowances, as emphasised by the preamble to the 2018-amendment of the ETS.[138] The ETS Directive thereby constitutes part of the secondary law that fulfils the objective of enhancing the polluter-pays principle explicitly set forth in TFEU 191(2).

The exact contents and implications of the principle are contested. The main idea is that it is 'an economic principle […] expressing the concept that the cost of environmental impairment, damage and clean-up should not be borne via taxes by society, but that the person who caused the pollution should bear those costs'.[139]

It has been argued that the ETS constitutes a version of the polluter pays principle, even when allowances are freely allocated.[140] It falls outside the scope of this thesis to address how, and to what degree, the liability imposed on emitters by the ETS currently entails a coherent implementation of this principle. For the purposes of the following analysis it is enough to note that the transition from free allocation to auctioning of allowances enhances the objective of internalising the cost of climate damage at the hand of the emitter of GHGs.

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[136] COM(2008) 16 final section 3.1.4. See, inter alia, recital 29 to Directive (EU) 2018/410, COM(2008) 16 final, p. 32.

[137] COM(2008) 16 final, p. 15.

[138] Recital 7-8 to Directive (EU) 2018/410 amending Directive 2003/87/EC.

[139] Krämer (2015), p. 27-28.

[140] See Woerdman *et al* (2008) for a nuanced discussion in terms of the whether the free allocation of allowances ('grandfathering') is inconsistent with the polluter-pays principle within emission trading schemes by providing a taxonomy of interpretations. The authors conclude that '[f]irst, contrary to what some have claimed, grandfathering is compatible with an efficiency interpretation of the polluter-pays principle. Second, only auctioning is consistent with an extended form of this principle,' p. 3.

2.2.4 Material and geographic scope

The material scope of the ETS comprises certain greenhouse gases emitted from specific activities.[141] It is by imposing liability for these emissions that the EU seeks to facilitate the desired emission reductions.

The GHGs subject to the ETS are listed in Annex II to the ETS Directive and include Carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur Hexafluoride (SF_6).[142] The relevant gas for CCS is CO_2. However, it is only CO_2 from *fossil sources* that are subject to liability under the ETS, as emissions from biomass sources are 'zero counted'.[143] EU policy measures to target emission reduction from biomass sources, in order to achieve negative emissions, are forthcoming.[144]

The activities subject to the scope of the ETS are listed in Annex I to the ETS Directive and comprises of two main categories: industrial production installations and aviation activities.[145] Activities included in Annex I are hereafter referred to as 'ETS activities'. Activities related to aviation fall outside the scope of this thesis as CCS is an emission reduction option available for the industrial and not aviation activities.[146]

The scope of the ETS has evolved through the distinct trading phases, gradually expanding to include new activities and GHGs. The current scope covers around 45 % of the EU's total GHG emissions and limits emissions from over 11,000 energy-intensive installations and the airlines operating within the EU and EFTA member states.[147] Follwoing the inclusion of the ETS in the EEA agreement, the geographic scope the ETS applies to 31 countries (28 EU countries and 3 EEA countries).[148]

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[141] Directive 2003/87/EC as amended Article 2.

[142] This definition was aligned with the definition under the UNFCCC as of the 2009-amendment, see recital 9 of Directive 2009/29/EC amending Directive 2003/87/EC.

[143] Commission Regulation (EU) No 601/2012 as amended Articles 38(2) and 43(4), European Commission Guidance Document on Biomass Issues EU ETS (2017).

[144] COM(2018) 773 final, p. 7: '[…] additional action need to be explored on how biomass can be supplied in a sustainable way while enhancing our natural sink or in combination with carbon capture and storage that both can lead to increased negative emissions'. Lack of incentive mechanism for bio-CCS mentioned in Woerdman *et al* (2015), p. 214-215. See IPCC (2018) Annex I: Glossary p. 554 for definition of negative emissions.

[145] Directive 2003/87/EC as amended Installations: Articles 2(1) and chapter III article 3h. Ibid., aviation activities: Art. 2(1) and chapter II Article 3a.

[146] Directive 2003/87/EC as amended Article 12 nr. 3a.

[147] European Commission a (n.d).

[148] Directive 2003/87/EC Article 1 and 2(3), EEA Joint Committee decision nr. 146/2007 of 26 October, 2007, incorporating the ETS Directive in Annex XX to the EEA Agreement. See also Europalov (2019).

The limited material scope implies that not all emission sources within the geographic scope are accounted for under the ETS scope of liability. In terms of the Norwegian full-scale CCS project, the ETS only applies to the emissions from one of the two capturing plants currently encompassed by the project. Cement production is part of Annex I while waste incineration is excluded.[149] In addition, both capturing plants has the potential of capturing a mix of fossil and biogenic CO_2.[150]

The ETS Directive allows for individual inclusion of activities and GHGs in order to accommodate problems or conflicting interests associated with the delineation of what falls within and outside its scope. This inclusion is contingent on the approval of the Commission, which must take into account 'the effects on the internal market, potential distortions of competition, the environmental integrity of the ETS and the reliability of the planned monitoring and reporting system' pursuant to ETS Directive Article 24. Relevant case law from the EU Courts demonstrate that the Commission retains a wide margin of discretion as to how conflicting objectives should be balanced in terms of such opt-in applications.[151] This 'opt-in' procedure previously allowed for opt in of individual projects, but now only allows for inclusion of categories of activities and GHG.[152]

2.2.5 The lack of application to road- and maritime transport

ETS' scope of application notably omits all transport but aviation. The possible inclusion of new transport sectors is significant for the question of whether and how the ETS accommodates mobile CO_2 transport. If the ETS comprised all transport sectors, then the specific activity of CO_2 transport would be automatically included under its scope. The ETS lack of application to road- and maritime transport thus prompts uncertainties as to how it may accommodate mobile CO_2 transport.

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[149] Directive 2003/87/EC Annex I. The Commission comments on the prevailing exclusion of waste incineration thus; 'This sector is already covered by both the Waste Incineration Directive and IPPC as there is a need for careful control of other pollutants from waste incineration. In addition, MRV requirements are likely to be complex due to the high variability in the composition of the waste stream,' see COM (2008) 16 final, p. 36.

[150] Norwegian Environmental Agency (2019), p. 2. The problematic aspects of capturing CO_2 from a mixture of sources within and outside the scope of the ETS should be subject to further research, but falls outside the scope of this thesis. See description of these issues in the Norwegian Environmental Agency (2019), p. 7-8. Waste incineration retains great potential for emission reductions with CCS, see recent feature on the Norwegian perspective by Topdahl (2020).

[151] Case T-16/04, *Arcelor v Parliament and Council* demonstrates that where the private entities as disadvantaged by an inclusion under the scope of the ETS, this may be justified if it is considered necessary and proportionate to the environmental protection pursued.

[152] For an overview of the use and obstacles associated with the opt-in mechanism during phases 1, 2 and start of phase 3 see Ellerman *et al* (2010), p. 261-263.

Whether the ETS should include additional transport sectors, notably road- and maritime transport, is subject to intense debate.[153] With regard to maritime transport, the discussion is particularly fraught. The International Maritime Organisation ('IMO') is working for a global solution for emission reductions, though it is taking longer than expected.[154] The latest development on this issue is that the European Commission has proposed in the EU Green Deal to include the maritime transport industry under the scope of the ETS, but still coordinate the efforts with the IMO.[155] This decision was received with mixed reactions: Some consider that resorting to a regional solution, like the ETS, may hinder an international agreement.[156] Other voices within the industry, however, pushed for this vote to promote emission reductions.[157] These reactions mirror the mixed reception of the inclusion of the aviation sector.[158] The details on how the maritime industry would be included in the ETS remain undecided.

2.3 Harmonised implementation of the ETS

2.3.1 Overview

The European Parliament and European Council confer powers onto the Commission to implement the ETS Directive in order to facilitate harmonised implementation across the ETS geographic scope. This includes the regulation establishing the Union Registry, which tracks the emissions trading.[159] It also consists of the Regulation on the monitoring and reporting of emissions ('MRR'),[160] and the Regulation on the accreditation and verification of emission reports (ARV),[161] together referred to as the 'MRV'.

[153] See European European Commission s(n.d) and European Commission t(n.d) for information on the EU climate policy on road and shipping transport, respectively. See Bragadóttir et al (2016) for a report made for the Nordic Council of Ministers on sectoral expansion of the EU ETS, focusing on road transport as a main GhG emitter in the Nordic countries.

[154] See generally IMO (2020), Woerdman et al. (2015), p. 55. In support of the IMO efforts, the EU adopted a regulation for the monitoring, reporting and verification of emissions from large ships (5,000 gross tonnes) Regulation (EU) 2015/757. However, it does not, however, obligate the maritime sector to an emission reduction goal, see recital 10.

[155] COM(2019) 640 final, p. 11.

[156] Haanperä & Graichen (2020), and IMO (2017).

[157] Stoefs (2020).

[158] See generally Gattini (2012) and the case C-366/10 IATA challenging the validity of including the aviation sector into the EU.

[159] Commission Regulation (EU) No 389/2013, competence set forth by ETS Directive as amended Article 19.

[160] Commission Regulation (EU) No 601/2012 as amended.

[161] Commission Implementing Regulation (EU) 2018/2067, competence set forth by Directive 2003/87/EC as amended Article 15, see also Article 10.

The MRR and the ARV make up the important 'compliance cycle' that the subjects of the ETS must adhere to.[162] The purpose of this rigorous compliance regime is to ensure the environmental integrity and effective operation of the market-based emission reduction system set forth by the ETS Directive.[163] The ARV presents rules for the use of third-party verification of the monitoring undertaken in compliance with the MRR. It is thus the rules set forth by the MRR that determine the main obligations for the ETS operators within the compliance regime, such as the monitoring plan submitted with the emission permit application.

These regulations are, as explained above, subordinate to the ETS Directive, as they are adopted on the basis of power conferred by specific provisions of the Directive.[164] The Commission faces a difficult task: implementing an highly complex and technical emission trading system without exceeding the boundaries set on the powers conferred. This consideration is at the heart of the issues posed to CO_2 transport at the implementing level of the ETS legal framework, as the analyses in chapter 3 and 4 will demonstrate.

The following section briefly presents the main features of the monitoring and reporting regulation (2.3.2), of which specific provisions are discussed in chapter 3 and 4. The subsequent section thereafter explains the revised scope of powers conferred upon the Commission to adopt those rules (2.3.3).

2.3.2 The Commission Regulation on the Monitoring and Reporting of Emissions

As its title suggests, the subject matter of the MRR is to establish rules on monitoring and reporting of GHG emissions and activity data pursuant to the ETS Directive.[165] Its geographic scope mirrors that of the Directive.[166] The power to adopt rules on this subject matter is set forth through ETS Directive Article 14(1).

The monitoring and reporting obligations set forth in the MRR are founded on, and should be applied on the basis of, the principles of completeness, consistency, comparability and transparency, accuracy, integrity of methodology and of the emission reports, and finally, continu-

[162] See generally European Commission d(n.d).
[163] See recital 2 to Commission implementing regulation (EU) 2018/2066.
[164] See Directive 2003/87/EC as amended Articles 14(1) and 15(3).
[165] Commission regulation (EU) No 601/201 as amended, Article 1.
[166] Ibid., Article 2.

ous improvement.[167] These principles ensure the compliance with the obligations in the ETS Directive and thus aim to facilitate its effective operation.[168]

The current Commission regulation on the monitoring and reporting of GHG emissions regulates the third trading phase ('MRR phase 3').[169] MRR phase 3 end when the fourth trading phase begins in January 2021 ('MRR phase 4').[170] An explicit objective of the MRR, as amended for phases 3 and 4, is to improve, simplify and clarify the reporting and monitoring rules without compromising the environmental integrity.[171]

The subject matter of the MRR is facilitated through the obligation to submit and maintain the monitoring plan associated with the emission permit.[172] Based on the findings from the monitoring of emissions, the operators file an annual emission report to the competent national authority.[173] The verified emission report constitutes the basis for the number of allowances that the operator is obligated to surrender.[174]

The MRR provides general and specific rules and guidance as to how the monitoring boundaries of each installation should be set in order to account for all relevant emission sources.[175] These rules, in addition to the specific rules on transfers of CO_2 in MRR Article 49, are central to the discussion of whether and how the ETS accommodates mobile CO_2 transport (see chapters 3 and 4).

2.3.3 Powers conferred upon the Commission to adopt rules on monitoring and reporting of emissions

As a consequence of the latest amendment, the ETS Directive confers powers onto the Commission to adopt rules on the monitoring and reporting of emissions in the form of an 'implementing act'.[176] This is a slight curtailment of Commission's previous powers under ETS Di-

[167] Ibid., Articles 4-9.
[168] Ibid., Recital 1, and recital 2 to Commission regulation (EU) 2018/2066.
[169] Commission regulation (EU) No 601/201 as amended.
[170] Commission implementing regulation (EU) 2018/2066, recital 26, Articles 1 and 77.
[171] Ibid., recital 3.
[172] Commission regulation (EU) No 601/201 as amended chapter II, Directive 2003/87/EC as amended Article 6.
[173] Directive 2003/87/EC as amended Article 14(3).
[174] Directive 2003/87/EC as amended Article 12 nr. 3, referring to the verification procedure set forth by Commission implementing regulation (EU) 2018/8589.
[175] Commission regulation (EU) No 601/2012 as amended Article 20 and Annex IV.
[176] Article 14(1) of Directive 2003/87/EC as amended by Directive (EU) 2018/410.

rective Article 14(1) which allows the Commission to amend 'non-essential elements' of the ETS Directive 'by supplementing it'.[177]

This revision came about in 2018 because that was the first time that the ETS Directive was revised following the Treaty of Lisbon.[178] The Treaty of Lisbon introduced a formal hierarchy of norms.[179] In this system, the basic legislative act – here the ETS Directive – may confer powers in the form of either a 'delegated act' or an 'implementing act' pursuant to TFEU Articles 290 and 291(1).[180] The difference between the two acts are still somewhat ambiguous, despite the simplification objective.[181] The key material difference appears to be that the implementing acts are meant to be *solely executive*, while the delegated act may 'supplement or amend certain non-essential elements' of the basic act, thus retaining a 'quasi legislative' power.[182]

The fact that the Parliament and the Council chose to confer powers to adopt the monitoring and reporting rules in the form of an 'implementing act' is notable because the Commission's proposal was to confer power in the form of a 'delegated act'.[183] The Commission appears to believe that adopting the monitoring and reporting rules requires the leeway provided through the 'quasi'-legislative power retained by a delegated act under TFEU 290.[184] Thus, by the 2018-revision of the ETS Directive, the Commission 'lost' the power struggle concerning the boundaries set on the delegation of powers to adopt the monitoring and reporting rules.[185]

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[177] Article 14(1) of the Directive 2003/87/EC as amended by Article 1(17) of Directive 2009/29/EC.

[178] Directive (EU) 2018/410 amending Directive 2003/87/EC.

[179] See Craig & De Búrca chapter 4 for an overview of the transition to the new system of the conferred powers.

[180] The ETS Directive is a legislative act adopted by the ordinary legislative procedure as set forth by TFEU Article 289(1). Delegated and implementing acts are subject to different oversight mechanisms, and only the implementing acts are subject to the updated comitology oversight system on Commission implementing powers, see Regulation (EU) No 182/2011.

[181] Bergström and Ritleng (2016), p. 109. The Working Group XI on simplification that suggested these provisions in the Treaty of Lisbon warned, fittingly, that 'nothing is more complicated than simplification', see CONV 424/02, relayed by Craig and De Búrca (2015) p. 110.

[182] This is the understanding of the Commission as set forth in COM(2009)673 final p. 3-4, and reiterated Craig and De Búrca (2015) p. 117. The efficacy of the delineation between the two types of legislative acts have been criticised by legal scholars, inter alia Craig and De Búrca, as whether the basic legislative act should provide the Commission with the power to adopt an implementing or delegated act is a decision that must be made at an early stage. Which of the two types of conferred powers are needed to properly implement the basic act may not become clear until after the adoption of the legal instruments, see Craig and De Búrca (2015) p. 118-120.

[183] COM/2015/0337 final - 2015/0148 (COD), p. 23, para (12).

[184] As set forth in the Commissions comment on the proposed TFEU 290 in COM(2009)673.

[185] It is suggested that the Commission prefers delegated act over an implementing act and that the Parliament and Council prefers the one that provides them with the greatest review powers, see a discussion on this in see Bergström and Ritleng (2016) p. 107-108.

In 2018 the Commission adopted a regulation on the monitoring and reporting of emissions on the basis of the new version of ETS Directive Article 14(1).[186] This regulation will replace MRR phase 3 when trading phase 3 of the ETS concludes by end 2020.[187] This means that the existing version of the MRR, adopted on the pre-Lisbon system of conferred powers, runs until the end of 2020, while the regulation adopted on the post-Lisbon powers commences as of 2021.[188]

The current version of Article 49 of MRR phase 3 was revised by the regulation that sets forth the rules for MRR phase 4.[189] This means that the regulation that sets forth the rules on monitoring and reporting for the remainder of trading phase 3, consists partly of rules adopted on the basis of the *previous* version of the ETS Directive Article 14(1), while Article 49, is adopted on the basis of the *new* version of ETS Directive Article 14(1).

Amending Article 49 with competence in the revised ETS Directive Article 14(1) seems to imply that the interpretation of MRR Article 49 must adhere to the limitations that follow implementing powers conferred on the Commission pursuant to TFEU Article 291(2).[190] The boundaries set for the CO_2 transfer rules will thus remain the same for the remainder of trading phase 3 and trading phase 4.

2.4 Paving the way for CCS – the CCS Directive and the ETS amendments

2.4.1 Overview

The EU policy instruments that promote CCS are a relatively new phenomenon, although the idea of CCS dates back to 1977.[191] The role of CCS in climate mitigation was, and to some degree still is, a controversial topic within the EU.[192] With time, however, CCS has come to

[186] Commission implementing regulation (EU) 2018/2066.

[187] Commission implementing regulation (EU) 2018/2066, recital 26, Articles 1 and 77.

[188] See example in Case C-460/15 Schaefer Kalk, though that case reviewed the Commission powers in light of the scope of the former ETS Directive Article 14(1).

[189] Article 76 (3) of Commission Implementing Regulation (EU) 2018/2066.

[190] I have not found any literature that discusses this particular question, neither specifically, nor generally. It is, in any case, a transitory problem as MRR phase 3 will be replaced all together in January 2021.

[191] Marchetti (1977).

[192] EU CCS funding has been on the table for a long time, see inter alia COM/2011/0112, p. 5, 9-10. For a brief overview of the evolution of EU policy on CCS see Billson & Pourkashanian (2017). See Simon (2019) for an opinion on the status of political backing for CCS, but still bureaucratic funding procedures.

represent part of the envisaged solution in order to 'reconcile the need for urgent action to tackle climate change with the need to ensure security of energy supply'.[193]

In 2009, two important legislative instruments were adopted to pave the way for CCS in Europe: the CCS Directive[194] and the amendment of the ETS Directive for the third trading phase, to facilitate CCS as an emission reduction option.[195] The two legislative instruments retain distinct, but related, functions for the regulation of CCS in Europe: The CCS Directive focuses on the environmentally safe storage of CO_2 in order to minimise risk to human health and the environment, while the amendment of the ETS provides an economic incentive for CCS and subjects any associated emissions to its scope of liability.

As the explanation of the ETS in section 2.3 demonstrates, the fundamental obligation to impose liability for emissions is centred on the idea of emissions originating from distinct industrial installations. It was into this system that CCS as an emission reduction option was introduced. The legal uncertainty posed to the use of mobile CO_2 transport modalities, like a ship, arise from this injunction: the effort to fit a technical emission reduction process with several integrated phases, into a system focused on activities performed by separate installations.

By providing a short introduction to the process of amending the ETS to accommodate CCS, and its relation to the CCS Directive, the present section prepares for the analyses in chapters 3 and 4 of how the ETS applies to, and may accommodate, mobile CO_2 transport.

2.4.2 The adoption of CCS-specific provisions in the ETS Directive – considerations and content

CCS was not a generally recognised emission reduction option under the ETS until its explicit inclusion under the ETS Directive for trading phase 3 (2013-2020).[196] The legislative design of the rules which were then adopted to promote CCS, was a result of specific considerations made prior to this amendment. This section provides an overview of these considerations, in order to better understand the rules adopted and the objectives that the legislative design pursues.

[193] COM(2008) 18 final, para 1.
[194] Directive 2009/31/EC.
[195] Directive 2009/29/EC amending Directive 2003/87/EC.
[196] Ibid. Woerdman e*t al.* (2015), p. 187-188 brief overview of ETS as the main incentive for CCS.

The general inclusion of CCS under the ETS came about in order to promote CCS as an emission reduction option in a harmonised manner across the geographic scope of the ETS.[197] The EU legislator sought to amend the ETS to contribute to:[198]

> "[…] the exploitation of the long-term potential offered by Carbon Capture and Storage to achieve the GHG emission reductions set by the EU Heads of State and Government by including CCS in the EU ETS, thereby providing necessary financial incentives to promote and use CCS, in particular in the long term."

The aim to provide a clear economic incentive to employ CCS must be understood in light of the prior possibility to employ CCS under the ETS. The only option for using CCS prior to the 2009 amendment was to include individual CCS projects under the then available opt-in mechanism in ETS Directive Article 24.[199] At the time, Article 24 allowed for opt-in of individual projects, not just activities and gases as is the case today.[200] Such opt-in of CCS was envisaged to include the whole CCS process under the scope of responsibility of one installation.[201] I have not found any examples of completed inclusions under this mechanism.[202]

The opt-in mechanism had three main disadvantages. Firstly, it was not readily available, but contingent on a comprehensive application by a single member state and the Commission's approval.[203] Secondly, it did not promote cross-border projects as it primarily facilitated member-state specific applications. Thirdly, it failed to facilitate different commercial operators of the different phases of the three-part process as all phases would be included under one installation.

These drawbacks were important considerations when considering alternative legislative designs to promote CCS in Europe with the 2009-amendment. These considerations are clearly stated within the impact assessments accompanying the proposals for the CCS Directive and the amendment of the ETS Directive.[204] The assessments relay the following main considerations for including CCS under the ETS: 1) providing a clear economic incentive to accommo-

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[197] Recital 39 to the preamble of Directive 2009/29/EC amending Directive 2003/87/EC.
[198] COM(2008) 16 final, p. 49,
[199] Ibid.
[200] Directive 2003/87/EC unamended Article 24.
[201] COM(2008) 18 final, section 5.2 para. 96.
[202] Dixon et al (2009) describes several commenced opt-in procedures set forth by the UK that contributed to important monitoring and reporting guidance for hypothetical CCS and EOR-projects. It appears from the article, however, that none of those were completed before the amendment of the 2009-ETS to include CCS more generally.
[203] COM(2008) 16 final, p. 49.
[204] COM(2008) 18 final, p. 27-29 and COM(2008) 16 final p. 49-52.

date a range of CCS technologies, and 2) the need to ensure environmental integrity and effectiveness of CCS as an emission reduction option.[205]

To facilitate these objectives, two main options were considered:[206]

> "Option 3.11: Opt-in of classes of project: Admit classes of projects one by one, through the current opt-in procedure, but with a harmonised generic approval possible for any opt-in, applicable throughout the EU.
>
> Option 3.12: Mandatory inclusion of all CCS: Include all CCS projects up front, by explicit reference to CCS in Annex I of the Directive"

Option 3.12 was chosen, as it was thought to better facilitate 'certainty and transparency for developers and investors, which might bring about a **broader range** of CCS technologies [than in the case of option 3.11]' (emphasis added).[207]

The ETS legislative framework was thereby amended to accommodate all CCS by means of two sets of rules at the ETS Directive level: ensuring the economic incentive for CCS in ETS Directive Article 12 nr. 3a, and ensuring the environmental integrity and effectiveness of the emission reduction process by inclusion of CCS activities in ETS Directive Annex I.

Article 12 nr. 3a states that:

> "An obligation to surrender allowances shall not arise in respect of emissions verified as captured and transported for permanent storage to a facility for which a permit is in force in accordance with [the CCS Directive]."

This provision essentially says that emissions avoided by employing the sanctioned type of CCS process is 'valued at the carbon price' of the market.[208] The prerequisites for qualifying for this incentive is the main topic of analysis in chapter 3.

The second set of rules consisted of the inclusion of the following three separate CCS activities under the scope of liability of Annex I. This imposed liability for all emissions, both leakage from the captured CO_2 and operational emissions:

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[205] COM(2008) 18 final, p. 27-29 and COM(2008) 16 final p. 49-52.
[206] COM(2008) 16 final, p. 50.
[207] Ibid., p. 52.
[208] COM(2008) 18 final p. 2.

- "Capture of greenhouse gases from installations covered by this [ETS] Directive for the purpose of transport and geological storage in a storage site permitted under [the CCS Directive] [CO_2]"
- "Transport of greenhouse gases by pipelines for geological storage in a storage site permitted under [the CCS Directive] [CO_2]"
- "Geological storage of greenhouse gases in a storage site permitted under [the CCS Directive] [CO_2]"

The syntax of the sentences describing the first two activities may be slightly confusing as to what 'permission' it refers to in the CCS Directive. It is, however, clear from the general context and the type of permits found in the CCS Directive that this refers to a *storage permit*.[209]

The two sets of rules that apply to the CCS process at the level of the ETS Directive are implemented through the transfer rules in MRR Article 49. Those transfer rules accounts for all emissions associated with a CCS process by only allowing the economic incentive in Article 12 nr. 3a through transfer between the CCS installations listed in Annex I.

In summary, it is clear that the general inclusion of CCS under the ETS sought to facilitate the following objectives: providing a clear economic incentive to promote a broad range of CCS technologies, ensuring harmonised CCS legislation across the ETS geographic scope and ensuring the environmental liability for the CCS process.

The notable 'omission' in this legislative design is any references to mobile transport modalities. The question of what this implies for a CCS process that employs mobile CO_2 transport is the subject matter of chapters 3 and 4.

2.4.3 An introduction to the CCS Directive, its relation to the ETS and implications for CO_2 transport

The CCS-specific rules under the ETS all require that the captured CO_2 is transported and stored in a storage facility *permitted under the CCS Directive*. For this reason, the CCS Directive is important for CCS employed as an emission reduction option under the ETS. This section explains the subject matter and function of the CCS Directive within EU legislation on

[209] See section 2.4.3.

CCS. The aim is to prepare for the analysis in chapter 3 of whether the storage permit requirement in the ETS Directive represents an impediment for using mobile CO_2 transport.

Both the subject matter and title of the CCS Directive, formally known as 'the directive on the geological storage of carbon dioxide', imply that the directive does not intend to comprehensively regulate the whole CCS process (capture, transport and storage).[210] The overwhelming emphasis of the CCS Directive is on the *storage phase* of the CCS process. For example, it is notable that the only emissions the CCS Directive refers to is leakage form the *storage site*.[211] The popular name 'CCS Directive' is therefore slightly misleading, as it suggests a broader scope.[212] For relevant community legislation concerning the capture and transport segments of the CCS process, the Directive refers mainly to existing legislation like the Environmental Impact Assessment Directive and the Industrial Emissions Directive.[213]

The main functions of the CCS Directive is to establish a mandatory licensing and permit system for exploration-, establishment- and operation of CO_2 storage facilities.[214] This is the permit that must be obtained in order to benefit from the economic incentive set forth by the ETS Directive to reduce emissions by CCS. The purpose of the CCS Directive is, like the ETS Directive, to contribute to mitigation of climate change. However, the immediate focus of the Directive is to mitigate the risks to human health and the environment that may occur from geological storage of CO_2.[215]

The 'geological storage of CO_2' is defined as 'injection accompanied by storage of CO_2 streams in underground geological formations.'[216] Storage sites for the purpose of research and testing, and with intended capacity of less than 100 kilotonnes CO_2, falls outside the scope of the CCS Directive.[217] This consequently implies that any CO_2 captured in such facilities would not require nor be able to receive a permit.[218]

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[210] Directive 2009/31/EC, Article 1. See also the Directive 2009/31/EC implementing report COM/2019/566 final, progress report COM(2015) 576 final, and generally Holwerda (2014), p. 33-46.

[211] Directive 2009/31/EC, Article 3(5).

[212] The term 'CCS Directive' is i.e. used by the Commission, see European Commission e(n.d). The Norwegian translation of 'the CCS Directive', is in fact 'the storage Directive' (lagringsdirketivet). See, inter alia, Europalov (2020b).

[213] Directive 2009/31/EC recitals 16-17 referring to Directive 2011/92/EU and Directive 2010/75/EU.

[214] Directive 2009/31/EC, chapters 2-4.

[215] Ibid., Article 1(2) and recital 1-3. The Directive is adopted on the basis of Article 192(1) of the TFEU, concerning the environmental and climate policy of the EU.

[216] Ibid., Article 3(1).

[217] Ibid., Article 2(2).

[218] This means that although the Norwegian full-scale project is called a 'demonstration project' by its facilitators it does not fall under this 'testing' category of the CCS Directive because it is estimated that about 400 000 tonnes of CO_2 per year could be captured by the currently planned capturing facilities, *CCSNorway (2020a).*

The CCS Directive applies to the geological storage of CO_2 both onshore in the territory of the EU member states and EFTA states, and offshore in their exclusive economic zones and continental shelves.[219] Storage of CO_2 outside this area is prohibited.[220] This means that a storage field that crosses the Norwegian/UK border in the North Sea could pose a problem post Brexit.[221] Further inquiry to such cross-border issues falls outside the scope of this thesis.[222]

The states may individually decide whether they wish to provide suitable storage sites within their territory.[223] The CCS Directive therefore facilitate cross-border access to transport networks that connect to storage sites in order to accommodate member states that either do not wish to store CO_2 within their territory/jurisdiction, or do not have suitable storage sites.[224] 'Transport networks' are defined as 'the network of pipelines, including associated booster stations, for the transport of CO_2 to the storage site'.[225] The ability for an emitter in one member state to inject and store CO_2 in another member state accentuates the basic principles of free movement of goods, services and capital within EU law.[226] The emphasis on *pipelines* in the CCS Directive is, therefore, not necessarily intended to favour pipeline transport. Rather, it seems that the intention is to ensure that permanent CCS infrastructure facilitates open access in order to pave the way for pan-European CCS projects.

It has been suggested that the definition of transport networks in the CCS Directive is an obstacle for mobile transport in the ETS.[227] This is because the MRR refers to the same definition.[228] However, although that definition poses a problem to mobile transport within the context of the *ETS*, as explained below in chapter 3, it does not restrict mobile transport within the CCS Directive. The function of the definition within the context of the CCS Directive is merely to facilitate third party access. This means that the problems posed to mobile CO_2 transport within the ETS may be solved within the context of the ETS legal framework. It is not a problem that needs to see an amendment of the CCS Directive.

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[219] Directive 2009/31/EC Article 2. Directive 2009/31/EC incorporated in the EEA Agreement by decision nr. 115/2012 by the EEA Joint Committee.
[220] Ibid., Article 2(3).
[221] See Feiring (2019) for a comprehensive analysis of the rules pertaining to the CO_2 storage phase, inter alia, problems posed to EU/UK CCS projects, p. 22.
[222] See generally Bankes (2020) p. 406-416, for an overview of the legal framework on 'The Use of Sub-Seabed Transboundary Geological Formations for the Disposal of Carbon Dioxide'.
[223] Directive 2009/31/EC Article 4(1).
[224] Ibid., Recital 38 and chapter 5.
[225] Ibid., Article 3(22).
[226] TFEU Article 26(2), Roggenkamp (2018) p. 245.
[227] O´Brien (2019), p. 21-22, O'Brien (2020).
[228] Commission Implementing Regulation (EU) 2018/2066, Article 3(63): 'transport network' means transport network as defined in Article 3(22) of Directive 2009/31/EC.'

The use of CCS under the ETS is conditioned on obtaining the storage permit set forth by the CCS Directive.[229] Any limitations on the transport phase under the ETS due to the rules under the CCS Directive must therefore be found within the conditions to attaining a storage permit, as analysed in chapter 3 below.

2.4.4 The apparent omission of mobile CO_2 transport – background

As will be explained thoroughly in chapter 3, the way in which CCS was introduced to the ETS poses particular challenges for the stakeholders in the forthcoming cluster projects. Why is pipeline transport explicitly regulated, while mobile CO_2 transport modalities are not mentioned? Was the omission intended to restrict the use of mobile CO_2 transport modalities in a CCS process under the ETS? This section briefly discusses some possible explanations for the omission, none of which seem to imply an intent to inhibit the use of mobile CO_2 transport.

Firstly, one could speculate that the intense debate on whether all shipping should be included under the ETS or not, as mentioned earlier, could have had a chilling effect on the specific inclusion of CO_2 shipping. However, as it would not be necessary to include all shipping, but merely shipping for the specific transport of CO_2, it seems that the stakeholders in that debate would not be too concerned with such inclusion or exclusion.

Secondly, it has been suggested that shipping was left out due to the fact that the legislators did not envisage the use of ships for transportation of CO_2 in large-scale CCS.[230] This perception seems, however, to be contradicted by how shipping and pipelines are mentioned as the 'two main kinds of technology that are likely to be used in the EU for transport of CO_2' in the impact assessment of the CCS Directive.[231] Moreover, CO_2 shipping was already in 2005 envisaged by the IPCC special report on CCS as potentially more cost-efficient than pipelines '[f]or amounts smaller than a few million tonnes of CO_2 per year or for larger distances overseas.[232] Although it is within the context of the ETS, and not within the CCS Directive, that this poses a challenge to mobile CO_2 transport, it is still remarkable that both the CCS Directive and the ETS Directive fails to address and thus positively *enable* other types of transport.

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[229] Directive 2003/87/EC as amended Article 12 nr. 3a, description of activities in Annex I, and MRR art. 49.

[230] O'Brien (2019), p. 22 referring to Boekholt (2013) p. 33, which states that 'when the CCS Directive was drafted, the parties had not envisaged the use of ships for transportation of CO_2', but with no source of reference. It has been difficult to find sources that substantiates this perception.

[231] Impact assessment COM(2008) 18 final, section 4.3 para. 75, the omission of shipping is further emphasised as remarkable by Woerdman *et al* (2015), p. 196.

[232] Impact assessment COM(2008) 18 final, section 4.3 para 75, and IPCC (2005) p. 5 and 186-187.

Thirdly, the focus on pipelines could be due to how the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the 'London Protocol') prevented cross border transport of CO_2 for permanent storage until its amendment in October 2019.[233] However, including CCS shipping in the ETS would enable CO_2 shipping for CCS within national borders and prepare for the removal of the London Protocol obstacle.

Finally, it has been suggested that the gap in the CCS and ETS legislative framework is due to the 'quite extensive international maritime safety regulation CO_2 shipping is subject to'.[234] However, these other legislative instruments do not solve the question of whether shipping of CO_2 on its way to permanent storage may be employed as part of an emission reduction technology under the ETS. This depends on the rules of the ETS alone, as a closed legal ecosystem setting forth a complex market mechanism.

For these reasons it seems that failing to explicitly mention mobile CO_2 transport, in particular shipping, within the ETS was not intended to necessarily inhibit such use. This is an important backdrop for the analyses in chapters 3 and 4.

[233] 'Transboundary export of carbon dioxide (CO_2) for the purpose of carbon capture and storage (or 'sequestration') can now be provisionally allowed under certain circumstances', IMO (2019).

[234] Holwerda (2014), p. 39-40, noting that 'no EU ETS permit is required for the transport of greenhouse gases (for storage) by ship' and that a reason could be the other substantial regulation on maritime transport, referring to those instruments as listed in Com(2008) 18 final, para. 86-89. However, the author does not identify this as an impediment to CO_2 shipping in Europe, as is the subject matter of this thesis.

3 Legal issues confronting mobile CO_2 transport – identification and analysis

3.1 Introduction

CO_2 captured and stored in a manner sanctioned by the ETS Directive does not incur liability for emissions. For the stakeholders in a CCS process it is imperative to clarify the content of the prerequisites set forth to obtain this incentive, pursuant to Article 12 nr. 3a. These stakeholders include the national competent authorities in charge of enforcing the ETS,[235] any ETS operator that seeks to buy CCS services in order to reduce emissions and any ETS operators offering those services to the market.

The economic incentive to employ CCS is particularly important for industrial activities where other emission reduction options are less effective. An example of this is the production of cement clinker, where it is not the combustion of fossil fuels but the production process itself that produces CO_2.[236]

This chapter identifies and analyses the prerequisites associated with CCS as an emission reduction option in light of the forthcoming Norwegian full-scale project. As introduced in chapter 1, that CCS project offers transport and storage services (known as 'the Northern Lights' project) to installations that produce and capture CO_2. Northern Lights will be operated by Equinor in cooperation with Shell and Total.[237] An essential part of the Northern Lights business model is to pick up the captured CO_2 at a proximate harbour to the capturing facility, thereby connecting decentralised capturing points to the permanent pipeline and storage infrastructure.[238] As an illustration, the shipping distance from the capturing facility at the cement production plant at Brevik operated by Norcem to the injection point of the pipeline network is about 700 km.[239]

The subject matter of chapter 3 is to analyse the prerequisites pursuant to ETS Directive Article 12 nr. 3a in order to ascertain whether the economic incentive will be available for a CCS process that employs mobile CO_2 transport. The analysis demonstrates how the issues regarding mobile CO_2 transport do not arise from the wording of that provision, but from the Commission's implementation of that provision. The explicit regulation of pipeline transport and

[235] Directive 2003/87/EC as amended Article 18.

[236] Norsk betongforening (2019), p. 11. See generally Hills *et al* (2020).

[237] Equinor (2020).

[238] Equinor (2020a), Seglem (2020).

[239] *CCSNorway (2020a).*

lack of mention of mobile CO_2 transport expose a clear tension between the aim to incentivise CCS while ensuring environmental integrity and effectiveness. This tension may imply that the current implementation of Article 12 nr. 3a goes beyond the scope of the powers conferred upon the Commission to adopt those rules.

The present chapter starts with an overview of the structural context and function of Article 12 nr. 3a and the two key prerequisites set forth: the storage permit requirement and the verification requirement (3.2). The Commission implementation of the verification requirement and its implications for mobile CO_2 transport necessitates a closer look at the directive-specific concept of 'emissions' and its implications for the Commission's implementing powers to adopt rules on the transfer of responsibility for CO_2 in a CCS process (3.3).

3.2 Avoiding liability for emissions by employing CCS under the ETS

3.2.1 CCS as a conditioned emission reduction option – Article 12 nr. 3a

The role and function of Article 12 nr. 3a is twofold: it signals that CCS is an available emission reduction option under the ETS *and* it conditions the type of CCS that is recognised by the ETS.

The economic incentive is evident from the first part of the provision (emphasis added):

> "**An obligation to surrender allowances shall not arise in respect of** emissions verified as captured and transported for permanent storage to a facility for which a permit is in force in accordance with [the CCS Directive]."

The provision is phrased as a conditioned freedom from the fundamental obligation set forth by Article 12 nr. 3 (emphases added):

> "[...] Member States shall ensure that, by 30 April each year, **the operator** of **each installation surrenders a number of allowances**, that is **equal to the total emissions from that installation** during the preceding calendar year as verified in accordance with Article 15, and that those allowances are subsequently cancelled [...]"

In other words: Where an operator of an installation successfully avoids emissions by employing CCS, then that operator need not surrender allowances for the CO_2 produced. The incentive to employ CCS arise where the price of obtaining an allowance to emit one tonne of CO_2

surpasses that of capturing, transporting and storing 1 tonne of CO_2. This is the general incentive to employ emission reduction options under the ETS, as emphasised in the preamble:

> "[t]he main long-term incentive arising from [the ETS directive] for the capture and storage of CO_2 ('CCS'), for new renewable energy technologies and for breakthrough innovation in low-carbon technologies and processes, including environmentally safe carbon capture and utilisation ('CCU'), is the carbon price signal it creates and the fact that allowances will not need to be surrendered for CO_2 emissions which are avoided or permanently stored."[240]

In terms of emission reduction efforts by CCS, however, it seems that it is not enough to merely avoid emissions in order to obtain the economic incentive, additional prerequisites must be observed. This is evident from the latter part of the Article 12 nr. 3a, which emphasises a certain verification process and a storage permit requirement (emphases added):

> "An obligation to surrender allowances shall not arise in respect of **emissions verified as captured and transported for permanent storage** to a facility **for which a permit is in force in accordance with [the CCS Directive]**."

Within the meaning of this provision it is apparent that the term 'emissions' must be interpreted within the natural meaning of that word, to refer to the act of *producing* CO_2 by releasing carbon into the air to react with oxygen. This means that the term is used inconsistently with the directive-specific definition of 'emissions', which would require the CO_2 to be released into the *atmosphere*[241] prior to capture.[242] This definition is addressed in detail in section 3.3.2 below.

In terms of the transport phase, it appears from a *prima facie* encounter that Article 12 nr. 3a does *not* condition the economic incentive on the type of transport used. The emphasis is on the *storage phase* and its adherence to the CCS Directive storage permit.

Refraining from restrictions on capture and transport technology would presumably enable the market to determine what providers offer the best services in terms of the state of technology and the most cost-efficient solutions for the CCS process in question. Such a consideration

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[240] Recital 14 to Directive (EU) 2018/410 amending Directive 2003/87/EC.

[241] 'Atmosphere' is not defined by the ETS, but is generally known to as: 'The atmosphere is divided into five different layers, based on temperature. The layer closest to Earth's surface is the troposphere, reaching from about seven and 15 kilometers (five to 10 miles) from the surface.' National Geographic (n.d).

[242] Directive 2003/87/EC as amended Article 3(b).

enhances the basic idea of the ETS: letting the market mechanism decide how and where it costs the least to cut emissions.[243]

It is, however, only by a closer analysis of the verification requirement and the storage requirement that the potential accommodation of mobile CO_2 transport may be determined. While the storage permit requirement aims to ensure safe geological storage, the verification requirement ensures the environmental integrity for the CCS process sanctioned under the ETS. The following sections review each of these requirements in order to ascertain whether the economic incentive is available for a CCS process that employs mobile CO_2 transport.

3.2.2 The storage permit requirement and its implications for CO_2 transport

The ETS Directive only sanctions storage of CO_2 in 'a facility for which a permit is in force in accordance with [the CCS Directive]', as emphasised by both Article 12 nr. 3a and the CCS activities subject to liability for emissions as included in Annex I to the ETS Directive.[244] This ensures that the CO_2 is stored in compliance with the objectives of safe geological storage as pursued by the CCS Directive.

It has been suggested that the interrelation between the CCS and ETS Directive that restricts any other transport modality than pipelines.[245] However, the CCS process under the *ETS Directive* is solely contingent on the storage permit provided for by the CCS Directive, as emphasised above in chapter 2. The aim of looking into the permit requirement pursuant to the CCS Directive is, therefore, to understand whether those rules impose any restrictions on the type of CO_2 transport employed in a CCS process under ETS Article 12 nr. 3a.

It is the 'facility' where the CO_2 is 'permanently stored' that must hold a 'permit' in accordance with the CCS Directive pursuant to ETS Directive Article 12 nr. 3a. As the only 'permit' that may be acquired pursuant to the CCS directive is a 'storage permit'[246] that provides for

[243] Directive 2003/87/EC as amended Article 1.

[244] Ibid., Annex I.

[245] O'Brien (2020), O'Brien 2019, p. 22.

[246] A 'storage permit' means 'a written and reasoned decision or decisions authorising the geological storage of CO_2 in a storage site by the operator, and specifying the conditions under which it may take place, issued by the competent authority pursuant to the requirements of this Directive' Directive 2009/31/EC., Article 3(11).

CO_2 storage in a 'storage site'[247], it follows from the context that it is this permit that Article 12 nr. 3a refers to.

Do the obligations associated with acquiring a storage site permit, restrict the transport modality used in the CCS process? These obligations stem from CCS Directive chapter 3, Articles 6-11. Article 6 nr. 1 holds that (emphases added):

> "Member States shall ensure that no **'storage site'** is operated without a **'storage permit'**, that there shall be only one **'operator'** for each storage site, and that no conflicting uses are permitted on the site."

The requirements associated with a CCS Directive storage permit pertain to the storage site. There are, however, a few prerequisites associated with the transport phase that the storage operator must adhere to, even if the transport phase may be operated by a different entity under the ETS.

The 'operator' is defined by the CCS Directive to mean:

> "[…] any natural or legal, private or public person who operates or controls the storage site or to whom decisive economic power over the technical functioning of the storage site has been delegated according to national legislation."[248]

The definition of 'operator' in the CCS Directive thus corresponds with the broad definition in ETS Directive Article 3(f), allowing for the same operator of a storage facility under the ETS Directive and the CCS Directive.

There are three main prerequisites which the storage site operator must adhere to in relation to the transport phase.

Firstly, as part of the permit application, the potential storage site operator must include information about 'the prospective sources and transport methods according to Article 7 nr. 4 of the CCS Directive.[249]

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[247] Ibid., Article 6. The term 'storage site' is defined by the CCS Directive as 'a defined volume area within a geological formation used for the geological storage of CO_2 and associated surface and injection facilities,' Ibid., Article 3(3).
[248] Ibid., Article 3(10).
[249] Ibid., Article 7(4).

Secondly, the storage site operator must include the environmental impact assessment required by the directive on the on the assessment of the effects of certain public and private projects on the environment, according to Article 7 nr. 9.[250] This environmental assessment could potentially require information about the transport phase of the CCS process, if, pursuant to the specific requirements of this regulation, the transport phase is seen as part of the same 'project' as the storage site.[251] This prerequisite requires compliance with that particular impact assessment, but does not *per se* limit the type of transport used.

Thirdly, Article 8 nr. 4 holds that the competent authority must be satisfied that 'all relevant requirements of this Directive and of other relevant community legislation are met' before issuing a storage permit.[252] Relevant legislation for the transport segment includes the Environmental Impact Assessment Directive[253] as well as the Industrial Emissions Directive[254], as referred to in the preamble of the CCS Directive.[255] However, none of those Directives limit the type of CO_2 transport that may be used in a CCS process.

To summarise, it seems that the only restrictions on the use of mobile CO_2 transport that arises from the storage requirement is by reference back to the ETS Directive as part of 'other Community legislation'. The CCS Directive itself does neither obligate nor restrict the use of mobile CO_2.[256] This implies that the solution to accommodate mobile CO_2 transport in Community legislation may be found solely within the parameters of the ETS legal framework. Amendments of the CCS Directive is, therefore, not needed to enable mobile CO_2 transport in a CCS process employed to reduce emissions under the ETS.

3.2.3 The verification requirement and restrictions on CO_2 transport

The question for this section is whether and how the verification requirement limits the type of transport used in a CCS process sanctioned by the ETS Directive. Any emissions avoided by employing CCS must be 'verified as captured and transported for permanent storage' in order to obtain the economic incentive set forth in Article 12 nr. 3a.

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[250] The directive referred to in Directive 2009/31/EC Article 7 nr. 9 is Directive 85/337/EEC. That directive was repealed and replaced by Directive 2011/92/EU (Article 14).

[251] Directive 2011/92/EU Article 5 nr. 1(a).

[252] Directive 2009/31/EC Article 8 nr. 1a.

[253] Directive 2011/92/EU.

[254] Directive 2010/75/EU.

[255] Recitals 15-17 to Directive 2009/31/EC.

[256] It does, however, amend other Community legislation to exclude CO_2 shipping from their scope of application. This appears to be an effort to remove existing barriers for such transport in Community legislation, see recital 46 of the preamble to Directive 2009/31/EC.

Article 12 nr. 3a does not itself stipulate a verification procedure, but refers to the monitoring reporting and verification regime within the Commission implementation level of the ETS legal framework, introduced in chapter 2 above. The main provision for the verification process indicated in Article 12 nr. 3a is MRR Article 49, concerning the rules on CO_2 transfers. However, the wording of Article 12 nr. 3a does imply two key features of those verification rules.

Firstly, the terms 'for permanent storage' indicates a requirement for the *purpose* of the CCS process, not a strict condition that no CO_2 may ever leak. This is apparent from the mechanisms in the CCS Directive and ETS that incurs an obligation to monitor and rectify leakage, thus acknowledging that there is no geological process that may *guarantee* leak free storage. [257]

Secondly, the expression 'captured and transported for permanent storage' indicates that the freedom from surrendering allowances for the avoided emissions arise *prior* to the actual storage of the captured CO_2. It is solely contingent on the verification of the act of capture and transport. This part of Article 12 nr. 3a refers to a system where the responsibility for captured CO_2, and thus liability for any emissions from leakage, is transferred between the different operators that take part in a CCS process. Transferring CO_2 out of the scope of responsibility of an ETS operator is subject to 'very specific conditions' in order to 'close potential loopholes' associated with that transfer. [258]

The transfer rules in MRR Article 49 nr. 1 reads as follows (emphases added):

> "1. **The operator shall subtract from the emissions of the installation** any amount of **CO_2** originating from fossil carbon in activities covered by Annex I to [the ETS Directive] that **is not emitted from the installation, but:**
>
> **(a) transferred out of the installation to any of the following:**

[257] See, inter alia, Deng et al (2017) for an example of how the risk of CO_2 leakage and its consequences continues to be an area of research. See for example the provisions concerning leakage from storage sites in the CCS Directive's chapter 3 and chapter 4, Commission Regulation (EU) No 601/2012 as amended Article 20 nr. 2 and nr. 23 of Annex IV, and Directive 2009/31/EC Articles 9 nr. 6, 11 nr. 3a, 13, 14 and 16.

[258] Recital 13 to Commission Regulation (EU) No 601/2012, note that the recital retains an inadvertence as 'Union's greenhouse gas emission allowance trading scheme' is repeated twice, where it is apparent that it is meant to refer to the CCS Directive at the latter mention.

(i) a capture installation for the purpose of transport and long-term geological storage in a storage site permitted under [the CCS Directive]

(ii) a **transport network** with the purpose of long-term geological storage in a storage site permitted under [the CCS Directive]

(iii) a storage site permitted under [the CCS Directive] for the purpose of long-term geological storage;

(b) transferred out of the installation and used to produce precipitated calcium carbonate, in which the used CO_2 is chemically bound."[259]

The entities listed in (i)-(iii) represent each of the three stages of a CCS process; (i) the capturing installation, (ii) the transport network and (iii) the storage site. Article 49 facilitates the transfers of responsibility for CO_2 between the different operators of the CCS activities listed in Annex I that may take part in a CCS process. As explained in Chapter 2, the ETS Directive allows an operator to obtain an emission permit for more than one ETS activity.[260] Thus, in a CCS process there may be one operator of all the activities in a CCS process, so that no transfer of responsibility is required, or up to four different ETS operators and consequently three transfers of responsibility, as provided for by Article 49. Any such transfers of responsibility under Article 49 ensure that if the contained CO_2 leaks into the atmosphere after the transfer, then it is the operator of the receiving installation that retains the responsibility to surrender allowances for those emissions.

An installation receiving CO_2 produced in an activity outside the scope of the ETS can never subtract that amount from their ETS emission accounting. This is because only CO_2 transferred from 'activities covered by Annex I' to the ETS Directive may be subtracted from the transferring installation. This implies that the emissions accounting of an ETS installation can never be in *negative figures,* ensuring that the ETS imposes liability for the actual emissions produced within its scope of liability.

This mechanism for transfer of responsibility in Article 49 corresponds to how the freedom from the obligation to surrender allowances in ETS Directive Article 12 nr. 3a arises before the CO_2 is actually stored. There is, however, a nuance between the two provisions regarding the time of when that freedom arises. Article 12 nr. 3a holds that the obligation to surrender

[259] Article 49(1) of Commission Regulation (EU) No 601/2012 as amended by Commission Implementing Regulation 2018/2066 Article 73(3).
[260] Directive 2003/87/EC as amended Article 6(1), second subparagraph.

allowances does not arise in respect of CO_2 that is verified as captured *and* transported for permanent storage. MRR Article 49 allows for subtraction of CO_2 transferred between the operator of the activity that produces CO_2 and potentially an operator that captures the CO_2. It could thus seem that although the operator that produces the CO_2 ('operator A') is allowed to subtract the CO_2 when transferred to the operator of the capturing installation ('operator B'), it is only when the CO_2 *is verified at the hand* of the transport network operator that the actual right to not surrender allowances for any leakage incurred arises at the hand of operator A. However, as the aim of both provisions is to ensure liability for any release of CO_2 occurring during the CCS process, it seems to be enough to facilitate that objective that the transferred CO_2 is verified as *added* to the capturing installations scope of liability. It seems, therefore, that this nuance between Article 12 nr. 3a cannot be interpreted to require that operator A and operator B are liable for the same CO_2 concomitantly.

The problem incurred for mobile CO_2 transport in a CCS process arises from the way in which Article 49 determines the possible destinations for transfer. The transport phase envisaged by Article 49 is indicated by 'transport networks' in Article 49 nr. 1(a)(ii). 'Transport networks' are defined by the MRR with reference to the definition set forth in the CCS Directive.[261] The terms 'transport network' is in the CCS Directive defined as 'the network of pipelines, including associated booster stations, for the transport of CO_2 to the storage site'.[262] As noted in chapter 2, this definition does not pose a problem within the context of the CCS Directive, which merely facilitates third party access to that transport network.

Within the MRR Article 49, however, the definition of 'transport networks' seems to imply that that it is only by transferring CO_2 to a *pipeline network* operator that the capturing installation may subtract that CO_2 from its scope of responsibility.[263] With this definition of 'transport network', it appears that the list of sanctioned destinations for transfer in a CCS process in MRR Article 49 nr. 1 (a) corresponds exactly with the list of CCS activities included under the ETS scope of liability. This overlap ensures that all the emissions associated with CCS as an emission reduction option is accounted for under the ETS scope of liability.

[261] Commission Implementing Regulation 2018/2086 Article 3(63) referring to Directive 2009/31/EC Article 3(22). A definition of 'transport networks' does not exist in MRR phase 3 (Commission Regulation (EU) No 601/2012 of 21). The emphasis on pipeline transport is there indicated by the definition of "CO_2 transport" in Article 3 item 52, and the link between Article 49 and the CCS activities listed in Annex I.

[262] Directive 2009/31/EC, Article 3 nr. 22.

[263] Commission Regulation (EU) No 601/2012 Article 3(52), and Commission Implementing Regulation (EU) 2018/2066 Article 3(55).

The emphasis on pipelines in Article 49 prompts the existential question for CCS projects relying on mobile transport: what is the consequence of transferring CO_2 to a mobile transport modality?

As the objective of Article 49 is to close 'loopholes' associated with transfers of CO_2, it appears that the list of explicit transfer destinations is exhaustive.[264] The wording of Article 49 thus seem to imply that the capturing installation may not subtract CO_2 transferred to an entity other than the ones explicitly listed in that provision.

This implication prompts another question: is the operator of the capturing installation, such as Norcem within in the Norwegian full-scale project, obliged to surrender allowances CO_2 transferred to the shipping segment on its way to permanent storage?

This does indeed appear to be the consequence derived from the wording of Article 49, as pipeline transport, corresponding to the Annex I pipeline transport activity, is the only transport activity that can *receive responsibility* for the CO_2 under the ETS. Consequently, if the CO_2 transferred to the mobile transport modality is subtracted from the capturing installation, then there are no means of imposing liability for any leakage that may happen during that transport phase, and the CO_2 may not be verified as captured and transported for permanent storage as required by ETS Directive Article 12 nr. 3a.

A high-level legal review performed for the Global CCS Institute from 2011 concludes that the wording of Article 49 implies that any CO_2 transferred to a ship will continue to constitute part of the capturing installation's total emissions.[265] A recent master thesis concludes that this implies liability for that CO_2 at the hand of the capturing operator as though the CO_2 sent off to storage was emitted.[266]

Ensuring the environmental integrity of the CO_2 in transit is an important consideration. However, it is highly problematic if the economic incentive set forth for CCS in Article 12 nr. 3a is not available for a CCS process that employs mobile transport to enable a cost-efficient design. Particularly considering how the forthcoming CCS cluster-projects are the first large-scale CCS projects that aim to achieve commercial viability in part based on the incentive mechanism set forth by the ETS, as this creates a market for offering CCS services to ETS operators of industrial installations.

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[264] Recital 13 to Commission Regulation (EU) No 601/2012.

[265] Global CCS-Institute Bech-Bruun (2012) p. 11. The report also suggest that the storage operator would have to add the CO_2 to their emissions. That appears a questionable conclusion as that CO_2 is already accounted for under the ETS by the capturing installation, thus implying double liability.

[266] O'Brien 2019, p. 22 and O'Brien (2020).

The wording of MRR Article 49 is not only problematic in terms of how it apparently inhibits the ETS Directive's aim to incentivise CCS. The main problem of concluding that the transfer rules imply liability for CO_2 transferred to a mobile transport modality is that it is inconsistent with the implications of the directive-specific concept of 'emissions'. By limiting the transfer in Article 49 to transfer to pipeline transport, the Commission is suggesting that the obligation to surrender allowances is not only instigated by releasing CO_2 into the atmosphere. Rather, it is suggesting that the obligation to surrender allowances arises merely from the fact that transferring CO_2 to mobile transport modality is not listed as an option in Article 49.

The question becomes whether this is a legal effect that the Commission is empowered to adopt within the limits set on the powers conferred by ETS Directive Article 14(1).

3.3 The concept of 'emissions' and implications for the Commission's implementing powers

3.3.1 Overview

The overarching question for this section is whether the suggested implications for employing mobile CO_2 transport under the current transfer rules – that the CO_2 transferred to a mobile transport modality may not be subtracted from the transferring installations emissions – is within the scope of the powers conferred upon the Commission to adopt.

The transfer rules in MRR Article 49 was amended in 2018 on the basis of the revised Article 14(1) of the ETS Directive (emphases added):[267]

> "The Commission shall adopt implementing acts concerning the detailed arrangements for the monitoring and reporting of **emissions**…
> […]
> **Those implementing acts** shall be adopted in accordance with the examination procedure referred to in Article 22a(2)."

Article 49 must thus be interpreted within this context: the concept of 'emissions' as set forth by the ETS Directive, as well as the boundaries set on implementing acts pursuant to TFEU Article 291 nr. 2. As discussed in section 2.3.3 above, the boundaries set on implementing powers imply that the content of the transfer rules in Article 49 is subject to the sole *execution*

[267] Commission Implementing Regulation (EU) 2018/2066, Article 76(3).

of the ETS Directive's obligations related to emissions.[268] The interpretative result of the content set forth in Article 49 may thus no longer 'amend non-essential elements' of the ETS Directive, as was the boundary set on the power to adopt Article 49 prior to the latest revision.[269]

The inquiry in this section starts with an analysis of the directive-specific definition and concept of 'emissions' set forth by ETS Directive article 3(b) and its implications for the Commission's implementing powers (3.3.2). Central to that analysis is the case C-460/15 *Schaefer Kalk* which considered a similar question with regard to the transfer of CO_2 for the production of precipitated calcium carbonate (3.3.3). The preliminary ruling provides some important insights to how the EU Court perceives the objectives of the ETS Directive in terms of facilitating emission reduction options by means of capturing CO_2 (3.3.4). The case led to the revision of Article 49 to explicitly include the transfer option now available in Article 49 nr. 1(b). The eventual question becomes what transfers of CO_2 are available under Article 49 in the wake of *Schaefer Kalk* and the revision of Article 49 (3.3.5).

3.3.2 The concept of 'emissions' in ETS Directive Article 3(b)

ETS Directive Article 3(b) defines the directive-specific concept of 'emissions' to mean (emphases added):

> "**the release of greenhouse gases into the atmosphere** from **sources in an installation** or the release from an aircraft performing an aviation activity **listed in Annex I of the gases specified in respect of that activity**;"

This definition facilitates the fundamental objective of the ETS: imposing liability for GHGs released into the atmosphere from sources in ETS installations. This definition thus adheres to the limited scope of the ETS – not all release of GHGs from the geographical scope of the ETS are included. However, the definition does not explicitly require that the CO_2 is produced by the installation that remains responsible for release. This feature allows for the transfer of responsibility of the CO_2 between the CCS activities listed in Article 49 nr. 1.

The definition does not specify a time frame for the 'release' of the GHG. This prompts the question of whether the definition could be circumvented by temporarily containing the CO_2 and later releasing it from a location outside the installation. Limiting the definition to 'direct

[268] Generally on the implementing acts see COM(2009)673 final p. 3-4, Craig & de Burca (2015) p. 117.
[269] Article 14(1) of Directive 2003/29/EC as amended by Directive 2009/29/EC.

and immediate emissions' would arbitrarily limit the scope of liability of the ETS operators and thus undermine the objective of the ETS to effectively induce actual emission reductions.[270] The definition of emissions must therefore be interpreted to mean release of GHGs produced within the scope of the ETS at any time and from any location.

In terms of the powers conferred by ETS Directive Article 14(1), the directive-specific definition of emissions in Article 3(b) implies that the Commission is empowered to:

> "[…] adopt implementing acts concerning the detailed arrangements for the monitoring and reporting of [the release of greenhouse gases into the atmosphere from sources in an installation or the release from an aircraft performing an aviation activity listed in Annex I of the gases specified in respect of that activity]"

This scope of competence must be read in light of the fundamental objective of the ETS: to induce emission reduction efforts by imposing liability on emissions. The fact that it is the release of GHGs into the atmosphere, and not merely the production of GHGs, that incurs liability, prompts the question of what this implies for both ETS Directive Article 12 nr. 3a and MRR Article 49.

As stated before, ETS Directive Article 12 nr. 3a sets forth the incentive to employ CCS thus:

> "An obligation to surrender allowances shall not arise in respect of emissions verified as captured and transported for permanent storage to a facility for which a permit is in force in accordance with [the CCS Directive]."

From an antithetical interpretation of this wording the question becomes: if CO_2 is stored in a storage facility without a CCS Directive storage permit, does the obligation to surrender allowances for avoided emissions still arise? This is likely to remain a theoretical question, due to sanctions set forth in the CCS Directive for anyone not complying with the permit requirement. It does, however, demonstrate a tension within the ETS Directive itself: Does Article 12 nr. 3a expand the scope of liability to not only CO_2 released into the atmosphere, but also CO_2 not stored in a manner sanctioned by Community regulation? Although apparently inconsistent with the logic of the ETS to incur liability to mitigate climate change, it is a provision at the directive-level and therefore not subordinate to Article 12 nr. 3 or the definition of emissions.

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[270] As underscored by General Advocate Sharpston in the associated opinion to Case-460/15 *Schaefer Kalk*, para. 39.

This seems to imply that the provision does, in fact, expand the scope of the obligation set forth in Article 12 nr. 3 specifically in terms of CCS, and not, *inter alia*, in terms of emission reductions from CCU. The latter aims at the same type of capture technology but aims at permanent storage in materials rather than an underground geological storage site, as briefly explained in chapter 1. The aim of such an implication seems to be the necessity to ensure safe geological storage as provided for under the CCS Directive-regime.

In terms of the transfer rules in MRR Article 49, however, it is clear that those rules are subordinate to the obligations and associated definitions at the directive-level. This seems to imply that MRR Article 49 may not impose liability on *not* emitted CO_2 apart from CO_2 not stored in a facility for which a CCS Directive storage permit is in force, suggested by the wording of Article 12 nr. 3a.

It therefore seems that the implications for employing mobile CO_2 transport under the current transfer rules – that the CO_2 transferred to a mobile transport modality may not be subtracted from the transferring installations emissions – goes beyond the scope of what the Commission is empowered to adopt, under ETS Directive Article 14(1). Considering the hierarchy of norms within the ETS, this suggests that Article 49 is invalid insofar as it imposes liability for CO_2 captured and transported by a mobile transport modality for permanent storage in a facility for which a CCS Directive storage permit is in force.

However, although it seems highly problematic to disallow a transferring installation to subtract CO_2 transferred to a mobile CO_2 transport modality, it seems similarly problematic to disregard the transfer rules completely. ETS Directive Article 12 nr. 3a still requires the CO_2 to be verified as captured and transported for permanent storage. The latter objective ensures that any leakage is accounted for.

It falls upon the Commission to facilitate rules that ensure the environmental integrity of the ETS without restricting legitimate CO_2 transfers for emission reduction purposes. The highly specific design of the current transfer rules wording of Article 49 appears to struggle with accommodating different transport modalities in a CCS process.

The implications of the current transfer rules are not only problematic for CO_2 transfers to a mobile CO_2 transport provider, however. It is also a significant issue for CO_2 transfers for emission reduction purposes by means of using the captured CO_2. The lack of accommodation of CCU for emission reduction purposes seems to contradict the clear intention the the ETS

should indeed facilitate such emission reduction efforts, as emphasised in the recital to the 2018-amendment of the ETS Directive (cited above).[271]

The only type of CCU currently facilitated by Article 49 is CO_2 transfers for the production of precipitated calcium carbonate (PCC), see Article 49 nr. 1(b). Article 49 was revised to accommodate production of PCC as a consequence of the preliminary ruling in C-460/15 *Schaefer Kalk* from 2017. The reasoning in that case is illuminating with regard to the Court's perspective on the concept of emissions and the power of the Commission to adopt rules of CO_2 transfers. The interpretation of the current wording of Article 49 necessitates a closer look at the questions addressed in *Schaefer Kalk* and the subsequent revision of Article 49. These sources are consulted in the following prior to the final analysis of whether Article 49 is indeed invalid insofar as it imposes liability for CO_2 transferred to a mobile transport modality.

3.3.3 Case C-460/15 *Schaefer Kalk*

The case C-460/15 concerned a request for a preliminary ruling on the validity of the former version of MRR Article 49 nr. 1 and MRR point 10 of Annex IV.[272] The request originated from the proceedings between Schaefer Kalk GmbH & Co. KG ('Schaefer Kalk') and Germany on behalf of the German Emissions Trading Authority at the Federal Environment Agency, ('the DEHSt').[273]

MRR Article 49 nr. 1 was at the time worded as follows (emphasis added):

> "Article 49
> Transferred CO_2
> 1. The operator shall subtract from the emissions of the installation any amount of CO_2 originating from fossil carbon in activities covered by Annex I to Directive 2003/87/EC, which is not emitted from the installation, but transferred out of the installation to any of the following:
>
> (a) a capture installation for the purpose of transport and long-term geological storage in a storage site permitted under [the CCS Directive]

[271] Recital 14 to Directive (EU) 2018/410 amending Directive 2003/87/EC.
[272] Case-460/15 *Schaefer Kalk*, para. 1.
[273] Ibid., para. 2. 'the DEHSt' stands for Deutsche Emissionshandelsstelle im Umweltbundesamt (German Emissions Trading Authority at the Federal Environment Agency, see para. 21.

(b) a transport network with the purpose of long-term geological storage in a storage site permitted under [the CCS Directive]
(c) a storage site permitted under [the CCS Directive] for the purpose of long-term geological storage.

For any other transfer of CO_2 out of the installation, no subtraction of CO_2 from the installation's emissions shall be allowed."

The other contested provision was a part of the sector specific monitoring and reporting rules in MRR Annex IV point 10(b), and was at the time worded as follows (emphasis added):

"[W]here CO_2 is used in the plant or transferred to another plant for the production of PCC (precipitated calcium carbonate), **that amount of CO_2 shall be considered as emitted by the installation producing the CO_2.**"

Schaefer Kalk operates an installation for the calcination of lime in Germany.[274] This activity is subject to the scope of liability of the ETS.[275] The calcination of limestone produces quicklime and excess carbon dioxide (CO_2).[276] Instead of releasing this excess CO_2 into the atmosphere, it may be transferred to another installation that uses it for the production of precipitated calcium carbonate (PCC).[277] Production of PCC is not an activity subject to the scope of the ETS.[278]

Schaefer Kalk applied for the ability to subtract the CO_2 transferred to the production of PCC from its scope of responsibility. This was submitted as part of the monitoring plan associated with the emission permit of the installation pursuant to ETS Directive Article 5-6. Schaefer Kalk reasoned that as the CO_2 was transferred for use in the production of PCC, and not for release into the atmosphere, then that transfer could not constitute 'emissions' in terms of the ETS Directive.

The DEHSt denied this request with reference to the then prevailing wording of MRR Article 49 nr. 1 and point 10(b) of the sector specific monitoring rules set forth in Annex IV.[279]

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[274] Case-460/15 *Schaefer Kalk*., para. 20.
[275] Directive 2003/87/EC Annex I.
[276] The National Lime Association (2020).
[277] Ibid.
[278] Case-460/15 Schaefer Kalk, para. 21.
[279] Commission Regulation (EU) No 601/2012 Article 49(1) and point 10 of Annex IV thereto

Schaefer Kalk brought the final rejection from the DEHSs to the Administrative Court of Berlin, relying on the illegality of the second subparagraph of Article 49 nr. 1 and point 10(b) to Annex IV. The company argued that 'those provisions, which subject CO_2 bound in PCC and transferred for the production of that substance to mandatory participation in the EU-ETS, are not covered by the powers granted under Article 14(1) of [the ETS Directive]'.[280]

The Administrative Court of Berlin referred this issue to the CJEU, where the First Chamber of the Court summarised the issues before it in paragraphs 26-27 as follows:

> "By its questions, which it is appropriate to consider together, in essence, the referring court asks the Court to rule on the validity of those provisions in so far as, by systematically including the CO_2 transferred for the production of PCC in the emissions of a lime combustion installation, regardless of whether or not that CO_2 is released into the atmosphere, those provisions go beyond the definition of emissions as provided for in Article 3(b) of [the ETS Directive].
>
> In that regard, it should be noted that Regulation No 601/2012 [MRR phase 3] was adopted on the basis of Article 14(1) of [the 2009-amendment of the ETS Directive], according to which the Commission is to adopt a regulation, inter alia, for the monitoring and reporting of emissions, that measure being designed to amend non-essential elements of the directive by supplementing it. Consequently, an assessment, in the present case, of the validity of the provisions at issue from that regulation requires determination whether the Commission, by adopting those provisions, did not exceed the limits as provided for in [the ETS Directive]."

The boundaries set on the Commission powers by Article 14(1) was at the time of the case subject to the pre-Lisbon system of conferred powers, as introduced in section 2.3.3 above. The boundaries set forth by Article 14(1) allowed the measure set forth in the monitoring and reporting of emissions to amend 'non-essential elements' of the ETS Directive by 'supplementing it'. This is a slightly broader scope than the current powers provided by Article 14(1), which merely empowers the *execution* of the ETS Directive.

The Court centred its analysis of the contested rules on the directive-specific 'emissions'-definition in Article 3(b). The central question for the Court was therefore:

[280] Case-460/15 Schaefer Kalk, para. 23.

> "[…] for the purposes of determining whether the CO_2 resulting from the activity of lime production by an installation such as that at issue in the main proceedings falls within the scope of Directive 2003/87, under Article 2(1) thereof, and Annexes I and II thereto, it is necessary to ascertain whether such lime production leads to the release of CO_2 into the atmosphere."[281]

In this relation the court stated that '[i]t appears from the material before the Court, which has not been disputed, that the CO_2 used for the production of PCC is chemically bound in that stable product'.[282]

The Court thus reasoned that the contested provisions created an irrefutable assumption that the CO_2 transferred for the production of PCC constituted 'emissions', without that CO_2 necessarily ever being released into the atmosphere.[283] The Court held that such a presumption essentially expanded the scope of the directive-specific definition of 'emissions', which requires release of CO_2 into the atmosphere.[284]

On the basis of these considerations the Court concluded as follows in paragraphs 48-49 (emphasis added):

> It follows from all the foregoing considerations that the Commission, having altered an essential element of [ETS Directive] when it adopted the second sentence of Article 49(1) of Regulation No 601/2012 and point 10(B) of Annex IV to that regulation [MRR phase 3], overstepped the limits laid down in Article 14(1) of that directive.
>
> Consequently, the answer to the questions referred is that the second sentence of Article 49(1) of Regulation No 601/2012 and point 10(B) of Annex IV to that regulation **are invalid in so far as they systematically include the CO_2 transferred to another installation for the production of PCC in the emissions of the lime combustion installation, regardless of whether or not that CO_2 is released into the atmosphere**."

[281] Case C-460/15 Schaefer Kalk para. 37.
[282] Ibid., para. 38.
[283] Ibid., para. 40-41.
[284] Ibid.

3.3.4 An analysis of *Schaefer Kalk* in light of the broader objectives of the CO_2 transfer rules and the overarching objectives of the ETS

The Court's reasoning in Schaefer Kalk clearly states that the Commission was not empowered to restrict CO_2 transfers without regard to whether or not that CO_2 would actually be released into the atmosphere, as provided for by the directive-specific concept of 'emissions'.

Certain features of the Court's reasoning warrant a closer analysis with regard to the issue addressed in this thesis: whether the revised version of the transfer rules, in the current version of Article 49, creates a similarly 'invalid' presumption with regard to transfers of CO_2 to a mobile transport modality. That is, as the wording seemingly creates an irrefutable presumption that all CO_2 transferred to the mobile transport modality are counted as 'emissions' at the hand of the transferring operator.

These features are first and foremost related to how the Court emphasises the economic logic of the ETS to solely impose liability for *actual* emissions, while there is very little regard to how this system may be implemented. Understandably, the latter feature was, and still is, the focus of the Commission.

The contested provisions in *Schafer Kalk* created an irrefutable presumption that any other transfer but the CCS process listed in Article 49 would constitute emissions at the hand of the transferring operator, as provided for by the then applicable second subparagraph.

As part of the proceedings in *Shaefer Kalk*, the Commission submitted that the restrictions on transfers to any other destination than the CCS process then listed in Article 49 nr. 1(a)-(c) was justified on the basis of Article 12 nr. 3a of the ETS Directive.[285] The argument of the Commission appeared to be that as the only type of transfers expressly indicated by the Directive was the CCS process in Article 12 nr. 3a, then it followed that no other transfer should be facilitated by the implementing transfer rules.

The Court did not accept the Commission's submissions regarding Article 12 nr. 3a. The Court's reasoning in paragraphs 33-36 illustrates the tension between the Directive and the Commission's implementation by stating that (emphasis added):

> "Indeed, it should be noted in that regard that Article 12(3a) of [the ETS Directive] provides that, subject to certain conditions, emissions which have been captured and trans-

[285] Case-460/15 *Schaefer Kalk*, para. 23.

ported for their permanent geological storage to a facility for which a permit is in force in accordance with [the CCS Directive] are not subject to the allowance surrender obligations.

Nevertheless, and contrary to the submissions of the Commission, that does not mean that the EU legislature considered that operators are exempt from the obligation to surrender only in the sole instance of permanent geological storage.

By contrast to the last paragraph of Article 49(1) of Regulation No 601/2012 [MRR phase 3 unamended], which provides that for any other transfer of CO_2 no subtraction of CO_2 from the installation's emissions is to be allowed, Article 12(3a) of [the ETS Directive] contains no similar rule.

The latter provision, which refers only to a particular situation and is intended to encourage the storage of greenhouse gases, was not intended to, and did not, amend the definition of 'emissions' within the meaning of Article 3 of [the ETS Directive], or even, by implication, the scope of that Directive as established in Article 2(1) thereof."[286]

The reasoning of the Court and the submissions of the Commission regarding Article 12 nr. 3a divulge a notable disparity in their perceptions of the ETS.

The Court emphasises the economic logic of the ETS and the fundamental obligation set forth by Article 12 nr. 3: 'it is therefore crucial, for the correct operation of the scheme established by [the ETS Directive], for those emissions to be identified which must be taken into account by operators in that regard'.[287] This is essential to ensure 'that the reductions of greenhouse gas emissions required to achieve a predetermined environmental outcome take place at the lowest cost', which is the main objective of the ETS as set forth by ETS Directive Article 1.[288] This conception suggests that the Court puts decisive emphasis on the role of the obliga-

[286] The reasoning of the last paragraph is notable in relation to the question prompted by an antithetical interpretation of Article 12 nr. 3a discussed above: would CO_2 produced within the ETS and stored in a storage site without a storage permit instigate an obligation to surrender allowances? The Courts reasoning seems to suggest that the answer to that question is no. The problem with that conclusion is that it would deprive Article 12 nr. 3a of its aim to ensure geological storage in compliance with the CCS Directive. However, as this was not the question before the Court one cannot rule out the possibility that it would reason differently if presented with this question outright.

[287] Case C-460/15 *Schaefer Kalk*, para. 31.

[288] Ibid., para. 29. The Court's analysis of the concept of 'emissions' received approval for its logic and coherence by the one legal article on this case that I have unearthed, see Siwior and Bukowska (2018), p. 26. That article was published before the amendments.

tion in Article 12 nr. 3: where the conditions that instigate that obligation do not exist, then there is a freedom from that obligation, a "right" to not surrender allowances.[289]

The Commission's perspective is, on the other hand, on the implementation of these fundamental ideas and objectives. Tasked with the implementation of the ETS and ensuring the environmental integrity of the system, the Commission understandably emphasises the need to restrict transfer to ensure liability for all release of CO_2 into the atmosphere that is originally produced within the scope of the ETS. The Commission's perspective on the role of Article 12 nr. 3a suggest that it considers the ETS as a closed ecosystem out of which no CO_2 should escape, and that this is a legitimate objective to pursue at the implementing level, regardless of whether that implies liability for some CO_2 that is never released into the atmosphere. The Commission thus implements the ETS Directive with emphasis on the risk of leakage associated with the transfer of captured CO_2.

The advantage of the Commission's perspective is that it enables a clear-cut manner in which to ensure the environmental integrity of all CO_2 produced within the scope of the ETS. It also aligns with some of the discourse within the literature that refers to how Article 12 nr. 3a defines what 'counts' as emissions in terms of geologically stored CO_2.[290] The disadvantage of that strategy is that, without detailed regulation for all the types legitimate transfers of CO_2, it undermines the incentive set forth by the market mechanism to find optimal ways to contain and use CO_2 that entail emission reductions.

The clear logic and advantage of the Court's reasoning is of course the idea that only emissions should incur a cost. The problem is, however, that the Court does not properly address the implementation of that logic and the problem of CO_2 transfers that are not meant to result in leakages, but where there is a *risk* for leakage.[291]

In relation to the specific case of CO_2 transferred for the production of PCC, the Court evaded these important nuances by stating that '[i]t appears from the material before the Court, which has not been disputed, that the CO_2 used for the production of PCC is chemically bound in

[289] This discourse aligns with the analytical framework of 'rights' proposed by Wesley Newcomb Hohfeldt, see Hohfeldt (1913-1914), see also the recent discussion on the nuances of Hohfeldt's analytical framework presented by Wibye (2018), Lindberg (2020)

[290] 'The idea is that every tonne of geologically stored CO_2 will count as not having been emitted under the ETS,' see Woerdman *et al* (2015), p. 187.

[291] The German Environmental Authority comments on this issue and issued a report on the potential and problems associated with CCU in terms of emission reductions under the ETS, see German Environment Agency (2019).

that stable product'.[292] With this pronouncement, it inferred logically that not allowing for transfer of excess CO_2 would contradict the fundamental incentive mechanism of the ETS.[293]

However, the risk of leakage was, in fact, contested between the parties. The issue was that those submissions was not brought before the national courts and could therefore not be considered as part of the preliminary ruling.[294] The Advocate General (AG) Opinion elaborates on this point as follows:[295]

> "It is therefore not for this Court to assess whether part of the carbon dioxide transferred from Schaefer Kalk's installation to another installation for producing PCC was (or might plausibly be) lost during transport or was indeed released into the atmosphere as a result of that production. In any event, it is common ground that at least the major part of the carbon dioxide used in the chemical process for producing PCC is chemically bound to that product. It is against that background that I shall address the questions referred. It will be for the referring court, where appropriate, to carry out the necessary verifications of fact."

This statement presents a problem with the interpretation of the Court: Does the Court's conclusion encompass transfer of CO_2 where there is no risk of leakage, or transfer of CO_2 where at least the 'major part' will never be emitted?

As the Court states in its ruling 'that the CO_2 used for the production of PCC is chemically bound in that stable product', it appears that the Court refrained from commenting on the situation where transferred CO_2 poses a risk for leakage. The Court does, however, indirectly comment on the risk of leakage in the final paragraphs of the ruling. After the Court stated that the Commission had expanded the scope of 'emissions' by adopting the contested provisions, it considered whether those provisions were necessary in order to prevent circumvention of the obligation to surrender allowances for actual emissions.

To this consideration the Court stated in paragraphs 43-44 that:

> "Moreover, it does not appear, in the first place, that the guarantees taken as a whole arising, on the one hand, from the monitoring and reporting scheme provided for in

[292] Case C-460/15 Schaefer Kalk para. 38.

[293] Case C-460/15 Schaefer Kalk para. 41.

[294] Advocate General Opinion to Case-460/15 Schaefer Kalk para 32, citing settled case law on TFEU Article 267 regarding the procedure for reviewing requests for preliminary hearings.

[295] Advocate General Opinion to Case-460/15, para. 32.

> [ETS Directive], and from the provisions of Regulation No 601/2012 [MRR phase 3] other than those at issue in the main proceedings, and arising, on the other, from the powers of review and verification conferred on the competent authorities of the Member States [...] would not be sufficient to avoid the risk of circumventing the emissions allowance scheme upon the transfer of greenhouse gases to an installation, such as that where the PCC is produced, not subject to that scheme.
>
> Against that background, although the second sentence of Article 49(1) of Regulation No 601/2012 [MRR phase 3] and point 10(B) of Annex IV to that regulation ensure that the CO_2 transferred to an installation, such as that where the PCC is produced, whether or not released into the atmosphere, is always regarded as an emission into the atmosphere, such a presumption, in addition to prejudicing the coherency of the scheme put in place as regards the objective of [ETS Directive], goes beyond what is necessary for attaining that objective."

The general reference to the 'guarantees taken as a whole' arising from the monitoring, reporting and verification and inspection regime, appears to indicate that ensuring compliance with the obligation to surrender allowances is important, but that the Commission cannot impose rules that risks imposing an obligation to surrender allowances for GHGs that are never released into the atmosphere.

On the basis of the logic of Schafer Kalk it appears that the ETS Directive requires an implementing framework that facilitates CO_2 transfers for all emission reduction purposes. Considering the issues still posed to the use of mobile CO_2 transport in a CCS process, and other uses of CO_2 that may lead to emission reductions, it seems that the Commission still struggles to find that balance within the rules on CO_2 transfers in MRR Article 49.

3.3.5 The implications and limitations of *Schaefer Kalk* for CO_2 transfers to mobile transport modalities

This section summarises the implications of Schaefer Kalk for the interpretation of the current transfer rules and its apparent restrictions on transfer of CO_2 to a mobile transport modality.

Article 49 is seems, *prima facie*, to imply that transfer options listed are exhaustive, as suggested in the prior discussions of that Article. The revision of Article 49, in the aftermath of *Schaefer Kalk*, renders that conclusion less certain.

In recital 17 of the preamble to the regulation that revised Article 49, the Commission solely comments on the need to account for the production of PCC specifically. That recital does not seem to indicate any ambition to facilitate other transfers than the ones now explicitly listed in Article 49.[296] However, rights and obligations may not be derived from the recitals of a preamble only. The possibility for other transfers than the ones explicitly listed must therefore be determined by interpreting the revised version of Article 49 in light of the boundaries set by the ETS Directive.[297]

The amendment of Article 49 nr. 1 in 2018 consisted of removing the second subparagraph of Article 49, which previously stated the following:[298]

> "For any other transfer of CO_2 out of the installation, no subtraction of CO_2 from the installation's emissions shall be allowed." [299]

In its place, the following was added:

> "(b) transferred out of the installation and used to produce precipitated calcium carbonate, in which the used CO_2 is chemically bound." [300]

Merely including the transfer option in b) would likely have sufficed to account for the specific conclusion in Scahefer Kalk, which stated that the contested provisions were only invalid in so far as they restricted CO_2 transfers for the production of PCC.[301]

By not only including Article 49 nr. 1(b), but also removing the explicit provision which restricted any other transfer, the Commission appears to acknowledge the Courts reasoning in so far as restricting CO_2 transfers that do not lead to emissions would be incompatible with the powers conferred. Particularly in light of the recent curtailment of those powers to the sole implementation of the ETS Directive, see section 2.3.3 above.

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[296] Recital 17 to Commission Implementing Regulation (EU) 2018/2066.

[297] See for example this stated in Case 345/13 *Karen Millen Fashions* para 31: "…it should be borne in mind that the preamble to a Community act has no binding legal force and cannot be relied on either as a ground for derogating from the actual provisions of the act in question or for interpreting those provisions in a manner clearly contrary to their wording…"

[298] Commission Implementing Regulation (EU) 2018/2066 Article 76(3) amending Regulation (EU) No 601/2012 Article 49.

[299] Commission regulation (EU) No 601/2012 Article 49 unamended.

[300] In addition to this removal, the fourth subparagraph of point 10.B, specifically stating that transferred CO_2 to a PCC installation should count as emissions on the hand of the transferring lime installation, was also removed from the Annex IV.

[301] Case C-460/15 *Schaefer Kalk* para. 49.

These considerations suggest that the list of transfer options enabled by Article 49 is no longer necessarily limited to the explicit options in nr. 1 (a)-(b).

This conclusion seems encompassed by the procedural rules set forth by Article 49 nr. 2. That provision sets forth how a transfer under Article 49 should be accounted for the annual emission reports by holding that (emphasis added):

> "In its annual emissions report, the operator of the transferring installation shall provide the receiving installation's installation identification code recognised in accordance with the acts adopted pursuant to Article 19(3) of [the ETS Directive], if the receiving installation is covered by that Directive. **In all other cases, the operator of the transferring installation shall provide the name, address and contact information of a contact person for the receiving installation.**
>
> The first subparagraph shall also apply to the receiving installation with respect to the transferring installation's 'installation identification' code."

The act referred to in Article 19(3) of the ETS Directive is the regulation that establishes the Union Registry for the carbon market.[302] The purpose of the Union Registry is to ensure the accurate accounting of transactions of emission allowances under the emissions trading scheme.[303] However, the Union Registry also records 'annual verified CO_2-emissions from installations and aircraft operators.'[304]

The second sentence of Article 49 nr. 2 states that CO_2 may be transferred to installations that *do not* retain a unique identifier in the Union Registry. This part of Article 49 thus facilitates transfer of CO_2 'out' of the scope of the ETS, as defined by ETS Directive Annex I. The purpose of including this option could simply be to account for the transfer now possible through option b), as the production of PCC is not subject to the scope of the ETS. However, as the prohibition in the second subparagraph is now removed, and the technical accounting for transfer out of the scope of the ETS in Article 49 nr. 2 is not specified to solely be a facility for the production of PCC, then there is a plausible case to be made for how the list of destinations in Article 49 nr. 1 is not exhaustive.

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[302] Commission Regulation (EU) No 601/2012 Article 49(2) as amended, referring to Article 19(3) of the Directive 2003/87/EC as amended that provides the basis of competence for the regulation establishing Union Registry, the Commission Regulation (EU) No 389/2013.
[303] Recital 1 to Commission Regulation (EU) No 389/2013
[304] European Commission (n.d.*Union Registry*)

It thus seems that Article 49 is not necessarily limited to the transfer options listed in (a)-(b). However, possible transfers 'out' of the scope of responsibility of the ETS must be reviewed in light of how the directive-specific concept of emissions encompasses the release of GHGs at a later point in time and at another location than where it was produced. This seems to imply that the current transfer rules facilitate CO_2 transfers 'out' of the ETS scope of liability in terms of transfers with *no* risk of leakage. It would contradict the integral objective of the ETS Directive, and the definition of 'emissions', to allow for any transfer of CO_2 that would undermine the environmental integrity of the market.

CO_2 transfers associated with no risk of leakage may encompass the situations where the CO_2 is chemically bound and stable in a certain type of product produced. Although this seems contested, at least in relation to the production of PCC, as mentioned in relation to the proceedings in Schaefer Kalk.

In terms of transferring captured CO_2 to a mobile transport modality, however, it is apparent that the current state of technology does not guarantee that there will be no leakage emissions during transport. It must consequently be concluded that the current transfer rules do not allow for transfer of CO_2 out of the scope of the ETS to a mobile transport modality, as there would be no account of the leakage onboard.

However, it seems equally clear that it is not within the power of the Commission to adopt a rule that considers *all* CO_2 transferred to a mobile transport modality on its way to permanent storage in a facility for which a CCS Directive permit is in force as 'emissions' at the hand of the transferring operator.

This leaves the current wording of Article 49 insufficient to facilitate the transfers of CO_2 apparently sanctioned at the directive-level, both in terms of including the forthcoming CCS cluster projects that rely on mobile transport modalities and in terms of transfers of CO_2 for uses that avoid emissions. It falls outside the scope of this thesis to analyse problems and solutions associated with CCU-transfers. I will, however, revisit the implications of the considerations in this thesis for CO_2 transfers for CCU in the final chapter.

3.4 Findings and implications

This chapter has considered whether the economic incentive set forth by Article 12 nr. 3a is available for the CCS projects that employ mobile CO_2 transport. The analysis demonstrates how the emphasis on pipeline transport, and ensuing issues for mobile CO_2 transport, arise from the Commission's implementation of the economic incentive set forth at the directive-

level. The wording of the implementing transfer rules in MRR Article 49 appear to suggest that CO_2 transferred to a mobile transport operator will constitute liable emissions at the hand of the transferring operator.

It is a major challenge for the business case of the forthcoming CCS cluster projects that a literal interpretation of MRR Article 49 only facilitates CO_2 transfers to a pipeline operator. In terms of the Norwegian full-scale project, for example, the business model relies on the ability for Norcem, operating the cement production facility and the capturing installation, to transfer CO_2 to the ship provided by the Northern Lights transport and storage project, operated by Equinor. The business model consequently necessitates a transfer of responsibility from the capturing operator to the CO_2 shipping segment.[305] It is similarly consequential for the Dutch Porthos project, as that project may be able to expand to additional capturing units if mobile CO_2 transport is viable under the ETS.

It comes across as a paradox that the only current CCS projects that the transfer rules enable are the ones that capture CO_2 from an activity that is not subject to the scope of the ETS, namely the CCS projects at Sleipner and Snøhvit. These two projects are commercially viable due to the unique Norwegian CO_2 tax, as explained in chapter 1.[306]

The analysis in this chapter further demonstrated how the current transfer rules are not only problematic in light of the objective to promote CCS, but also how the literal interpretation of these rules imply content beyond that which the Commission is empowered to adopt. The reasoning in *Schaefer Kalk* showed how the Commission is not empowered to adopt rules that create an irrefutable presumption that *all* CO_2 transferred out of the scope of the ETS constitutes liable 'emissions'.

This seems to suggest that an amendment is necessary, though this may take time and is therefore only a long-term solution. Another alternative is the opt-in of mobile CO_2 transport through the inclusion mechanism in ETS Directive Article 24. However, as briefly introduced in chapter 2, this is problematic for several reasons. In terms of practicalities, it is problematic that the mechanism is primarily aimed at inclusion within a single member state, and that it takes time to receive approval from the Commission. The time aspect is problematic in light of the forthcoming investment decisions where there is a short window of opportunity. In terms of legislative design, it is clear that the opt-in would not obtain the harmonised application of legislation on CCS that the current rules are intended to facilitate. The analyses in this

[305] *CCSNorway (2020a).*

[306] Sleipner Vest (2014/2020), Snøhvit/Hammerfest LNG (2014/2020). These projects are only subject to *liability* for emissions for the CCS activities performed, as listen in Directive 2003/87/EC as amended.

chapter demonstrates an additional problem: yielding to the opt-in option essentially accepts that there is no manner in which the current transfer rules can be interpreted to adhere to the hierarchy of norms within the ETS.

The next chapter proposes another solution to the issues identified in this chapter. By applying a teleological interpretation of the relevant provisions set forth it is possible to include mobile CO_2 transport within the current ETS scope of liability. This interpretation implies that the economic incentive for CCS under the ETS is readily available for the forthcoming projects that rely on mobile CO_2 transport connections.

4 Accommodating Mobile CO_2 Transport Within the Current ETS Legal Framework

4.1 Introduction

When the ETS Directive was amended to include CCS, it was an explicit objective that the incentive mechanism should aim to promote a broad range of CCS technologies.[307] Despite this clear intention, it appears from the analysis in chapter 3 that the implementing CO_2 transfer rules do not appear to support CCS processes that employ mobile CO_2 transport. This seems to unintentionally inhibit the business case for CCS in Europe as envisaged by the forthcoming CCS cluster projects.

The key problem of the current framework is that it does not include mobile CO_2 transport within the ETS scope of liability. This problem stems from the way in which the CCS process was introduced into a system centred on emissions from separate industrial installations, see section 2.4 above. The ETS was not designed to account for emissions associated with an integrated emission reduction process. This means that there are no means of monitoring leakage from the mobile transport phase, as the only transport activity currently included under the ETS is transport by pipelines.

As demonstrated in Chapter 3, a literal interpretation of the current framework raises several issues, suggesting that an amendment is necessary to accommodate CCS cluster projects employing mobile transport. In this chapter, however, a teleological interpretation is presented which facilitates mobile CO_2 transport within the current legal framework. In this interpretation the mobile CO_2 transport phase is considered as an integrated part of either one of the CCS installations it connects. This is possible through a broad interpretation of the directive-specific definition of 'installation', in light of its legislative context and pursuant to the ETS Directive's objectives.[308]

The proposed interpretation incentivises emission reductions and is consistent with the scope of the obligations to surrender emission allowances for actual emissions. It also ensures the integrity of the system, as any emissions during the transportation phase would be accounted for by the designated ETS operator of the relevant installation. Through this interpretative solution to the issues raised in Chapter 3, the economic incentive set forth for CCS under the

[307] COM(2008) 16 final, p. 52.

[308] Directive 2003/87/EC as amended Article 3(f).

ETS may already be considered available for the planned CCS cluster projects which employ mobile transport modalities.

This chapter begins with interpreting the scope of an ETS installation as provided for under the ETS legal framework (4.2) and subsequently applies that definition to the mobile transport phase in a CCS process (4.3). The suggested interpretation prompts the related question of liability for the operative emissions of the mobile transport modality, which is addressed separately in (4.4).

4.2 The scope of an 'installation'

4.2.1 The function of the term 'installation' within the ETS scope of liability

The ETS facilitates liability for emissions under the 'cap' of the market by ensuring that no activity subject to its scope may be performed without obtaining an emission permit.[309] That emission permit encompasses the emissions from the *installation* that performs the liable activity included under ETS Directive Annex I.[310] It is therefore the scope of the specific 'installation' that determines what emission sources the operator of that installation must surrender allowances for, as required by ETS Directive Article 12 nr. 3.

One emission permit may cover 'one or more installations on the same site operated by the same operator'.[311] As mentioned in chapter 2, the term 'site' is not defined.[312] This enables the issuance of emission permits to one operator covering a large geographical area. The main concern of the ETS Directive is that there is a designated operator for all emissions occurring within the scope of the ETS, not how many installations that operator is responsible for. The operator of an installation must, however, retain either practical or economic control over the installations in question, as required by Article 3(e) ETS Directive.[313] This ensures that the designated entity is able to comply with the numerous obligations set forth by the ETS legal framework.

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[309] Directive 2003/87/EC as amended, Article 4.

[310] Ibid., Article 6 (1).

[311] Ibid.

[312] European Commission (2010), p. 4 states that no guidance is provided to allow for flexible transpositions.

[313] Directive 2003/87EC as amended, Article 3(f): 'operator' means any person who operates or controls an installation or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the installation has been delegated;"

The main question for the following three sections is what constitutes the general scope of an ETS installation. The natural starting point for this analysis is the definition of the term 'installation' in the context of the ETS Directive (4.2.2). Thereafter the analysis proceeds to the general and sector-specific monitoring rules set forth by MRR Annex IV, which aim to facilitate harmonised transposition of the installation-definition across the different industries (4.2.3). The final section discusses the case C-158/15 *EPZ*, which provides guidance on what may constitute 'directly associated activities' within the installation definition (4.2.4).

4.2.2 The definition of an 'installation' – ETS Directive Article 3(e)

ETS Directive Article 3(e) defines 'installation' as (emphases added):

> "a **stationary technical unit** where one or more activities listed in Annex I are carried out **and** any **other directly associated activities** which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution;"

By the inclusion of the word 'and', the provision indicates two main elements of what comprises an ETS installation. The first part is the 'stationary technical unit' that carries out an activity listed in Annex I of the ETS Directive. Stationary does not mean it must be permanently stationary, but that when it is stationary it would fall under the scope of the ETS if it performs an activity listed in Annex I of the ETS Directive.[314] An example would be a mobile platform performing an Annex I activity when stationary.[315]

The second part of what comprises an installation is 'any directly associated activity' that have a 'technical connection with the activities carried out on that site' and 'which could have an effect on emissions and pollution'. It is clear from the syntax of Article 3(e) that the term 'stationary' applies to the *stationary technical unit*, not the associated activities. The 'directly associated activities' themselves need not be listed in Annex 1 of the ETS Directive.[316]

The definition of 'directly associated activity' within Article 3(e) does not specify whether the associated activity must be co-located with the stationary technical unit. The wording seems

[314] European Commission (2010), p. 6.

[315] I.e connecting to offshore industry and when stationary combustion of fuels with a total rated thermal input exceeding 20 MW, see Directive 2003/87/EC as amended, Annex I.

[316] Underscored in Advocate General Opinion in the Case C-158/15, *EPZ*. para 29: where she holds that 'it follows from the very definition of 'installation' that other activities are also to be attributed to the installation if they are directly associated with the main activity…'

to indicate that this is not required, because it merely requires a 'technical connection' between the associated activity and the Annex I activities 'carried out on that site' of the main technical unit. This implies that the boundaries of an installation could encompass a considerable geographical scope, depending on the associated activities in question, and that an operator may not circumvent liability merely by distancing the associated activities from the main technical unit.

The only additional guidance within the ETS Directive on the scope of an installation is found in Annex I nr. 5, which holds that '[w]hen the capacity threshold of any activity in this Annex is found to be exceeded in an installation, all units in which fuels are combusted, [...] shall be included in the greenhouse gas emission permit'. By including all ancillary combustion units to the main ETS activity it seems that the scope set for the installation in question should be comprehensive. The Commission guiding document on Annex I activities underscores this point by holding that '[t]he installation boundaries should be set as broad as possible'.[317]

The inclusion of 'directly associated activities' within the scope of liability of an installation aligns with the logic of the ETS which seeks to put a 'carbon price' on the activities listed in Annex I.[318] The carbon price on the Annex I activities must include the associated activity that is necessary for the functioning of the main technical unit. If this ancillary activity and its emissions were excluded, then there would not be a 'true' carbon price on the Annex I activity. The directive-specific definition thereby contributes ensuring the environmental integrity and effectiveness of the ETS by imposing liability for all emissions directly associated with Annex I activities. A prime objective of the installation-definition is thereby 'to take full account of the relevant environmental effects [it] regulate[s]'.[319] The interpretation of what encompasses an installation thus implies that the elements of the installation-definition cannot be interpreted conservatively as that risks exclusion of relevant emission sources from the ETS.[320]

[317] European Commission (2010)., p. 7.
[318] Similarly emphasised in Advocate General opinion to Case C-158/15, *EPZ*, paras 38-39, specifically in para. 38: 'This view is based on the idea that the market mechanism for trading in emissions allowances should ensure that operators of installations minimise as far as possible the CO_2 emissions arising in the course of their activities'.
[319] Advocate General opinion to Case C-158/15, *EPZ*, para. 35.
[320] Ibid., similarly underscored in para. 28.

4.2.3 The scope of an 'installation' by reference to the monitoring boundaries

Considering the hierarchy of norms within the ETS legal framework, it is the provisions of the Directive that determine the rights and obligations of any operator subject to its scheme, including the scope of an installation. However, as explained above, there is a need for general monitoring boundaries for different industrial activities in order to promote harmonised transposition and promote the environmental integrity and effectiveness of the ETS.

The regulation on the monitoring and reporting of emissions thereby provides additional guidance and rules on how to set the monitoring boundaries of an installation with respect to the various activities listed in Annex I. The additional rules set forth in the MRR may not, however, amend more than 'non-essential elements' of the ETS Directive throughout the third trading phase, and, as of the fourth trading phase, the Commission may not amend the ETS Directive at all, pursuant to the boundaries set for forthcoming implementing act, as explained in section 2.3.3 above. The monitoring boundaries set forth within the MRR must, in other words, be interpreted within the boundaries set by the installation-definition and the description of the activities in Annex I.

The Commission provides both general and specific rules and guidance as to how the operator of an installation should set its monitoring boundaries. The sector-specific monitoring boundaries in MRR Annex IV provide the specific rules that each type of activity is obligated to observe pursuant to Article 20 nr. 2. The general rules and guidance supplement those sector-specific minimum standards.[321]

Most of the rules in the MRR, as well as the Commission guiding documents that accompany the ETS legal framework, underscores the importance of including all relevant emission sources associated with the Annex I activities carried out on an installation. This is evidenced, *inter alia*, by the first paragraph of Article 20(1) which holds that (emphasis added):

> "1. An operator shall define the monitoring boundaries for each installation.
> Within those boundaries, the operator **shall include all relevant greenhouse gas emissions** from all emission sources and source streams belonging to activities carried out at the installation and listed in Annex I to [the ETS Directive], as well as from activities and greenhouse gases included by a Member State pursuant to Article 24 of [the ETS Directive]."

[321] Commission Regulation No 601/2012 as amended Article 20(2).

Article 20(1) aligns with and underscores the provisions and purpose of the ETS Directive as it relates to the concept of an 'installation' and the objective of retaining the environmental integrity of the ETS. This objective is further ensured by the principle of 'completeness' set forth by Article 5 of the MRR, which holds that (emphasis added):

> "Monitoring and reporting shall **be complete and cover all process and combustion emissions from all emission sources and source streams belonging to activities listed in Annex I to** [the ETS Directive] and other relevant activities included pursuant to Article 24 of that Directive, and of all greenhouse gases specified in relation to those activities […]"

The principle of completeness thereby underscores how directly associated activities constitutes an obligatory part of the scope of liability of an installation. The application of the installation definition to a concrete Annex I activity was considered by the CJEU in case C-158/15 (*EPZ*). That case is considered in the following as it provides some general guidance as to how the 'directly associated activities' part of the installation definition should be interpreted.

4.2.4 Case-158/15 EPZ on 'directly associated activities'

The central case on the interpretation of 'directly associated activities' pursuant to Article 3(e) of the ETS Directive is Case C-158/15 ('EPZ').[322] The EPZ concerned whether

> "[…] a fuel storage site of a coal-fired power plant [...] constitutes an 'installation' within the meaning of Article 3(e) of [the ETS Directive], taking into account in particular the fact that it is situated approximately 800 metres from that power plant, which is separated from it by a public road, and that the fuel is transported from that site to the power plant by means of a conveyor belt which crosses that public road."[323]

The coal storage was in itself not an activity subject to Annex I of the ETS because it did not reach the threshold of 20 MW required for the activity, specified as '[c]ombustion of fuels in installations with a total rated thermal input exceeding 20 MW]'.[324] The potential emissions from the storage facility, in the form of self-heating of the coal, would therefore only be sub-

[322] Referred to, inter alia, by C-457/15 *Vattenfall para.34.* However, the case does not consider the directly associated activity part of the definition, merely the EPZ interpretative guidance on 'installation' more generally.
[323] Case C-158/15, *EPZ,* para 24.
[324] Directive 2003/87/EC Annex I, first category. Case C-158/15, *EPZ*, para 20.

ject to the scope of responsibility of the operator of the power plant if that coal storage was considered a 'directly associated activity' to the power plant as the main technical unit.[325]

With regard to the definition of 'directly associated activities', it was clear that the coal storage could have 'an effect on emissions' because of the self-heating.[326] Thus, the question was whether it otherwise fulfilled the prerequisites for being a 'directly associated activity' within the meaning of ETS Directive Article 3(e).

In its characteristically succinct manner, the Court reasoned as follows (emphases added):[327]

> "[...] that **the fact that the coal is essential to the functioning of the power plant is in itself sufficient for the view to be taken that the storage is directly associated with that plant's activity.** That direct association is, moreover, evidenced by the existence of a technical connection between the two activities. As the Advocate General proposes in point 30 of her Opinion, such a connection should be assumed if the relevant activity is integrated into the same technical process as the power plant's combustion activity.
>
> […] Such a connection exists in any event, for a coal storage site such as that at issue in the main proceedings, by reason of the very fact of the practical organisation of that site and the presence of a conveyor belt located between the coal park and the power plant.
>
> [...] **The other facts mentioned by the referring court, namely that the storage site and the power plant are situated approximately 800 metres from each other** and are separated, moreover, by a public road, are of no relevance in that regard."

On the basis of this reasoning, the Court concluded that the storage facility constituted a directly associated activity and thus was subject to the scope of the power plant installation pursuant to Article 3(e) of the ETS Directive.[328]

The particularly interesting feature of the Court's reasoning is how it emphasises that the coal 'is essential to the functioning' of the power plant and therefore is 'in itself sufficient' for the view to be taken that the storage is directly associated with that plant's activity.[329] This seems to indicate a holistic approach to the installation-definition, where an associated activity may

[325] Case C-158/15, *EPZ*, para 29.
[326] Case C-158/15, *EPZ*, para 33.
[327] Case C-158/15, *EPZ*, para. 30-32.
[328] Ibid., para. 34.
[329] Ibid., para. 30.

exist either due to its role as an *essential function* to the main technical unit, *or* it may be evidenced by a technical connection. The latter 'should be assumed if the relevant activity is integrated into the same technical process as the power plant's combustion activity'.[330]

A directly associated activity will often retain both of these characteristics, as was the case for the coal storage facility connected to the power plant by the conveyor belt. By emphasising that the essential function of the coal was enough to see the coal storage as an associated activity, the Court appears to signal that an operator should not be able to circumvent liability for an emission source originating from an activity that is essential to the functioning of the main activity; neither by rearranging the site so that the connection does not appear sufficiently 'technical', nor by expanding the distance between the associated activity and main activity. This perspective on the installation-concept supports the objective of the ETS legal framework to incentivise cost-effective emission reductions by setting a carbon price on the Annex I activities that encompass all directly relevant ancillary emission sources.

The question of whether a different organisation of the site might impact the status of the coal storage facility was underscored by the parties to the case. While the Court remains concise in its reasoning regarding the organisation of the storage, the Advocate General offers some illuminating insights as to whether 'if the storage were organised differently, this would potentially rule out its inclusion as part of the power plant installation'.[331]

In that regard, the Advocate General points out that the definition of a 'directly associated activity' may not depend on the commercial organisation, such as outsourcing of the activities involved,[332] nor the choice of 'technical means to connect the different parts of the installation'.[333] That is, as long as those parts of the installation are 'connected within the same technical process'. On this basis, she notes with respect to the conveyor belt that 'other more flexible connections, such as lorries, would also be conceivable'.[334] This is possible because 'the term 'technical unit' is not defined within the directive and can therefore be interpreted with greater flexibility and primarily with reference to what activities are integrated in the same technical process that performs the Annex I activity.[335]

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[330] Ibid.

[331] Advocate General opinion to Case C-158/15, *EPZ*, para. 44-51.

[332] Case C-158/15, *EPZ* para 45. This also seems to imply that all directly associated activities must be operated by the same operator as the main technical unit, as discussed in 4.3.2 below, though the *EPZ* does not address this directly.

[333] Advocate General opinion to Case C-158/15, *EPZ*, para. 48.

[334] Ibid.

[335] Ibid., para. 26-27.

This reasoning aligns with the idea that an operator should not be able to circumvent responsibility by choosing a mobile rather than a stationary technical connection. The arguments made by the Court and the Advocate General demonstrates how the installation-definition seeks to avoid arbitrary exclusion of relevant emission sources.

While the Court considers the distance between the storage facility and the coal power plant of 'no relevance', the Advocate General applied a more nuanced approach. She noted that in assessing the integration of an associated activity in the main technical process, the 'distance […] cannot be more than indicative'. However, she added that '[t]he further they are away from each other, the more unlikely it is that there is a direct technical connection'. This latter notion does not seem substantiated by the Courts reasoning, which emphasises the question of whether the potentially associated activity is essential for the functioning of the main activity, more than the specific distance involved. However, it could be that the question of geographic scope would be subject to greater scrutiny if the storage facility was placed at considerably more remote location and that was the facts presented to the court.

Both the reasoning of the Court and the reasoning of the Advocate General are firmly rooted in the objective of the ETS to put a carbon price on the activities subject to its scope, and that the scope of an installation must take this objective into account. This conception is well illustrated by how the Advocate General refutes *EPZ*'s submission that it should not be responsible for the self-heating emission because it could not prevent those emissions. The Advocate General Kokott states decisively in that regard that:

> "Even if one takes it for granted that the operator of a coal storage facility really cannot avoid self-heating, EPZ nevertheless fails to recognise that included in the market mechanism is a measure whereby certain activities will in some circumstances cease completely if they are no longer competitive due to the cost of their unavoidable emissions. [...] The objectives of [ETS Directive] therefore similarly confirm the inclusion of the coal storage facility in the power plant installation."

With these considerations in mind, the question for the following section is how this applies to the CCS projects that employ mobile CO_2 transport

4.3 The scope of CCS installations applied to mobile CO_2 transport

4.3.1 Mobile CO_2 transport as a 'directly associated activity' within a CCS process

The question for this section is whether a mobile CO_2 transport segment may constitute 'a directly associated activity' to a 'stationary technical unit' that carries out either the capturing activity, the transport by pipelines or the storage activity, as listed in Article 49 nr. 1(a) (i)-(iii), and listed in ETS Directive Annex I.

Although the mobile transport segment could potentially connect the capturing activity directly to the injection point of the storage facility, it is primarily envisaged as a flexible connection between the capturing points and the pipeline network in the forthcoming cluster projects.[336]

In terms of the Norwegian full-scale project, the question becomes whether the shipping segment could be considered a directly associated activity to either the capturing activity at the cement production facility or to the pipeline network. If the answer is yes, then the transfer rules in Article 49 would not pose a problem to employing mobile CO_2 transport, as the CO_2 in transit would be accounted for by an ETS operator at all times.

The analysis of the directive-specific definition of 'installation' demonstrated how the elements of the definition cannot be interpreted restrictively as one risks excluding relevant emission sources from the scope of the ETS. The reasoning of the Court in the case *EPZ* demonstrated how the question of what activities constitutes part of an installation must take into account the function and integration of that activity for the main Annex I activity.

The scope of the installations that perform the CCS activities listed in Annex I and MRR Article 49 must be determined by reference to the specific Annex I activities they perform, as the above analyses relay.

The liable CCS activities are described in Annex I as follows (emphases added):

> "Capture of greenhouse gases from installations covered by this Directive **for the purpose of transport and geological storage in a storage site permitted under [the CCS Directive]**
>
> "Transport of greenhouse gases by pipelines **for geological storage in a storage site permitted under [the CCS Directive]"**

[336] See chapter 1.

> **"Geological storage** of greenhouse gases in a storage site permitted under [the CCS Directive]"

These three activities all pursue the same purpose within the same process: geological storage of captured CO_2 in a storage site permitted under the CCS Directive, as indicated by the emphases. Prior to the explicit inclusion of CCS under the ETS the available option was to include a whole CCS process under the scope of the same installation.[337] A central aim of including the phases of CCS as separate activities in Annex I was to facilitate commercial operation by different designated entities.[338] Separating the three activities was, in other words, not intended to disjoin the process that begins with the production and capture of CO_2 and ends with geological storage in a storage site with a CCS Directive permit.

The nature and interdependence of the phases of a CCS process provides the backdrop for the question of what may constitute 'directly associated activities' to the main stationary technical units performing these Annex I activities.

The relevance of the reasoning in the case of *EPZ* must be viewed in light of the differences between the practical scenarios of the coal fired power plant and a CCS project employing a mobile transport segment as part of that process. A key difference is that the coal storage facility serves the fuel of the coal fired power plant. It is therefore 'essential' for the functioning of the power plant.[339] CO_2 transport from a capturing facility to, inter alia a pipeline network, does not retain a 'technical connection' with the *individual activity* of capturing CO_2 itself, nor the *individual activity* of transport by pipelines. For many ETS activities this would be enough to say that it is *not* part of that installation pursuant to the definition in Article 3 e). However, the purpose of the different CCS activities listed in Annex I is not limited to 'CO_2 capture' *only*, nor to 'pipeline transport' *only*. The activities of *merely* capturing or transporting CO_2 is, in fact, not subject to the scope of the ETS. The two activities are instead only subject to the scope of the ETS when they facilitate emission reductions by geological storage of captured CO_2.

With these considerations in mind it seems that the activities of the CCS process must be perceived to be part of the same integrated process. A mobile CO_2 transport phase within a CCS project thereby constitutes an *integrated* part of the emission reduction process. It is an activi-

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[337] As explained in sub-chapter 2.4 above.

[338] This is perceived as an explicit objective of the current system see Dixon et al (2009), p. 4449-4450 and the motifs set forth in the Commission impact assessment in sub-chapter 2.4 above.

[339] Case C-158/15, *EPZ* para 30.

ty that enables the captured CO_2 in reaching the ultimate objective of the process: geological storage in a site permitted under the CCS Directive.

Though the mobile transport segment is not essential to the separate technical processes of the CCS activities considered in *isolation*, it is essential to attaining the obligatory purpose of those activities within the specific CCS project. That is true regardless of whether the transport segment is long or short. It still serves an integrated element within a three-part technical process for the permanent storage of CO_2. Applied to the Norwegian full-scale project, this implies that even the protracted shipping segment may be considered a 'directly associated activity' to both the capturing unit and the pipeline network.

It is further evident that a mobile transport activity may have an effect on the emissions of the main Annex I activity, as required by the definition in Article 3(e). Both leakage emissions and operative emissions mean that the transport activity could have an effect on the emissions of the main technical unit, as required in order to consist a 'directly associated activity' pursuant to Article 3(e).

This interpretation does not appear to be in conflict with the sector-specific monitoring boundaries set forth in MRR Annex IV nr. 21-23, which presumes a seamless scope of the CCS process from the capturing installation to the storage facility.

With regard to the capturing installation, the nr. 21 of Annex IV states that:

> "[…] All parts of the installation related to CO_2 capture, intermediate storage, transfer to a CO_2 transport network or to a site for geological storage of CO_2 greenhouse gas emissions shall be included in the greenhouse gas emissions permit and accounted for in the associated monitoring plan. […]"

We here see that 'transfer' to a pipeline network, or a storage site, should be included. The modality of transfer is not given. As the regulation that sets forth the rules for MRR phase 4 specifically defines 'the transport of CO_2 by pipelines for geological storage in a storage site permitted under [the CCS Directive];[340] it seems that the 'transfer' in this sector specific boundary is meant to be over a relatively short distance to the proximate pipeline network or the injection point of storage facility, not represent a major CO_2 transport segment such as 700 km of maritime transport. However, 'transfer' is not defined within these monitoring

[340] Commission Regulation (EU) No 601/2012 as amended Article 3(52), and Commission Implementing Regulation (EU) 2018/2066 Article 3(55).

rules. As a teleological interpretation of the installation-concept to accommodate mobile CO_2-transport seems possible, then 'transfer' may be interpreted likewise.

With regard to the pipeline network, the sector specific monitoring boundaries in Annex IV, nr. 22, does not include an explicit 'transfer'. It only specifies in relation to the other CCS activities that:

> "Each transport network shall have a minimum of one start point and one end point, each connected to other installations carrying out one or more of the activities: capture, transport or geological storage of CO_2."

This statement implies that the scope of each of the installations in Article 49 should be connected, preventing loopholes between the scopes of responsibility of the CCS operators in question. The fact that there is no explicit mention of transfer with respect to the pipeline does not mean that it contradicts an interpretation where a mobile transport segment could constitute part of its installation. This is because that depends on the interpretation of 'installation' in Article 3(e), not the monitoring boundaries suggested by Annex IV of the MRR. The MRR merely implements the ETS Directive. Thus, as long as there is no explicit contradiction between the MRR and the ETS Directive, as was the case in *Schaefer Kalk*, these two instruments should be interpreted to be aligned within their common objective to establish a well-functioning carbon market.

Excluding the mobile CO_2 transport modality from the scope of liability seems to omit a relevant emission source from an integrated CCS process that is otherwise accounted for under the ETS. As there are no sector-specific monitoring requirements for this type of CO_2 transport, it follows that the operators must find a monitoring solution that adheres to the basic principles for monitoring set forth by MRR Article 5-9 as required by MRR Article 4.[341] This is necessary in order to obtain an emission permit for the installation that includes the mobile transport modality, as required by ETS Directive Article 6.

This application of the 'installation'-definition to the interdependent CCS process pursues the objectives of facilitating CCS as an emission reduction process under the ETS while ensuring responsibility for the environmental integrity of that process. The interpretation must necessarily expand the elements of the installation definition in light of how it has been applied to industrial installations previously. This is necessary in order to facilitate the economic incen-

[341] In terms of the mobile transport modalities and any leakage incurred the monitoring could possibly be solved by measuring the CO_2 injected into the ship and the CO_2 injected into the pipeline transport network.

tive for employing CCS provided by ETS Directive Article 12 nr 3a, which does not condition the transport modality used. The interpretation avoids imposing liability for *not* emitted CO_2 and thereby aligns the Commission CO_2 transfer rules with the scope of powers conferred by the ETS Directive to adopt those rules. This consequently aligns the interpretation of MRR Article 49 with the legislative context within the relevant EU secondary law, which represents a key feature of EU legal methodology.[342]

This suggested interpretation raises the related question of whether the operator for the installation that includes the mobile CO_2 transport segment incurs liability for operative emissions, in addition to any emissions from leakage of CO_2 transport onboard. This is considered separately in section 4.4 below. Prior to that analysis I will address two related topics to the proposed interpretation. Firstly, the question of what is required of an entity that seeks to be the designated operator of the installation that includes the mobile CO_2 transport segment (4.3.2) and, secondly, the interpretative solution envisaged by the Norwegian Environmental Agency for the mobile transport segments in the Norwegian full-scale project (4.3.3).

4.3.2 The relation between the scope of an installation and the potential 'operator'

The inclusion of a mobile transport segment under the scope of an installation necessarily expands both the scope and nature of that installation, especially if the transport segment is protracted. This change raises the question of who qualifies to be the designated 'operator' of that installation pursuant to the definition of an operator in ETS Directive Article 3(f).

That definition requires practical or decisive economic control over the installation, as stated previously. The objective is apparently to ensure that the designated operator of the installation retains the necessary control needed to comply with the substantial monitoring, reporting and verification requirements. It thus seems that the transport segment may not be fully outsourced from the installation it is considered part of.

In terms of the Norwegian full-scale project, for example, it seems to align best with the commercial organisation of that project to include the shipping segment under the pipeline network, as Equinor is going to be the main owner/and practical operator of the Northern Lights CO_2 transport and storage venture.[343] To include the 700 km shipping segment under

[342] See generally Riesenhuber (2017), p. 241.

[343] This is what the sources I have been able to obtain suggest. Equinor (2020a), Norwegian Environmental Agency (2020).

the scope of the capturing installation seems to presuppose that Norcem obtains either practical or decisive economic control over that ship.

The relation between the operator and the scope of an installation thus indicates a drawback with the proposed teleological interpretation; although the interpretation allows for the transport to be included under either of the installations it connects, it does not facilitate all types of commercial designs because there may not be a third operator. Facilitating the possibility for different commercial operators was a clear objective for including the three phases of the CCS separately in ETS Directive Annex I.[344]

This demonstrates how the suggested interpretation in this chapter should only serve as a temporary solution. Amendment of the ETS legal framework to explicitly enable mobile CO_2 transport is a preferable solution, as described in chapter 5 below.

4.3.3 The solution envisaged by the Norwegian Environmental Agency

The above suggested interpretation partly aligns with the solution envisaged by the Norwegian Environmental Agency suggested to accommodate the mobile CO_2 transport segments in the forthcoming Norwegian full-scale project. The Agency's suggestion is included in the letter sent to the Commission by to obtain an opinion on how the ETS legal framework applies to the Norwegian full-scale project.[345]

The project is thought to comprise two designated ETS operators, as envisaged by the private parties in collaboration with the Norwegian Environmental Agency. Norcem will be the designated operator for the cement production facility and the capturing activity.[346] The existing emission permit issued to the cement production activity may thus be expanded to include the capturing activity.[347] Equinor is anticipated as the designated operator of the pipeline transport network and the storage activity.[348]

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[344] This is perceived as an explicit objective of the current system and appreciated as a significant difference to the situation prior to the general amendment that included CCS under the ETS, see Dixon et al (2009), p. 4449-4450. As alluded to in chapter 2, the previously available opt-in of CCS under Article 24 only allowed opt-in of a whole CCS process under one installation controlled by one operator.

[345] Norwegian Environmental Agency (2019).

[346] Confirmed by Norwegian Environmental Agency (2020), supported by Norcem (2020a).

[347] Norcem Brevik (2014/2018).

[348] Norwegian Environmental Agency (2020).

The Norwegian Environmental Agency suggests in its letter to the Commission that the emission permit issued to the operator of the capturing installation may encompass one or more mobile transport segments that connect to the pipeline network in order to account for leakage during that transport.[349]

The only flexible connection planned to connect the capturing facility operated by Norcem and the pipeline network operated by Equinor, is the 700 km shipping segment. The connection between the cement production and capturing installations and the shipping is planned as pipelines.[350] That intermediate transfer could, however, be facilitated by trucks in terms of other capturing units, such as will be the case for the planned waste incineration plant.[351]

The idea to include those transport segments under the capturing operator's emission permit comes from the sector-specific monitoring boundaries set forth for the capturing installation. As cited above the MRR Annex IV nr. 21 states that (emphasis added):

> "[…] All parts of the installation related to CO_2 capture, intermediate storage, **transfer** to a CO_2 transport network or to a site for geological storage of CO_2 greenhouse gas emissions shall be included in the greenhouse gas emissions permit and accounted for in the associated monitoring plan. [...]."

My impression is that the Agency does not perceive that the mobile CO_2 transport modality would constitute part of the capturing installation in order for it to be included under the emission permit.[352] The letter consequently does not address the liability for the operative emissions by the ship as they consider any mobile emission source to fall *per se* outside the scope of liability of the ETS Directive.[353]

It is unclear how the Agency arrives at the conclusion that a shipping segment may be included within the monitoring boundaries of an installation without constituting part of that installation. It is similarly unclear how this aligns with the system where the scope of an emission permit adheres to the boundaries of the installations it covers.[354]

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[349] Norwegian Environmental Agency (2019), p. 6.

[350] Norcem (2020a).

[351] Norwegian Environmental Agency (2019), p. 1-2.

[352] Confirmed in a telephone call and a meeting with the Agency spring 2020, Norwegian Environmental Agency (2020).

[353] Norwegian Environmental Agency (2020).

[354] Directive 2003/87/EC Articles 4-6 which facilitates the liability obligation in Article 12 nr. 3.

The letter mentions that including the shipping segment under the scope of the capturing operator would mean that the capturing operator remains liable for leakage associated with a ship it does not control.[355] The Agency suggests that this may be solved by commercial arrangements. There is, however, no discussion regarding whether Norcem may be the designated operator of an installation that encompasses such a protracted shipping segment, without that ship being within the practical economic control of that company, as required by ETS Directive Article 3(f).

Although the Agency's suggestion departs from my analyses on a few points, it is clear that both the Agency and I perceive that *not* accommodating for mobile transport in a CCS process under the ETS is inconsistent with the basic obligation to surrender allowances for actual emissions only.[356]

4.4 Operative emissions from the mobile CO_2 transport

4.4.1 The issues with the general exclusion of emissions from mobile sources

The inclusion of mobile transport under the scope of either of the CCS installations listed in Annex I prompts a related question: is the designated operator liable for the operative emissions of the mobile transport?

The fundamental obligation to 'pay' for emissions in Article 12 nr. 3 states that '[...] the operator of each installation surrenders a number of allowances, that is equal to the total emissions from that installation during the preceding calendar year [...]'. The total emissions from an installation thus depends on the scope of the installation. It seems to follow from this that all emissions from a directly associated activity to an installation performing an Annex I activity falls within the scope of liability defined by Article 12 nr. 3, including operative emissions from the mobile transport modality.

The second sub-paragraph of MRR Article 20 nr. 1, however, includes a peculiar exclusion of what appears to be potentially relevant emissions sources, by holding that:

[355] Norwegian Environmental Agency (2019), p. 6.

[356] Norwegian Environmental Agency (2019), p. 4-5.

> "The operator shall also include emissions from regular operations and abnormal events […] **with the exception of emissions from mobile machinery for transportation purposes.**"[357]

This begs the question: on what basis does the Commission retain the power to exclude the emissions of all 'mobile machinery for transport purposes' from the ambit of the responsibility of an ETS operator? It could be that the Commission interprets the definition of an installation in Article 3(e) to exclude, categorically, *any* type mobile emission source. However, if that was apparent from the definition, there would be no need to exclude that emission source explicitly. And, as noted above, it is clear from the syntax of Article 3(e) that the directly associated activity need not themselves be stationary.

Another argument for excluding emissions from mobile machinery could be if it was both very difficult or impractical to monitor those emissions, and that they represented a negligible source of emissions. However, those characteristics would necessarily depend on the mobile machinery in question, and they therefore appear unfit for substantiating a categorical exclusion of that emission category. The *per se* exclusion of emissions from mobile machinery for transportation purposes seems to lack explicit corroboration within the ETS Directive.

The fundamental obligation in Article 12 nr. 3 of the ETS Directive requires an operator to surrender allowances corresponding to 'the total emissions from that installation'. The concept of an installation is therefore central to the scope of that obligation. It seems, therefore, that an ETS operator should not solely rely on the guidance in MRR Article 20(1) regarding the exclusion of emissions from mobile transport sources, without substantiating it with reference to the definition of an installation in Article 3(e). This is because the Commission's exclusion of that emission source could *potentially* constitute more than merely a non-essential element of the ETS Directive, depending on the nature of the activity and installation in question. The Commission is not empowered to adopt rules with such an implication.

An interpretative solution to this potential problem within the ETS hierarchy of norms would be to consider a mobile emission source a 'directly associated activity' to the main technical unit and interpret MRR Article 20(1) in a manner consistent with the superior norm of the Directive. This would align the MRR with the directive-specific definition and its objective to ensure 'complete' monitoring of all relevant emission sources.

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[357] The exception of mobile machinery is repeated in the Commission guiding documents on the interpretation of what constitutes an installation, and exemplified as 'trucks, forklifts, bulldozers' which has the purpose of being mobile at the moment of performing its tasks', see European Commission (2010)., p. 7 and European Commission (2017)., p. 20.

It could be that the Commission has recently realised the problem of the categorical exclusion in Article 20 nr. 1, because it states in its guiding document on the interpretation of the MRR from 2017 in the chapter on 'completeness', that 'mobile machinery used within the installation are **generally** excluded'.[358] This is a more careful approach than what comes across both in Article 20 nr. 1 and the Commission guiding document on activities in Annex I from 2010. The latter guidance includes a similar categorical exclusion of 'truly mobile sources'.[359]

I stress this point about mobile machinery, and its relation to the scope of an ETS installation, because the guiding documents and rules of the MRR represent important points of reference for the national authorities and private entities subject to the ETS legal framework.[360]

4.4.2 Application to the mobile CO_2 transport phase

The tension between Article 20(1) and the scope of liability at the directive-level becomes particularly clear in terms of the CCS cluster projects. The 700 km shipping segment in the Norwegian full-scale project would entail a substantial emission source if powered by fossil fuels – not necessarily compared to the CO_2 it transports to storage, but compared to the operative emissions of the other CCS activities subject to liability under Annex I. The CCS activities listed in Annex I incur liability for both leakage and operative emissions. This follows implicitly from the scope of liability determined by Article 12 nr. 3, but also expressly from the sector-specific monitoring boundaries set forth in MRR Annex IV nr. 21-23.

Provided that one accepts the inclusion of a mobile transport modality under the scope of a CCS installation, it follows that refraining from imposing liability for the operative emissions of the mobile transport would undermine the environmental integrity and effectiveness of the CCS process sanctioned by the ETS. The latter was a central consideration made prior to the inclusion of CCS under the ETS.[361] Subjecting the operative emissions of the ship to liability would also promote the objective of the ETS to induce cost-effective emission reductions.[362]

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[358] European Commission (2017)., p. 20.

[359] European Commission (2010), p. 7: 'Excluded from the EU ETS is "true" mobile machinery (trucks, forklifts, bulldozers…), i.e. machinery which has the purpose of being mobile at the moment of performing its tasks.'

[360] This is, *inter alia*, evidenced by the emission permits issued by the Norwegian Environmental Agency that refers to these guidance documents in relation to specific monitoring obligations, see inter alia, Sleipner (2014/2020), p. 29.

[361] COM(2008) 18 final, p. 11, 20 and COM(2008) 16 final, p. 50.

[362] Such as electrification of the ship, wholly or partly.

Due to the explicit provision in MRR Article 20(1), however, it seems that there is no clear answer as to whether the current legal framework requires liability for the operative emissions of the mobile transport modality, if included under the scope of an installation. This seems to essentially depend on whether excluding that specific emission source on the basis of MRR Article 20(1) would entail a correct implementation of the ETS Directive with regard to the scope of liability of an installation and the directly associated activities within.

There is, however, a clear intention to put a 'true' carbon price on the CCS process as a whole, by including the all the three separate phases under the Annex I scope of liability. Thus, if a mobile transport modality is interpreted to be a directly associated part of that process, and thus eligible for the economic incentive set forth for employing CCS under the ETS, then the intention to account for all emissions associated with a CCS process would suggest that liability for the operative emissions of the mobile transport modality too.

4.5 Conclusion

This chapter demonstrated how the directive-specific definition of 'installation' allows for an interpretation that encompasses a mobile CO_2 transport segment with reference to the integrated nature of a CCS process. This interpretation of an installation adheres to the concept of emissions and to the current system of ensuring environmental integrity of the whole CCS process.

The main conclusion is, therefore, that the economic incentive set forth by Article 12 nr. 3a is available for the forthcoming CCS cluster projects that rely on mobile CO_2 transport. This applies to all the forthcoming European CCS projects that plan to capture CO_2 from sources within the scope of the ETS, including the Norwegian full-scale project and the forthcoming Dutch Porthos-project.

5 Conclusions, Recommendations and Reflections

5.1 Summary of conclusions

This thesis demonstrated how the ETS may accommodate a CCS process that employs mobile transport modalities, despite an initial legislative design that solely enables pipeline transport.

A key finding is that the ETS Directive requires that the Commission's implementation of monitoring, reporting and verification of emissions facilitates *all* emission reduction efforts. The current implementing regulation on monitoring and reporting of emissions, however, *prima facie* would imply liability for 'emissions' as of the transfer of CO_2 to a mobile transport provider, as well as various forms of CCU, without regard to whether the CO_2 is ever released into the atmosphere.

Imposing liability under the ETS for CO_2 that never constitutes 'emissions' within the meaning of the directive-specific definition, appears to be incompatible with the scope of powers conferred upon the Commission to adopt these transfer rules. It would also undermine the objective to incentivise a cost-efficient design of a CCS process. However, disregarding the transfer rules entirely would undermine another central objective of the ETS: ensuring the environmental integrity and effectiveness of the system by accounting for actual emissions, e.g. leakage from a mobile transport modality.

This conundrum may be solved by interpreting the relevant provisions within the legal framework in the light of the directive-specific definitions, objectives and purpose of the ETS Directive. In the interpretative solution proposed in this thesis, the mobile CO_2 transport phase in a CCS process is considered as a 'directly associated activity' to the two 'technical units' it connects within the scope of an 'installation', i.e. the capturing unit or pipeline network. This teleological interpretation ensures that an ETS operator is liable for actual emissions associated with that transport segment, and thus ensures a fundamental objective of the ETS: enabling market-based emission reduction alternatives.

5.2 Recommended amendments to enable mobile CO_2 transport

The analyses set forth in chapter 4 argues that the current framework may be interpreted to accommodate CCS processes that employ mobile transport modalities. Including mobile CO_2 transport under the scope of liability of a CCS installation should, however, only serve as a temporary solution prior to enabling amendments for three main reasons.

Firstly, the motivation for writing this analysis was the uncertainty associated with the wording of the current framework. It does not serve the cause of investor confidence that the wording of key provisions apparently contradicts the aim to facilitate a broad range of CCS technologies. Legal uncertainty is known to represent an investment barrier when it comes to new technology and infrastructure.[363] Secondly, the current solution does not provide a clear answer as to whether the operative emissions of the mobile transport modality incurs liability. Thirdly, including a potentially significant additional activity under the scope of an installation may restrict the commercial organisation of the CCS process due to how the operator of the installation must retain practical or economic control over the installation.

The rules should therefore be amended to clearly accommodate all CO_2 transport modalities. Including mobile CO_2 transport as a separate activity under ETS Directive Annex I seems to be the amendment that would best align with the current legislative design and objectives. This would allow the mobile transport modality to retain a separate ETS operator and thus enable flexible commercial arrangements. It would also ensure that most operative and leakage emissions are accounted for under the scope of that operator's liability. And finally, sector specific monitoring rules would be provided for within MRR Annex IV, ensuring harmonised implementation within and between pan-European CCS projects.

The evident drawback of amending the ETS Directive is the extensive process associated with such amendments. An inferior, though more easily attainable alternative, would be to amend the monitoring and reporting regulation to explicitly state that mobile CO_2 transport is a directly associated to the installations taking part in the CCS process, as proposed in chapter 4. It would send a clear signal if mobile CO_2 transport was explicitly included as a potentially 'directly associated activity' to the different CCS activities described in the sector specific monitoring boundaries of the MRR.[364] Reviewing the expedience of the *per se* exclusion of emission sources from mobile transport appears a prudent part of that amendment process.[365]

5.3 Final reflections on the ETS and its struggle to enable all emission reductions

The analyses of how the ETS applies to a CCS process employing mobile CO_2 transport, bears witness of a greater problem incurred under the ETS: how to accommodate the evolu-

[363] See, inter alia, Davis (2017), p. 12.
[364] Commission Regulation No 601/2012 as amended, Annex IV sections 21-23.
[365] Ibid., Article 20 nr. 2.

tion and innovation of emission reduction technologies while retaining the environmental integrity and effectiveness of the market.

The main aim of the ETS is to create a market mechanism that induces cost-effective emission reductions in order to mitigate climate change. Enabling a broad range of emission reduction options is therefore an important objective of the ETS, as explicitly stated in the preamble to the latest amendment of the ETS Directive.[366]

In order to facilitate emission reduction efforts, it is imperative that the monitoring, reporting and verification (MRV) regime manages to identify not only the GHGs *produced* within the scope of the ETS, but also the GHGs that are actually *released into the atmosphere*. This consideration draws attention to an inherent flaw within the current MRV regime: it fiercely accounts for all emissions within the ETS scope of liability, but fails to facilitate CO_2 transfers out of that scope of liability for emission reduction purposes. This feature ensures that all potential emissions are 'payed for', but also potentially imposes liability for GHGs that are never emitted and thus unintentionally disincentivises potential emission reduction efforts.

The nature and ambitions of the ETS represents a potentially powerful vehicle for cost-effective emission reduction efforts though innovative CO_2 capture technology (CCS/CCU). Living up to that potential requires that the current monitoring and reporting regime is amended to facilitate a broad range of CO_2 transfers for emission reduction purposes. Either by expanding the scope of the ETS to account for possible emissions or by adopting more general transfer rules that presupposes risk of leakage.

However, facilitating those ambitions represents a complex and difficult implementing task. In that respect, one could question whether the recent curtailment of the powers conferred to adopt the MRV regime enables or disables the Commission in this effort. Implementing a detailed and highly ambitious regime could potentially warrant the type of quasi-legislative powers that a delegated act pursuant to TFEU Article 290 provides.

[366] Recital 14 to Directive (EU) 2018/410 amending Directive 2003/87/EC.

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The London Protocol	1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, London, 7 November 1996.

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Regulation (EU) 2018/842	Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013.
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