

Brussels, 17 July 2020
Case No: 85378
Document No: 1143911
Decision No 093/20/COL

[Non-confidential version]

[The information in square brackets is covered by the obligation of professional secrecy]

Ministry of Trade Industry and Fisheries
PO Box 8090 Dep
0032 Oslo
Norway

Subject: The Full-Scale CCS Project

Table of Contents

1	Summary	4
2	Procedure	4
3	Background.....	5
3.1	CCS technology.....	5
3.2	Policy background	6
3.3	CCS regulatory context.....	9
3.3.1	EU/EEA law – the CCS Directive	9
3.3.2	The implementation of the CCS Directive into Norwegian law	10
3.3.3	The EU Emission Trading System.....	11
3.3.4	The Norwegian CO ₂ tax.....	12
3.3.5	Public international law.....	13
3.4	State of development of CCS projects.....	14
3.5	The Norwegian CCS strategy and the Full-Scale CCS Project.....	15
4	Development process prior to the Full-Scale CCS Project.....	17
4.1	Introduction.....	17
4.2	The pre-feasibility study	17
4.3	Feasibility studies	18
4.3.1	General.....	18
4.3.2	CO ₂ capture.....	19
4.3.3	CO ₂ transport.....	19
4.3.4	CO ₂ storage.....	20

4.4	Concept and FEED studies.....	20
4.4.1	General.....	20
4.4.2	The competitive process for awarding State financing for the Concept and FEED studies.....	21
4.4.3	CO ₂ capture.....	21
4.4.4	CO ₂ transport and storage.....	22
5	Construction and operation of the Full-Scale CCS Project	23
5.1	General.....	23
5.2	The project participants	23
5.2.1	Introduction.....	23
5.2.2	Fortum Oslo Varme AS	24
5.2.3	Norcem AS	24
5.2.4	Northern Lights.....	25
5.3	The granting authority and the legal basis	26
5.4	Form of aid, budget, and duration.....	27
5.5	Aid granting process	29
5.6	The CO ₂ Capture Projects	29
5.6.1	The FOV Capture Project.....	29
5.6.2	The Norcem Capture Project.....	32
5.7	The Transport and Storage Project.....	33
5.7.1	General.....	33
5.7.2	CCS developments	35
5.8	The principles of granting investment and operating aid.....	36
5.8.1	Introduction.....	36
5.8.2	Cost estimation.....	36
5.8.3	State Quality Assurance Process	38
5.8.4	Financing of construction and operation of the Capture Projects	39
5.8.4.1	General.....	39
5.8.4.2	Investment aid	39
5.8.4.2.1	Eligible investment cost	39
5.8.4.2.2	Cost-sharing mechanism	41
5.8.4.2.3	CAPEX exposure caps	42
5.8.4.3	Operating aid	42
5.8.4.3.1	Introduction.....	42
5.8.4.3.2	Eligible operating cost	42
5.8.4.3.3	Fixed and variable operating aid.....	42
5.8.4.3.4	Additional operating support.....	44

5.8.4.3.5	Operating aid reduction mechanism and gain-share	44
5.8.4.3.6	Cost auditing.....	46
5.8.5	Financing of construction and operation of CO ₂ Transport and Storage	46
5.8.5.1	Introduction	46
5.8.5.2	Compensation model.....	46
5.8.5.3	Investment aid	47
5.8.5.3.1	General.....	47
5.8.5.3.2	Investment basis aid.....	48
5.8.5.3.3	Additional investment aid.....	50
5.8.5.4	Operating aid	51
5.8.5.4.1	General.....	51
5.8.5.4.2	Cost related to CO ₂ leakages	53
5.8.5.4.3	Removal cost.....	54
5.8.5.4.4	Administration of the storage site and third-party revenues..	54
5.8.5.4.5	Gain-Share Mechanism	56
5.8.5.4.6	Cost auditing.....	56
5.9	Cumulation, transparency.....	57
6	Presence of state aid	57
7	Procedural requirements.....	59
8	Compatibility of the measures.....	59
8.1	Introduction.....	59
8.2	Objective of common interest	60
8.3	Need for state intervention.....	61
8.4	Appropriateness of the state aid	62
8.5	Incentive effect.....	63
8.5.1	General.....	63
8.5.2	The Capture Projects	63
8.5.3	The Transport and Storage Project	64
8.6	Proportionality.....	65
8.6.1	General.....	65
8.6.2	The Capture Projects	65
8.6.3	The Transport and Storage Project	67
8.6.4	Compensation related to CO ₂ leakages and risks in the interface between capture, transport and storage	68
8.7	Avoidance of undue negative effects on competition and trade.....	68
8.7.1	Introduction.....	68

8.7.2	The FOV Capture Project.....	70
8.7.2.1	General.....	70
8.7.2.2	Keeping an inefficient firm afloat.....	70
8.7.2.3	Distortion of dynamic incentives	70
8.7.2.4	Creating or enhancing market power or exclusionary practices.....	72
8.7.2.5	Artificially altering trade flows or the location of production.....	72
8.7.3	The Norcem Capture Project.....	72
8.7.3.1	General.....	72
8.7.3.2	Keeping an inefficient firm afloat.....	73
8.7.3.3	Distortion of dynamic incentives	73
8.7.3.4	Creating or enhancing market power or exclusionary practices.....	74
8.7.3.5	Artificially altering trade flows or the location of production.....	74
8.7.4	Northern Lights.....	74
8.7.4.1	General.....	74
8.7.4.2	Keeping an inefficient firm afloat.....	75
8.7.4.3	Distortion of dynamic incentives	75
8.7.4.4	Creating or enhancing market power or exclusionary practices.....	76
8.7.4.5	Artificially altering trade flows or the location of production.....	76
8.8	Transparency.....	77
9	Conclusion.....	77

1 Summary

- (1) The EFTA Surveillance Authority (“ESA”) wishes to inform Norway that, having assessed the notified Support Agreements (“the measures”), concluded between the Norwegian Government and Norcem AS (“Norcem”), Fortum Oslo Varme AS (“FOV”) and Northern Lights, concerning the financing of the construction and operation of a full-scale CO₂ capture, transport and storage project (“the Project”), it considers that the measures constitute state aid within the meaning of Article 61(1) of the EEA Agreement. ESA has decided not to raise objections to the measures, as they are compatible with the functioning of the EEA Agreement, pursuant to its Article 61(3)(c). ESA has based its decision on the following considerations.

2 Procedure

- (2) The Norwegian authorities notified the measures on 2 July 2020.¹

¹ Documents No 1141887, 1141889, 1141891, 1141893 and 1141895.

3 Background

3.1 CCS technology

- (3) As a means of reducing carbon dioxide (“CO₂”) emissions, Carbon Capture and Storage (“CCS”) seeks to enable producers and installations to capture the CO₂ emitted from their industrial plants, including power plants, transport the so captured CO₂ to a suitable storage site and inject the CO₂ into suitable geological formation for permanent storage.² The CCS process chain has three main phases:
- (i) CO₂ from the combustion process is captured and compressed (“capture”).
 - (ii) The compressed CO₂ is transported by pipeline, truck or tanker to the storage site (“transport”).
 - (iii) The compressed CO₂ is injected into a geological formation for long-term isolation from the atmosphere, usually in depleted gas or oil fields or deep saline aquifers (“storage”).
- (4) Currently, there are three basic technologies available for CO₂ capture: (i) pre-combustion processes, whereby fuel is converted into a gaseous mixture of hydrogen and CO₂, after which the CO₂ can be separated and compressed for transport and storage; (ii) post-combustion processes, which separate CO₂ from combustion exhaust gases; and (iii) oxyfuel combustion, which uses oxygen rather than air for combustion of fuel.³
- (5) According to the Norwegian authorities, the Norwegian continental shelf (“NCS”) is suited for CO₂-storage in geological formations.⁴ Norway has long-standing experience in deploying CCS technologies in relation to its natural gas production. Since 1996, CO₂ has been captured from the natural gas stream offshore from the Sleipner gas field and permanently stored in a sub-sea saline aquifer, as the world’s first offshore CCS plant (“the Sleipner project”). Since 2008, CO₂ has been captured from the natural gas entering the Snøhvit LNG⁵ plant onshore and transported by pipeline for permanent storage in an offshore saline aquifer, as the world’s first LNG plant with CO₂ capture and storage capabilities (“the Snøhvit project”).⁶ The Norwegian Sleipner and Snøhvit projects have demonstrated the technological viability of CCS, as well as its effectiveness as a method of reducing CO₂ emissions.⁷
- (6) CCS technology has not yet reached full commercial-scale level for the whole process chain and is not used by the industry. Considering the high costs of

² ESA’s Guidelines on state aid for environmental protection and energy 2014–2020 (“EEAG”), ([OJ L 131, 28.5.2015, p. 1](#)) and EEA supplement to the OJ No 30, 28.5.2015, p. 1), paragraph 14(33).

³ See more information about these capture technology routes at, for instance, the websites of the Global CCS Institute (“GCCSI”), available [here](#). The GCCSI is a leading CCS think tank.

⁴ The Norwegian Petroleum Directorate has published a CO₂ storage atlas for the NCS that shows several possible storage sites, accessible [here](#).

⁵ Liquefied natural gas (“LNG”) is natural gas that has been converted to a liquid form for the ease and safety of natural gas transport.

⁶ See [Norsk Petroleum](#), a website run in cooperation by the Norwegian Ministry of Petroleum and Energy and the Norwegian Petroleum Directorate.

⁷ Equinor operates these fields. Information is available in English [here](#).

developing CCS projects, in particular the capture component of the process,⁸ the price for carbon emission allowances under the European Union's Emissions Trading System ("ETS") have been too low to incentivise commercial deployment of CCS, also taking into account the various forms of liability throughout the project lifecycle.⁹ Important barriers to the uptake of CCS still remain, due to the lack of sufficient incentives and infrastructure.¹⁰

3.2 Policy background

- (7) The need for CCS to mitigate climate change is well documented in reports from the Intergovernmental Panel on Climate Change ("IPCC")¹¹ and the International Energy Agency ("IEA").¹²
- (8) The Paris Agreement,¹³ adopted under the United Nations Framework Convention on Climate Change, sets out the long-term objectives of limiting global warming to well below 2°C, above pre-industrial levels, and pursuing efforts to limit it to 1.5°C to avoid dangerous climate change.¹⁴ The goals are linked to the requirement under the Paris Agreement of all Parties working together to bring greenhouse gas¹⁵ ("GHG") emissions to zero within the second half of the 21st century.¹⁶ To achieve this aim, the Paris Agreement requires all Parties to put forward their best efforts through nationally determined contributions ("NDCs") and to strengthen these efforts in the years ahead. The European Union ("EU"), its Member States and the EEA EFTA States are among the Parties to the Paris Agreement.¹⁷
- (9) The IPCC suggests a remaining budget of approximately 420 GtCO_{2e} (gigatonnes of CO₂ equivalent¹⁸) for a two-third chance of limiting warming to 1.5°C and of approximately 580 GtCO_{2e} for an even chance.¹⁹ In the various scenarios and

⁸ See the websites of the European Commission, [Carbon Capture and Geological Storage](#).

⁹ See, for instance, 2019 Thought Leadership Report, [Lessons and Perceptions: Adopting a Commercial Approach to CCS Liability](#), the GCCSI.

¹⁰ See, for example, the International Energy Agency's Technology report of November 2018, *Five keys to unlock CCS investment*. The report is available [here](#).

¹¹ The Intergovernmental Panel on Climate Change ("IPCC") is the United Nations body for assessing the science related to climate change. See its report of October 2018, *Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, in particular Chapter 2. The report is available [here](#).

¹² The International Energy Agency ("IEA") is an intergovernmental organization established in the framework of the Organisation for Economic Co-operation and Development (OECD). See, for example, its Technology report of July 2019, *The Role of CO₂ Storage*. The report is available [here](#).

¹³ The [Paris Agreement](#) was adopted at on 12 December 2015 at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) held in Paris from 30 November to 13 December 2015, and entered into force on 4 November 2016.

¹⁴ Article 2(1)(a) of the Paris Agreement.

¹⁵ Greenhouse gases are gases that trap heat in the atmosphere. CO₂ is among the main GHGs.

¹⁶ Article 4(2) of the Paris Agreement.

¹⁷ The EU formally ratified the Paris Agreement on 5 October 2016. See more information about the EU and the Paris Agreement available [here](#).

¹⁸ It is a simplified way to put emissions of various GHGs on a common footing by expressing them in terms of the amount of CO₂ that would have the same global warming effect.

¹⁹ See Chapter 2 of the IPCC report of October 2018.

pathways described by e.g. the IPCC and the IEA in their reports, estimate figures are all high for the reduction of GHG emissions needed to achieve the goals set out in the Paris Agreement. According to the United Nations Emissions Gap Report 2019, fossil CO₂ emissions from energy use and industry, which dominate total GHG emissions, grew 2% in 2018, reaching a record 37.5 GtCO_{2e} per year.²⁰ The “emissions gap”,²¹ in order to achieve the goals of the Paris Agreement, is large. In 2030, annual emissions need to be 15 GtCO_{2e} lower than current unconditional NDCs, to achieve the 2°C goal and 32 GtCO_{2e} lower for the 1.5°C goal.²²

- (10) Environmental protection is an important EEA objective.²³ The Contracting Parties to the EEA Agreement have declared that the protection of the environment and the reduction of CO₂ emissions are in their common interest and that CCS technology will play a key role in that regard.²⁴ The EU is also committed to transforming Europe into a highly energy-efficient, carbon neutral economy. For 2050, EU leaders have endorsed a climate-neutrality objective, in line with the Paris Agreement.²⁵
- (11) The EU’s Energy Roadmap 2050 (“the roadmap”) sets out CCS among the main routes to a more sustainable, competitive and secure energy system in 2050.²⁶ The roadmap notes that for all fossil fuels, CCS will have to be applied from around 2030 onwards in the power sector, in order to reach the decarbonisation targets. CCS is also an important option for decarbonisation of several heavy industries and combined with biomass could deliver “carbon negative”²⁷ values.²⁸
- (12) In November 2018, the European Commission published its vision for a climate neutral Europe by 2050 in “A Clean Planet for all – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy”.²⁹ CCS is one of seven building blocks in the strategy and in the various scenarios put forward, its contribution ranges from 52 to 606 million tons of CO₂ per year (“mtpa”)

²⁰ The United Nations Environment Programme, Emissions Gap Report 2019, [Executive Summary](#), page IV.

²¹ The discrepancy between these goals and the current measures being implemented has become known as the “emissions gap”.

²² *Idem*, page VIII.

²³ It is, for example, mentioned in the preamble to the EEA Agreement and its Article 73.

²⁴ See, for instance, the Conclusions of the 47th meeting of the EEA Council adopted on 16 May 2017 (Ref. [EEE 1605/16](#)), point 6.

²⁵ See the Conclusions of the European Council meeting of 12 December 2019 ([EUCO 29/19, CO EUR 31 CONCL 9](#)).

²⁶ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Energy Roadmap 2050 of 15 December 2015, ([COM\(2011\) 885 final](#)). See, in particular, section 2.

²⁷ Carbon negativity is the reduction of an entity’s carbon footprint to less than neutral, so that the entity in question has a net effect of removing carbon dioxide from the atmosphere rather than adding it.

²⁸ *Idem*, page 12.

²⁹ Commission from the European Commission of 28 November 2018, *A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy*, ([COM/2018/773 final](#)).

in 2050, which indicates a strong case for CCS in supporting Europe's path to a climate neutral economy.³⁰

- (13) In 2019, the European Commission launched a new growth strategy (“the European Green Deal”). The European Green Deal aims to transform the EU into a modern, resource-efficient and competitive economy, where there are no net emissions of GHGs in 2050.³¹ The European Green Deal puts forward a number of initiatives to fight climate change, cut pollution and protect biodiversity.³² It recognises the EU industries’ needs for “climate and resource frontrunners” to develop the first commercial applications of breakthrough technologies in key industrial sectors by 2030. CCS is included as one of the priority areas.³³
- (14) The European Commission has also adopted a legislative proposal for a European climate law,³⁴ enshrining the 2050 climate-neutrality objective and establishing the framework for its achievement. The proposed regulation would involve the Commission reviewing the EU's 2030 target for reducing GHG emissions, in light of the mid-century climate neutrality objective, exploring options for 50 to 55% emissions reduction and proposing a new 2030 target, if necessary.³⁵
- (15) Norway has an agreement with the EU, its Member States and Iceland on cooperation of achieving the target of at least 40% reduction of GHG emissions by 2030 compared to 1990 levels.³⁶ In its updated NDC to the Paris Agreement, Norway has committed to a target of at least 50% and towards 55% reduction of GHG emissions by 2030, compared to 1990 levels.³⁷
- (16) Norway has publicly expressed its ambitions and interest in the “use of our cooperation with the EU to further the ambitious agenda of the European Green Deal”.³⁸ For 2050, Norway has endorsed the objective of reducing its GHG emissions by 80–95% compared to 1990 levels through the Norwegian Climate

³⁰ Idem, table 9, page 198. See also GCCSI's report [Global Status of CCS 2019](#), page 44.

³¹ Communication from the Commission of 11 December 2019, *The European Green Deal*, (COM(2019) 640 final).

³² Annex I to the Communication on the European Green Deal, [Roadmap – Key actions](#).

³³ See the European Green Deal, page 8.

³⁴ Proposal for a regulation of the European Parliament and of the Council establishing the framework for achieving climate neutrality and amending Regulation (EU) 2018/1999, *European Climate Law*, of 4 March 2020 (COM/2020/80 final).

³⁵ See the BRIEFING EU Legislation in Progress, [European climate law](#), and the Annex I to the European Green Deal, [Roadmap – Key actions](#), page 2.

³⁶ See EEA Joint Committee Decision No [269/2019](#) of 25 October 2019, incorporating into the EEA Agreement Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 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 (OJ L 156, 19.06.2018, p. 26). See also the press release by the European Commission of 25 October 2019, available [here](#).

³⁷ Submission by Norway on 7 February 2020, [Update of Norway's nationally determined contribution](#). See also the press release from the Norwegian Government, available [here](#).

³⁸ Publication by the Norwegian Government, [A European Green Deal Norwegian perspectives and contributions](#), see paragraph 4.

Change Act.³⁹ On the Norwegian Government's political platform,⁴⁰ "Granavolden", it is stated that the Norwegian Government will make Norway a low emission society by 2050, with emissions reduced by 90–95%.⁴¹

3.3 CCS regulatory context

3.3.1 EU/EEA law – the CCS Directive

- (17) The CCS Directive⁴² establishes the legal framework for the environmentally safe geological storage of CO₂ to contribute to the fight against climate change. The CCS Directive covers CO₂ storage in geological formations in the EU and the entire lifetime of storage sites.⁴³ It also contains provisions on the transport components of the CCS chain.
- (18) The CCS Directive governs the permitting,⁴⁴ operation and closure of storage sites,⁴⁵ such as by imposing requirements for ensuring that permits are granted on the basis of objective, published and transparent criteria and the access to transport network and storage sites is organised in a transparent and non-discriminatory manner.⁴⁶
- (19) Under the CCS Directive, the operator of a CO₂ storage site assumes the liability for CO₂ leakages,⁴⁷ until the responsibility is transferred to the competent authority, after the closure of a storage site upon fulfilment of certain conditions.⁴⁸ In order to prevent CO₂ leakages, the operator is obliged to carry out monitoring during operation, according to an approved monitoring plan,⁴⁹ and, in the event of any CO₂ leakages, the operator is required to take any necessary corrective measures.⁵⁰ If the operator fails to take the necessary corrective measures, the competent authority shall take the necessary corrective measures itself and recover the costs from the operator.⁵¹

³⁹ In Norwegian: *Lov om klimamål (klimaloven)*, ([LOV-2017-06-16-60](#)). An unofficial English translation is available [here](#).

⁴⁰ The Norwegian Government's political platform of 17 January 2019, in Norwegian: *Granavolden*, available [here](#). An English translation is available on the Introduction and Foreign and development policy only.

⁴¹ See section 12 of *Granavolden* on Climate and Environment.

⁴² Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation ([OJ L 140, 5.6.2009, p. 114](#)).

⁴³ See the European Commission's website, [A legal framework for the safe geological storage of carbon dioxide](#).

⁴⁴ See in particular, Articles 5, 6 and 10 of the CCS Directive concerning exploration and storage permits.

⁴⁵ See Chapter 4 of the CCS Directive.

⁴⁶ See for example Article 21 of the CCS Directive on access to transport network and storage sites.

⁴⁷ Article 3 no. 6 defines 'leakages' as "any release of CO₂ from the storage complex".

⁴⁸ Provided that the conditions in Article 18 of the CCS Directive are met.

⁴⁹ The approved monitoring plan is a condition for obtaining the storage permit according to Article 8(5) of the CCS Directive.

⁵⁰ See, for example, Articles 16 and 19 of the CCS Directive.

⁵¹ Article 16(4) of the CCS Directive.

- (20) The present decision is without prejudice to the rights and obligations under the legislation described in section 3.3 and also those under that legislation or future amendments thereto, as agreed by the Contracting Parties to the EEA Agreement.

3.3.2 The implementation of the CCS Directive into Norwegian law

- (21) In Norway, the CCS Directive is implemented, for non-petroleum related CCS activities,⁵² by the CO₂ Storage Regulations,⁵³ and an additional chapter in the Norwegian Pollution Regulations.⁵⁴ As explained by the Norwegian authorities, the CO₂ Storage Regulations cover the access to exploration, development and use of the NCS for CO₂ storage, whereas the Pollution Regulations cover requirements for CO₂ storage relating to pollution and protection of the environment, including permitting injection and monitoring of CO₂ into subsea reservoirs.
- (22) The permitting system for non-petroleum related CCS activities, as explained by the Norwegian authorities, entails that the operator of a CO₂ storage site may need to obtain an exploitation licence⁵⁵ for the utilisation of a subsea reservoir for injection and storage of CO₂, in accordance with the provisions of the CO₂ Storage Regulations.⁵⁶ The granting is conditional on the operator having the financial strength, technical and geological expertise and reliability required to operate and control the storage site.⁵⁷ The operator must then obtain a storage permit⁵⁸ from the pollution authorities,⁵⁹ before injecting and storing CO₂ into the subsea reservoir.⁶⁰ The process and requirements for the granting of the storage permit are governed by the CO₂ Storage Regulations⁶¹ and the Pollution Regulations.⁶²
- (23) The Norwegian authorities have described the regime for access to the transport and storage site under the CO₂ Storage Regulations as follows:

⁵² The CCS Directive entered into force for the EEA EFTA States on 1 June 2013 by EEA Joint Committee Decision No 115/2012 of 15 June 2012 amending Annex XX (Environment) to the EEA Agreement ([OJ L 270, 4.10.2012, p. 38](#)).

⁵³ In Norwegian: *Forskrift om utnyttelse av undersjøiske reservoarer på kontinentalsokkelen til lagring av CO₂ og om transport av CO₂ på kontinentalsokkelen*, ([FOR-2014-12-05-1517](#)). In English: *Regulation on exploitation of subsea natural resources for storage of carbon dioxide and on transport of carbon dioxide on the continental shelf* ("the CO₂ Storage Regulations"). The Norwegian Petroleum Directorate has made an official English translation of the CO₂ Storage Regulations available [here](#).

⁵⁴ In Norwegian: *Forskrift om begrensnng av forurensning (forurensningsforskriften)*, ([FOR-2004-06-01-931](#)). See Chapter 35. Storage of CO₂ in geological formations (adopted on 22 October 2014).

⁵⁵ In Norwegian: *utnyttelsestillatelse*.

⁵⁶ Section 4-1(1) of the Norwegian CO₂ Storage Regulations.

⁵⁷ Section 4-1(3) of the Norwegian CO₂ Storage Regulations.

⁵⁸ In Norwegian: *lagringstillatelse*.

⁵⁹ The Norwegian Environment Agency (*Miljødirektoratet*), which is a state administrative body under the Ministry of Climate and Environment. More information is in Norwegian available [here](#).

⁶⁰ Section 5-2(1) of the Norwegian CO₂ Storage Regulations. Consent for injection and storage of CO₂ is given by the Ministry of Petroleum and Energy or the one it authorizes and by the Ministry of Labour and Social Affairs or the one it authorizes cf., in Norwegian: *Forskrift om helse, miljø og sikkerhet i petroleumsvirksomheten og på enkelte landanlegg (rammeforskriften)*, ([FOR-2010-02-12-158](#)).

⁶¹ The Norwegian Ministry of Petroleum and Energy is the competent authority under the CO₂ Storage Regulations.

⁶² Section 34-4 of the Pollution Regulations.

- the Ministry of Petroleum and Energy may, under objective and non-discriminatory conditions, decide that third-parties may use facilities and storage locations owned or used by a licensee, if this is warranted by the consideration for efficient operations or social considerations, and the Ministry finds that such use is not an unreasonable impediment for the licensee's own duly substantiated reasonable need for storage or for a party that has already secured a usage right.⁶³
- Agreements on the use of facilities and storage locations shall be submitted to the Ministry for approval.⁶⁴

3.3.3 *The EU Emission Trading System*

(24) The EEA EFTA States take part in the ETS, established by the ETS Directive.⁶⁵ The ETS is a “cap and trade” system that sets a cap for the total volume of GHG emissions from certain installations and operators⁶⁶ and allows trading of emission allowances within the cap.⁶⁷ The cap is reduced over time so that the total emissions fall during the implementation of the system in each trading period. The current third phase of the ETS began in 2013 and will last until the end of 2020. The fourth phase from 2021 will last until 2030 and is designed to achieve the EU's 2030 emission reduction targets.⁶⁸ The ETS covers GHG emissions from most land-based industry sectors, the oil and gas industry and aviation. Under the ETS Directive, allowances for emissions are issued annually and distributed either by auction or allocated for free and can subsequently be traded.⁶⁹ According to Article 12 item 3 of the ETS Directive, the operator of each installation covered by the ETS⁷⁰ shall each year surrender a number of emission allowances that is equal to the total emissions from its installation during the preceding calendar year.⁷¹ The main tradable units are called European Union Allowances (“EUAs”)⁷² and can be used by installations and operators to fulfil their obligation to surrender emission allowances. Each EUA gives the holder the right to emit one tonne of CO₂ equivalent.⁷³ The price of one EUA (“the carbon price”) is determined by the market,

⁶³ Section 5-12, cf. sections 4-5 and 6-1, of the Norwegian CO₂ Storage Regulations.

⁶⁴ Section 5-12(4) of the Norwegian CO₂ Storage Regulations.

⁶⁵ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC ([OJ L 275, 25.10.2003, p. 32](#)).

⁶⁶ Annex I of the ETS Directive lists the categories of activities to which the directive applies.

⁶⁷ See the European Commission's EU ETS Handbook, available [here](#).

⁶⁸ See the European Commission's websites, where information on the EU Emission Trading System (EU ETS) is available [here](#).

⁶⁹ Auctioning is the default method of allocating emission allowances within the EU ETS. From 2021 onwards the share of allowances to be auctioned under the revised EU ETS Directive shall be 57 %, without prejudice to possible reductions under the directive. Under the EU ETS, a transition to auctioning is foreseen to take place progressively. Some allowances will continue to be allocated for free until 2020 and beyond. See more information on the European Commission's website [here](#).

⁷⁰ Annex I of the ETS Directive lists the categories of activities to which the Directive applies.

⁷¹ According to Article 12 item 3 of the ETS Directive.

⁷² Allowances for aircraft operators are called Aviation European Union Allowances (“AEAs”).

⁷³ Article 3(a) of the EU ETS Directive defines the emission “allowance” as being “an allowance to emit one tonne of carbon dioxide equivalent during a specified period, which shall be valid only for the purposes of meeting the requirements of this Directive and shall be transferable in accordance with the provisions of this Directive”.

depending on the demand and surplus of emission allowances. High supply of emission allowances compared to demand will result in a low carbon price.

- (25) The 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, see Article 12 item 3a of the ETS Directive. This is further operationalised through the Monitoring and Reporting Regulation.⁷⁴ Accordingly, emissions captured, transported and stored in line with the CCS Directive's requirements will be considered as not emitted under the ETS Directive. The CCS Directive and the ETS Directive thus provide the possibility for operators of CCS equipped power plants and industrial installations to subtract from the emissions of the installation safely stored CO₂, when the criteria provided for under these acts are met.
- (26) ESA notes that in addition to the ETS Directive and the CCS Directive, there are a number of legislative instruments in force that provide the legal framework for the environmentally safe carbon capture and storage in the EU/EEA, such as the Directive on integrated pollution prevention and control and the Directive on environmental impact assessments.⁷⁵

3.3.4 The Norwegian CO₂ tax

- (27) In 1991, Norway introduced a CO₂ tax on emissions from petroleum activities on the NCS⁷⁶ and a CO₂ tax on mineral products.⁷⁷ The CO₂ tax on mineral products is a special tax that is payable on import and domestic production of mineral products, including mineral oil, gasoline, natural gas and LPG.⁷⁸ The purpose of the CO₂ taxes is to contribute to cost-effective reductions of GHG emissions.⁷⁹
- (28) About 80% of GHG emissions in Norway are taxed and/or regulated through the ETS.⁸⁰ Certain GHG emissions are not subject to taxation or ETS obligations, such

⁷⁴ Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012 of 21 June 2012 ("MRR") ([OJ L 334, 31.12.2018, p. 1–93](#)).

⁷⁵ Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment ([OJ L 26, 28.1.2012, p. 1–21](#)), and Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) ([OJ L 334, 17.12.2010, p. 17–119](#)).

⁷⁶ In Norwegian: *Lov om avgift på utslipp av CO₂ i petroleumsvirksomhet på kontinentalsokkelen*, ([LOV-1990-12-21-72](#)).

⁷⁷ In Norwegian: *Forskrift om særavgifter*, ([FOR-2001-12-11-1451](#)). See Chapter 3-6 of the regulations on the CO₂ tax on mineral products.

⁷⁸ The special fees that are adopted by the Parliament on the legal basis of this regulation are part of the state annual budget and applicable for one calendar year at a time.

⁷⁹ See the information at the Norwegian Government's website, available [here](#) (only in Norwegian).

⁸⁰ See the information on the website of Energy Facts Norway, which is a website run by the Norwegian Ministry of Petroleum and Energy. A factsheet on Taxes and emissions trading is available in English [here](#). Also stated in the Norwegian Government's proposition to the Parliament (Prop. 1 LS (2019-2020)) (in Norwegian). See section 10.9 CO₂ tax on mineral products.

as CO₂ emissions from waste incineration. Processes are ongoing to assess the non-priced emissions for the possible introduction of CO₂ taxes.⁸¹

- (29) On 4 May 2020, the Norwegian Tax Administration, on behalf of the Norwegian Ministry of Finance, sent a proposal for adopting a tax on CO₂ emissions from waste incineration for public consultation.⁸² As explained by the Norwegian authorities, the proposal entails a tax that will not comprise emissions of CO₂ from waste incineration that are subject to an obligation to surrender emission allowances under the ETS⁸³ nor CO₂ emissions that do not contain fossil material. CO₂ that is captured and stored will also be exempted from the tax.

3.3.5 Public international law

- (30) The London Protocol⁸⁴ is a global agreement that forms the legal basis in international environmental law for the protection and preservation of the marine environment from all sources of pollution.⁸⁵ According to Article 6 of the London Protocol, the Contracting Parties to the Protocol shall not allow the export of waste or other matter to other countries for dumping or incineration at sea. Consequently, the export of CO₂ for the purpose of permanent geological storage offshore is, in principle, not permitted. In 2009, the Contracting Parties to the London Protocol adopted an amendment to Article 6, which opened for CO₂ export for the purpose of permanent geological storage offshore.⁸⁶ However, to enter into force, the amendment requires acceptance by 2/3 of the Contracting Parties to the Protocol. By the end of 2019, only six, out of the 52 Parties, had accepted the amendment.⁸⁷
- (31) In order to solve the regulatory barrier under the London Protocol for cross-border transport and storage of CO₂, a Resolution was adopted at the meeting of the Contracting Parties to the Protocol on 7 to 11 October 2019,⁸⁸ allowing provisional application of the amendment to Article 6, in accordance with Article 25 of the Vienna Convention on the Law of the Treaties.⁸⁹ After this, a Party may provisionally apply the amendment by submitting a unilateral declaration, in accordance with

⁸¹ See the information on the Norwegian Government's website, available [here](#) (only in Norwegian).

⁸² The proposal is available (in Norwegian) [here](#).

⁸³ According to the Norwegian Act of 17 December 2004 No 99 Relating to Greenhouse Gas Emission Allowance Trading and the Obligation to Surrender Emission Allowances. In Norwegian: [Lov om kvoteplikt og handel med kvoter for utslipp av klimagasser \(klimakvoteloven\)](#), (LOV-2004-12-17-99).

⁸⁴ The [1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 \(as amended in 2006\)](#).

⁸⁵ The Contracting Parties to the 1996 London Protocol adopted amendments to Annex I to the Protocol to include CO₂ sequestration in sub-seabed geological formations ([Resolution LP.1\(1\)](#)), on 2 November 2006. These amendments allow and regulate the storage of CO₂ streams from CO₂ capture processes in geological formations under the seabed.

⁸⁶ The amendment to Article 6 of the London Protocol adopted on 30 October 2009 ([Resolution LP.3\(4\)](#)). Article 6 of the Protocol concerns the export of wastes for dumping processes, and its amendment was aimed at enabling Parties to share transboundary sub-seabed geological formations for sequestration projects.

⁸⁷ These were the United Kingdom, the Netherlands, Norway, Finland, Iran and Estonia.

⁸⁸ The provisional application of the 2009 amendment to Article 6 of the London Protocol adopted on 11 October 2019 (Resolution LP.5(14)).

⁸⁹ See the International Maritime Organization's briefing (No 22, 14 October 2019), *Addressing barriers to transboundary carbon capture and storage*, available [here](#).

international law. The Party would need to conclude bilateral agreements with other Parties to allow for cross-border transport and storage of CO₂.

- (32) The Norwegian Government considers the Resolution as an international breakthrough for capture, transport and transport of CO₂ across borders that could possibly lead to a faster development of CCS as a climate technology.⁹⁰ The Resolution, allowing export of CO₂ for the purpose of geological storage offshore under the London Protocol, is crucial for the ability of operators of CCS projects to obtain third-party volumes of CO₂. The Norwegian Government also looks into co-operation with other countries in Europe, concerning CO₂ storage in the North Sea.⁹¹

3.4 State of development of CCS projects

- (33) Based on the information of the Global CCS Institute (“the GCCSI”), there are currently no large-scale⁹² CCS projects in Europe covering the whole CCS chain (capture, transport and storage), which involve industrial emissions.⁹³ As explained by the Norwegian authorities, the two large-scale projects that exist in Europe concern the capture of CO₂ in relation to natural gas production and are based in Norway.⁹⁴
- (34) Out of 21 large-scale facilities in operation in the world, 19 capture CO₂ from industrial processes with high CO₂ concentrations. In 10 of these 19 cases, CO₂ is captured as part of a process of removing excess CO₂ when producing and processing natural gas. The Norwegian authorities have explained that CO₂ must be captured in such cases, because of standards set for natural gas components, including CO₂. Pure CO₂ would alternatively be emitted into the atmosphere. In 16 of these 19 facilities, the CO₂ is used for enhanced oil recovery⁹⁵ (“EOR”), thereby generating income. But even in the case of such EOR-driven CCS projects, additional state aid or tax incentives are often needed.⁹⁶
- (35) According to the GCCSI’s CO₂RE database, there are 11 full-scale CCS projects under planning in Europe. The Norwegian authorities consider that in addition to the Norwegian Full-Scale CCS Project, among the most mature are: the Porthos project in the Netherlands,⁹⁷ the Acorn,⁹⁸ Net Zero Teesside⁹⁹ and the Northern

⁹⁰ See the Norwegian Government’s press release on 8 of January 2020, *Important milestone for CO₂ projects achieved*, available [here](#).

⁹¹ See the information at the Norwegian Government’s website, available in English [here](#).

⁹² According to the GCCSI’s [CO₂RE database](#), in order to be classified as large-scale integrated CCS facility, the facility must comprise of capture, transport and storage capacity of at least 800 000 tonnes of CO₂ annually for a coal-based power plant, or at least 400 000 tonnes of CO₂ annually for other emission intensive industrial facilities (including natural gas-based power generation).

⁹³ The GCCSI’s [CO₂RE database](#).

⁹⁴ The Sleipner and Snøhvit projects. See paragraphs (5) and (156) for more information.

⁹⁵ Enhanced oil recovery is the extraction of crude oil from an oil field that cannot be extracted otherwise.

⁹⁶ For instance, the [Tax Credit for Carbon Sequestration](#) (Section 45Q) in the United States.

⁹⁷ See: <https://www.rotterdamccus.nl/en/> and <https://www.porthosco2.nl/en/project/>.

⁹⁸ See: <https://theacornproject.uk/about/>.

⁹⁹ See: <https://www.netzeroteesside.co.uk/>.

Gas Network H21¹⁰⁰ projects in the United Kingdom; and the Ervia Cork CCS project in Ireland.¹⁰¹

- (36) Porthos prepares a project to transport CO₂ from industry in the Port of Rotterdam and store the CO₂ in empty gas fields beneath the North Sea. The CO₂ transported and stored by Porthos will be captured by various companies. It is expected that, in its early years, the project will be able to store approximately 2.5 million tonnes of CO₂ per year.¹⁰²
- (37) Norway considers that the notified Project is the European CCS project closest to a Final Investment Decision (“FID”) from the State.¹⁰³ The Norwegian Government’s FID is dependent on a Parliamentary Decision, authorising execution of and support to the Project. The Norwegian Government will present its FID proposal to the Norwegian Parliament in October 2020, as part of the State budget for 2021, to be adopted by the Parliament in December 2020. Norway anticipates that the Project becomes operational in the same timespan as the Porthos project.¹⁰⁴ Given a positive FID by the Norwegian Government and the Project participants in 2020, the Norwegian authorities anticipate that the Project (the Capture, Transport and Storage Projects) will be operational in 2024.

3.5 The Norwegian CCS strategy and the Full-Scale CCS Project

- (38) The Norwegian Government has supported CCS technology development for more than 15 years. It developed a strategy for CCS,¹⁰⁵ which was presented for the first time in the budget position to the Norwegian Parliament in October 2014.¹⁰⁶ The strategy aims at identifying measures to promote technology development and to reduce the costs of CCS.¹⁰⁷ The Norwegian Government’s CCS ambitions are formulated against the backdrop of the dual challenge of the need for mitigating climate change and the increasing global demand for energy.¹⁰⁸
- (39) The Norwegian CCS strategy encompasses a wide range of activities, including research, development and demonstration, work on the realisation of large-scale demonstration facilities, transport, storage and alternative use of captured CO₂ and efforts to promote CCS internationally. Several of these initiatives have been subject to previous state aid notifications to ESA:
- The Technology Centre Mongstad.¹⁰⁹

¹⁰⁰ See: <https://www.h21.green/about/>.

¹⁰¹ See: <https://www.ervia.ie/who-we-are/carbon-capture-storage/>.

¹⁰² According to the Porthos project [website](#).

¹⁰³ According to the Porthos project [website](#), the final investment decision for the Porthos project is expected to be taken in late 2021.

¹⁰⁴ According to the Porthos project [website](#), the final investment decision is expected late 2021 and the system to be operational in 2024.

¹⁰⁵ See the Norwegian Government’s carbon capture and storage strategy. Information in English is available [here](#).

¹⁰⁶ The Norwegian Government’s carbon capture and storage strategy, *Regjeringas strategi for arbeidet med CO₂-handtering, kapittel 4 (Prop. 1 S (2014-2015))*.

¹⁰⁷ See the Norwegian Government’s article on its CCS strategy, available in English [here](#).

¹⁰⁸ Ibid.

¹⁰⁹ ESA’s Decision No [503/08/COL](#) (Norway) on *Test Centre Mongstad*.

- The carbon capture research facility at Norcem Brevik.¹¹⁰
 - CLIMIT Demo aid scheme.¹¹¹
 - The development phase of the full-scale carbon capture facility at Mongstad.¹¹²
 - Financing of “Concept and FEED Studies” on full-scale CO₂ capture and storage.¹¹³
 - Continued financing of CO₂ Technology Centre Mongstad.¹¹⁴
- (40) An important part of the Norwegian CCS strategy was the ambition of developing a full-scale CCS chain in Norway by 2020.¹¹⁵ The Norwegian Government’s political platform, “Granavolden”, reiterates this long-standing ambition to realise a cost effective solution for full-scale CCS in Norway, stating that this incites technology development in an international perspective.¹¹⁶ The Project contributes to the realisation of this policy ambition by 2024.¹¹⁷
- (41) The Norwegian authorities consider that deployment of CCS technology throughout the entire economy will require investment decisions in industries having the largest CO₂ emissions. However, uncertainties such as changing market regulations and global trade mean that long-term and large-scale investments are challenging.
- (42) As explained by the Norwegian authorities, the overall objective of the Project is to contribute to the necessary development and uptake of CCS by the market, allowing Norway’s and the EU’s long-term climate targets to be achieved at the lowest cost possible.
- (43) The Project aims to demonstrate the implementation of a large-scale CCS chain, involving capture,¹¹⁸ transport¹¹⁹ and storage;¹²⁰ to establish a management chain for CO₂; to facilitate technology development, learning effects and national and international experience and knowledge sharing; and to contribute to general cost reductions and the maturing of CCS. The commercial structure of the Project and the Norwegian State’s role in it allow for reducing risks in the whole CCS chain,

¹¹⁰ ESA’s Decision No [74/13/COL](#) (Norway) on Aid to Norcem AS for the Construction of a Carbon Capture Research Facility at its Cement Plant in Brevik.

¹¹¹ ESA’s Decision No [478/15/COL](#) (Norway) raising no objections to the prolongation of the CLIMIT Demo Aid Scheme.

¹¹² ESA’s Decision No [091/12/COL](#) (Norway) on Aid for the Development Phase of the Mongstad CCS Facility.

¹¹³ ESA’s Decision No [045/17/COL](#) (Norway) on the financing of “Concept and FEED Studies” on full-scale CO₂ capture and storage.

¹¹⁴ ESA’s Decision No [146/17/COL](#) (Norway) on continued financing of CO₂ Technology Centre Mongstad.

¹¹⁵ According to the original strategy from 2014. The Norwegian CCS strategy has later been amended to extend the timeline for the realization of this ambition.

¹¹⁶ See section 12 of Granavolden on Climate and Environment.

¹¹⁷ See also the Northern Lights’ article stating that the full-scale project is a result of the Norwegian government’s ambition to develop a full-scale CCS value chain in Norway by 2024, available [here](#).

¹¹⁸ Capture from several potential several sources/industries; CO₂ from flue gasses typically holding lower CO₂-concentration; capture from industrial processes with mainly atmospheric pressure; CO₂ partly from biogenic sources.

¹¹⁹ Transportation by ship, allowing a flexible CCS chain that can be optimised and extended.

¹²⁰ Storage infrastructure designed for new CO₂ volumes and a storage site with large capacity.

covering the extra cost of being an early mover and establishing an infrastructure, as well as transport and storage service providers.

4 Development process prior to the Full-Scale CCS Project

4.1 Introduction

- (44) The Project was developed through several phases: (i) pre-feasibility studies, (ii) feasibility studies, (iii) Concept and front-end engineering and design (“FEED”) studies, and (iv) construction and operation of CO₂ capture, transport and storage facilities. The current notification concerns only the last phase (iv). Phases (i), (ii) and (iii) are further described in sections 4.2, 4.3 and 4.4 below.
- (45) When transitioning through the phases, the Norwegian authorities have used a phased scope development process with decision gates. Decision gates are used as a project management technique in which a project is divided into distinct stages or phases, separated by decision points (known as gates). A phased scope development process reduces the technical and commercial risks in stages, leading to a well-defined basis for an investment decision and execution of the project. According to the Norwegian authorities, this is consistent with industry practice for projects of similar size and complexity.
- (46) The development process of the Project can be illustrated as follows:

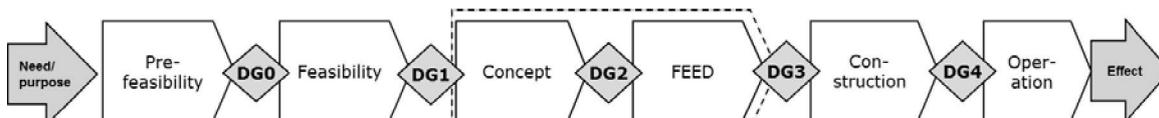


Figure 1. Illustration of the CCS Project's development process.

- (47) Decisions regarding development of the Project have thus followed the results from the previous phases and the overall CCS chain evaluations.
- (48) As described in the following subsections, several State bodies or State-owned entities such as Gassnova¹²¹ and Gassco¹²² have had roles in executing the various stages of the Project. The Ministry of Petroleum and Energy (“the Ministry”) has been involved in all phases of the Project.

4.2 The pre-feasibility study

- (49) One of the initiatives under the Norwegian Government's CCS strategy was surveying potential full-scale CCS projects in Norway. The Ministry tasked Gassnova with performing an analysis of potential projects, together with Gassco and the Norwegian Petroleum Directorate.¹²³ This task was conducted in the form of a pre-feasibility study.

¹²¹ Gassnova is the Norwegian state enterprise for Carbon Capture and Storage (CCS). See: <https://gassnova.no/en/>.

¹²² Gassco is a Norwegian State-owned operator of gas pipelines and transport-related gas processing facilities on and from the Norwegian Continental Shelf. See: <https://www.gassco.no/en/about-gassco/>.

¹²³ The Norwegian Petroleum Directorate is a governmental specialist directorate and administrative body, reporting to the Ministry of Petroleum and Energy. Its primary objective is to contribute to the

- (50) On 4 May 2015, the Ministry received the pre-feasibility report from Gassnova. The report showed that several industrial players could be willing to assume studies for CCS possibilities.¹²⁴
- (51) The target segment for potential CO₂ capture sites were mainly existing land-based emission sources with CO₂ emissions above 0.4 million tonnes per year (mtpa).¹²⁵ Gassnova's report built on a mapping study performed in 2012 and on a list of emissions of CO₂ from land-based industry produced by the Norwegian Environment Agency.¹²⁶ The report listed, amongst others, FOV's Klemetsrud plant and Norcem's Brevik plant as potential CO₂ capture sites.¹²⁷
- (52) The report considered transportation of CO₂ by ship and pipeline a more technologically mature process than that of capturing and storing it. The study showed that different concepts could be used, but which concept would be the more suitable would vary depending on conditions at the capture and storage sites, such as pressure and temperature. A ship-based solution was considered the most cost-effective, when transporting limited amounts of CO₂ over relatively long distances.
- (53) The report identified sites that could be technically suitable for CO₂ storage and companies with a potential interest in taking part in potential feasibility studies in the future. Existing storage sites, oil and gas fields in late-stage production and prospective storage sites abroad were also considered. As none of the potential storage alternatives had been studied to the level required, recommendations on which alternative would be more suitable could not be made.

4.3 Feasibility studies

4.3.1 General

- (54) As the first step towards a full-scale CCS project in Norway, the Ministry initiated feasibility studies for a full-scale CO₂ chain (capture, transport and storage). The feasibility studies' aim was to identify at least one technically and economically feasible CCS chain.
- (55) The feasibility studies included technical studies of all elements of the CCS project, developing a design basis for the whole chain and delivering a cost estimate at ±40% uncertainty for investment and operation of each elements of the chain. They also included setting a schedule and scope for the Concept and FEED studies, as well as a preliminary schedule and scope of work necessary to reach an investment decision.

greatest possible values for Norwegian society from the oil and gas activities through efficient and responsible resource management. See: <https://www.npd.no/en/about-us/organisation/>.

¹²⁴ An unofficial English translation of the summary of the findings from the pre-feasibility report.

¹²⁵ Idem, page 1.

¹²⁶ A Government agency under the Ministry of Climate and Environment. The primary tasks of the agency are reduction of greenhouse gas emissions, management of Norwegian nature, and prevention of pollution. See: <https://www.environmentagency.no/norwegian-environment-agency/about-us/>.

¹²⁷ An unofficial English translation of the summary of the findings from the pre-feasibility report, pages 2 and 3.

- (56) On 4 July 2016, the Ministry presented the results of the feasibility studies.¹²⁸ The studies showed that it was technically feasible to realize a CCS chain in Norway.

4.3.2 CO₂ capture

- (57) As explained in ESA's Decision No 045/17/COL, all potential candidates were given the opportunity to express their interest in participating in the feasibility studies. The potential candidates provided input as to whether capturing CO₂ from their emission sources was relevant, based on a self-assessment of technical, commercial and financial considerations.
- (58) Gassnova entered into the financing contracts with the emission source owners, according to the principles for pre-commercial procurement.¹²⁹ Ultimately, three owners of existing emission sources, Yara AS, Norcem AS and Energigjenvinningsetaten in Oslo Municipality (currently FOV)¹³⁰ confirmed that their emission sources fulfilled the criteria and expressed an interest in participating in the feasibility studies.
- (59) The three parties were presented with a scope of work based on Gassnova's mandate for the feasibility studies and reverted with offers. Based on the offers, Gassnova entered into negotiations with each of the owners. Following the negotiations, Gassnova entered into agreements on the financing of feasibility studies of CO₂ capture with the three emission owners.
- (60) The feasibility studies assessed potential capture facilities and their integration into existing facilities at three different locations and for three different industries: Norcem's cement factory in Brevik, Yara's ammonia plant in Porsgrunn and FOV's waste-to-energy plant in Oslo. The feasibility studies showed that CO₂ capture was technically feasible at all three emission locations.

4.3.3 CO₂ transport

- (61) Gassco contracted the feasibility studies for transport following a public procurement process. Three candidates requested participation and were qualified and invited to deliver bids.
- (62) Gassco received bids from all three candidates and awarded contracts to two of them. The feasibility studies examined three different concepts for CO₂ transport by ship: low-pressure, medium-pressure and high-pressure.
- (63) Knutsen OAS Shipping performed the studies of the first and third concept and Larvik Shipping performed the studies of the second concept. The aim was to assess technically and economically feasible concepts for ship transport of CO₂ to enable the State to decide if a CO₂ chain based on ship transport could be further matured. The work was based on an overall design basis for the complete CO₂ chain.
- (64) The feasibility studies examined transport of CO₂ at vapour/liquid equilibrium for different conditions. It was important to document solutions that could work across

¹²⁸ An unofficial English version of the report "[Feasibility study for full-scale CCS in Norway](#)".

¹²⁹ ESA's Decision No 045/17/COL, paragraph 29.

¹³⁰ See paragraph (88).

the CO₂ chain and reduce the total costs of a full-scale CCS-project. Based on the feasibility studies, Gassco considered the solutions for all three studied transport conditions (low-pressure, medium-pressure and high-pressure) technically feasible.

4.3.4 CO₂ storage

- (65) The Ministry contracted feasibility studies of CO₂ storage following a public procurement process.¹³¹ A notice to participate in a negotiated procedure, including the minimum requirements and a description of the service, was announced both nationally and in the EU in October 2015.¹³²
- (66) All qualified candidates were invited to submit expressions of interest. Qualification criteria included relevant experience in studying CO₂ storage, defined as experience with studies of CO₂ storage, or other experience with gas storage, or experience with exploration and development of oil and gas fields.
- (67) Only Equinor¹³³ showed interest in participating in the negotiated procedure. An invitation to the public procurement process was issued to Equinor, as it met the minimum requirements. On 2 December 2015, the Ministry received an offer from Equinor. Following negotiations, the parties signed a contract on 4 January 2016.
- (68) Following the feasibility studies, Gassnova considered a solution for developing a CO₂ storage site with onshore facilities and a pipeline to the Smeaheia area as the best solution, given the project's objective. The Smeaheia area is located east of the "Troll" field, approximately 50 km from the coast, west of Kollsnes, near Bergen. This solution had the lowest implementation risk, large storage capacity and it was relatively easy to develop the capacity of the infrastructure.

4.4 Concept and FEED studies

4.4.1 General

- (69) Following completion of the feasibility studies, the Norwegian authorities funded Concept and FEED studies for a full-scale CO₂ capture and storage project. That funding was the subject of ESA's Decision No 045/17/COL.
- (70) The feasibility studies provided a cost estimate of $\pm 40\%$ for the investment in and operation of each element of the CCS chain (see paragraph (55)). However, for a concept decision, this uncertainty needed to be further reduced. Concept and FEED aimed to deliver the final concept for the construction and operation phase.
- (71) The concept studies aimed at considering different concepts in each of the capture, transport and storage project and select the preferred concepts to mature into the FEED phase. A typical concept selection decision was on which capture technology or development concept to mature.¹³⁴
- (72) In the FEED phase, the selected concepts were further detailed, both technically and commercially, in order to support an investment decision. In order to present a

¹³¹ The Ministry procured the feasibility studies of storage, but delegated responsibility for following up the submission of the studies to Gassnova.

¹³² ESA's Decision No 045/17/COL, paragraph 31.

¹³³ Until 15 May 2018 called Statoil ASA.

¹³⁴ ESA's Decision No 045/17/COL, paragraph 21.

cost estimate with sufficient confidence for an investment decision, the uncertainty requirement was set to a maximum of $\pm 20\%$. To accommodate such low uncertainty range, extensive engineering work was required as basis for the cost estimate to reduce the risks related to the project. After, and if, an investment decision has been made, the project will move into detailed engineering and construction phase, before it is put into operation.¹³⁵

4.4.2 *The competitive process for awarding State financing for the Concept and FEED studies*

- (73) As explained in ESA's Decision No 045/17/COL, the process for State financing for the Concept and FEED studies was to be carried out in accordance with the general principles and framework of a restricted negotiated procedure. As explained by the Norwegian authorities, the competitive process was open to all qualified operators and carried out in an objective, non-discriminatory and transparent way, with bids evaluated based on published award criteria.
- (74) The process would begin with a pre-qualification procedure and a selection of candidates invited to submit bids for the financing of Concept and FEED studies.¹³⁶ Following negotiations, there would be an evaluation of the bids based on the award criteria that apply to the concept phase, as set out in the tender documents. Subject to the available concepts and execution/operation estimates, the intention was to perform a screening process and potentially reduce the number of recipients of public financing for FEED Studies, following an assessment of the received offers and the criteria outlined in the tender documents.
- (75) The tender documents provided that the beneficiaries awarded contracts to carry out Concept and FEED studies were eligible to submit offers for the financing of the construction and operation of the capture facilities. However, the decision on whether to proceed to the construction and operation phase would be made on the basis of, *inter alia*, the results of the studies.

4.4.3 *CO₂ capture*

- (76) On 26 October 2016, based on the results of the feasibility study, Gassnova announced the pre-qualification process for financing of the Concept and FEED studies for CO₂ capture. In the qualification stage, potential tenderers were required to document, amongst others, technical competence/qualifications and organisation to carry out both the Concept and FEED phase and the construction and operation phase.¹³⁷
- (77) As explained in ESA's Decision No 045/17/COL, Gassnova evaluated the bids and awarded financing contracts for the Concept and FEED phase. The financing contracts were awarded to the owners of three potential capture facilities: Norcem's cement factory in Brevik, FOV's waste incineration plant at Klemetstrud in Oslo and Yara's ammonia plant.

¹³⁵ *Idem*, paragraph 22.

¹³⁶ *Idem*, paragraph 56.

¹³⁷ *Idem*, paragraph 61.

- (78) The concept phase was completed in September 2017 and documented in the beneficiaries' concept reports.¹³⁸ After the concept phase, FEED studies on CO₂ capture at Yara's ammonia plant was not recommended, as it had a smaller learning potential compared to the two others and some uncertainties concerning the plant.¹³⁹ The FEED phase was thereafter initiated in September 2018 and completed in 31 October 2019, when the FEED reports were submitted.¹⁴⁰ The FEED studies include the beneficiaries' cost-risk analyses. The FEED reports were also subject to external quality assurance under Norway's Quality Assurance Process for Large Public Investments.¹⁴¹

4.4.4 CO₂ transport and storage

- (79) On 26 October 2016, based on the results of the feasibility study, Gassnova announced the financing of Concept and FEED studies of a CO₂ storage site with onshore facilities and a pipeline to the "Smeaheia" area.¹⁴² The deadline for qualification was 11 November 2016. On 8 December 2016, the tender documents were submitted to the qualified candidates, with a deadline for bids until 10 February 2017.¹⁴³
- (80) After an initial pre-qualification of tenderers, Gassnova issued a notice to tender for the financing of Concept and FEED studies of storage to qualified candidates. Following negotiations in accordance with the tender procedure, Gassnova awarded the contract to Equinor. Equinor later entered into an agreement with the other tenderers, Total and Shell, leading to the formation of the Northern Lights joint venture (see paragraph (95)).
- (81) The concept phase was completed in December 2017 and documented in the concept report.¹⁴⁴ The FEED studies were initiated in September 2018 and a preliminary FEED report submitted on 29 November 2019. The final FEED report will be delivered taking into account the results of the test well following change of storage location.
- (82) As regards the transport element, the Norwegian authorities have taken efficiency considerations and risks involved to imply that it is more rational for the operator of the storage facilities to also carry out transport services. Combining transport and storage activities may release synergies that ultimately reduces the amount of aid necessary to complete the project. The transport element was also part of the negotiations held with candidates of State financing for the Concept and FEED studies, held under the framework of a restricted negotiated procedure.

¹³⁸ The [concept reports](#) concerning the Capture Projects.

¹³⁹ [Press release](#) of the Ministry. The Norwegian Government continues with the planning of a demonstration project for CO₂ capture, transport and storage, 15 May 2018.

¹⁴⁰ FOV's and Norcem's FEED reports were submitted on 31 October 2019.

¹⁴¹ See section 5.8.3 for more information on the external quality assurance procedure.

¹⁴² As the concept studies have advanced, it has become clear that a CO₂ storage site in the Smeaheia area would entail too much risk for an investment decision to be made. Following consultations with Gassnova, Equinor and its partners have therefore proposed to evaluate the "Johansen" formation (located south of the Troll field, approximately 80 km from the coast) as a potential area for CO₂ storage to support the continuation of the CCS project.

¹⁴³ See also section 3.5.3 of ESA's Decision No 045/17/COL.

¹⁴⁴ The [concept report](#) concerning Northern Lights.

5 Construction and operation of the Full-Scale CCS Project

5.1 General

- (83) The measures concern individual investment and operating aid for the construction and operation of the Project.
- (84) The Project is one of the first industrial CCS projects to develop an open access infrastructure to store significant volumes of CO₂ from across the European continent.
- (85) The Project is planned with three main parts, see figure 2 below:
- One or two CO₂ capture plants, incl. facilities for CO₂ liquefaction, buffer storage and export terminal.
 - Two ships for the transport of liquefied CO₂ from the capture plant(s) to the onshore CO₂ receiving terminal.
 - A storage facility, consisting of an onshore CO₂ receiving terminal, incl. facilities for buffer storage and pumping of CO₂, a subsea pipeline and an injection well.

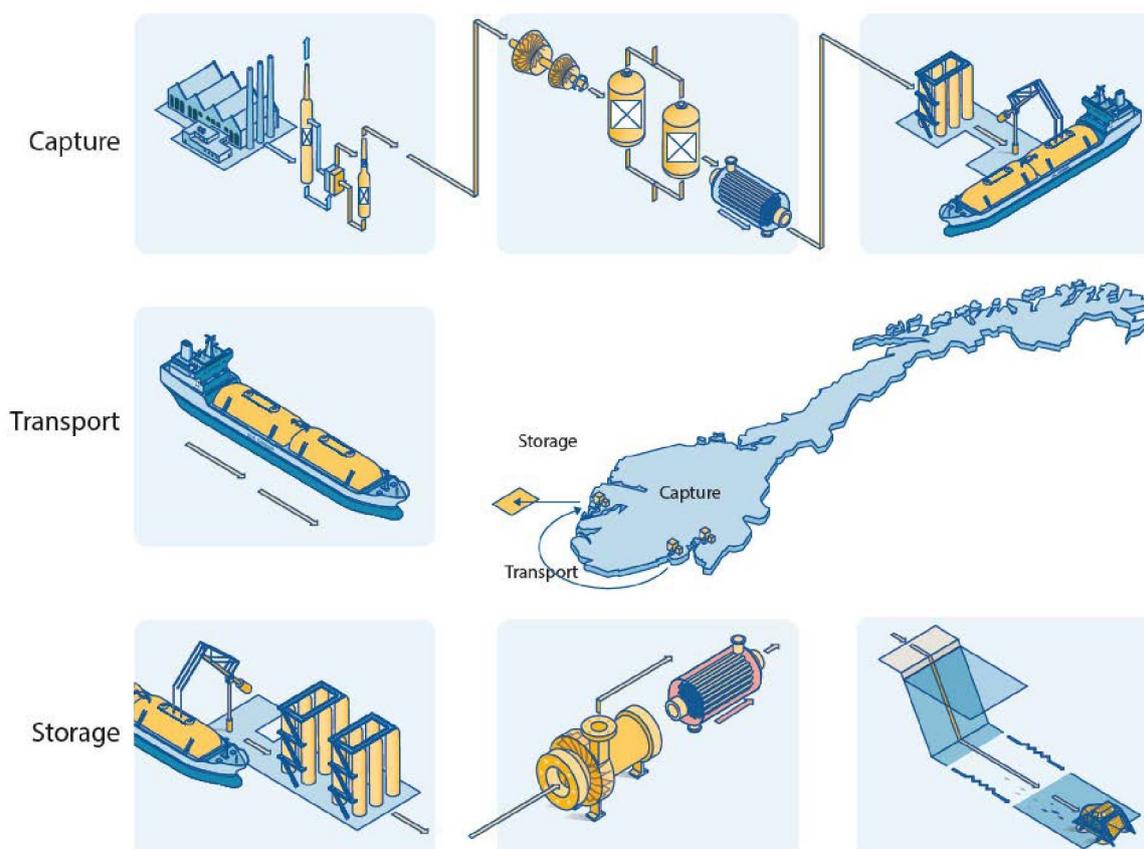


Figure 2. Illustration of the main elements of the Full-Scale CCS Project.

5.2 The project participants

5.2.1 Introduction

- (86) The Project consists of up to two CO₂ capture projects and a CO₂ transport and storage project.

- (87) The CO₂ capture projects concern two capture facilities at a waste-to-energy plant at Klemetsrud, Oslo, owned and operated by FOV, and a cement factory in Brevik, owned and operated by Norcem (separately “the FOV Capture Project” and “the Norcem Capture Project”, and together “the Capture Projects”).

5.2.2 Fortum Oslo Varme AS

- (88) FOV is a limited liability company established in Norway. FOV is a legal successor to Klemetsrudanlegget AS. In turn, Klemetsrudanlegget AS is a legal successor of Energigjenvinningsetaten,¹⁴⁵ as regards the Klemetsrud plant. Klemetsrudanlegget AS was created by way of demerger from the City of Oslo’s Waste-to-Energy Agency in 2015.
- (89) FOV’s shares are owned by the City of Oslo (50%) and Fortum Participation Limited (“FPL”) (50%). FPL is a wholly-owned subsidiary of the Finnish energy company Fortum Oyj, which is incorporated in Ireland. Fortum Oyj is a Finnish State-owned energy company, focusing on the Nordic and Baltic countries, Poland, Russia and India. Fortum operates power plants, including co-generation plants, and generates and sells electricity and heat. The company also sells waste services, such as recycling, reutilisation, final disposal solutions, soil remediation, environmental constructions services, other energy-related services and products, e.g. consultancy services for power plants and electric vehicle charging.¹⁴⁶
- (90) FOV operates the Klemetsrud waste-to-energy plant. FOV provides waste incineration treatment services to municipalities and commercial and industrial customers. Heat from the waste incineration is recycled to electricity and district heating and cooling in the greater Oslo area. The combustion capacity is 375 000 tonnes per year with continuous operation of 24 hours per day. The plant produces 150 GWh of electricity per year and supplies the district heating network in Oslo. In total, FOV has 11 plants in Oslo providing district heating.¹⁴⁷
- (91) The Norwegian authorities have explained that, as regards residual waste from commercial and industrial customers, price is the main selection criteria for choosing a service provider. The same applies for international waste/import of waste, which is highly price sensitive. However, the FOV Capture Project may increase FOV’s competitiveness in public tenders, when environment and emissions are important factors. The latter is the case, in particular, with providing waste incineration services to municipalities and other public customers that may include environmental criteria in contract award procedures.

5.2.3 Norcem AS

- (92) Norcem is the only cement producer in Norway and supplies cement internationally.¹⁴⁸ Norcem has two plants in Brevik and Kjølpsvik, which are among the most modern in Europe, as far as energy consumption and limitation of emissions are concerned. The two plants have a total production capacity of 1.8 million tonnes per year and the market share in Norway is around 75%. Currently,

¹⁴⁵ Energigjenvinningsetaten is the former Waste-to-Energy Agency of the City of Oslo. The latter was recently merged with the city’s Waste Management Agency.

¹⁴⁶ For further information concerning Fortum Oyj see: <https://www.fortum.com/about-us>

¹⁴⁷ See <https://www.fortum.com/district-heating-oslo>

¹⁴⁸ For further information concerning Norcem AS see: http://www.norcem.no/en/about_us

Norcem exports cement and clinker to Sweden, Denmark and Iceland. Over the years, Norcem has also exported to markets in the United States, the United Kingdom, Russia and Western Africa.

- (93) Norcem AS is part of the HeidelbergCement group. HeidelbergCement is a German multinational building materials company, headquartered in Heidelberg, Germany. It is one of the largest building materials companies in the world. HeidelbergCement is number one producer of construction aggregates, number two in cement and number three in ready mixed concrete worldwide.
- (94) As explained by the Norwegian authorities, the project itself does not allow Norcem to increase sales immediately. Moreover, both of Norcem's plants produce close to their capacity. However, the Capture Project will be positive in terms of meeting consumers' increasing demand for sustainably produced cement. At the same time, the Capture Project will increase costs significantly, leading to increased competition from producers of cement, with a much higher carbon footprint, in particular, outside the EEA.

5.2.4 Northern Lights

- (95) The CO₂ from the Capture Projects is delivered to the transport and storage element of the Project ("the Transport and Storage Project"). The Transport and Storage Project is to be owned and operated by Northern Lights. Northern Lights is a joint venture between Equinor Refining Norway AS, Total E&P Norge AS and Norske Shell A/S ("the Northern Lights Participants").
- (96) Equinor Refining Norway AS ("Equinor") is part of the Equinor group.¹⁴⁹ Equinor is an international energy company with headquarters in Stavanger, Norway. The Norwegian State holds 67% of the shares in Equinor through the Ministry.
- (97) Total E&P Norge AS¹⁵⁰ ("Total") is a Norwegian subsidiary of the Total group, a French multinational broad-energy company that produces and markets fuels, natural gas and low-carbon electricity.
- (98) Norske Shell A/S ("Shell") is part of the Shell group. The Shell group is a Dutch-British oil and gas multinational headquartered in the Netherlands and incorporated in the United Kingdom.¹⁵¹

¹⁴⁹ For further information concerning Equinor see: <https://www.equinor.com>.

¹⁵⁰ For further information concerning Total see: <https://www.total.com/norway>.

¹⁵¹ For further information concerning Shell see: <https://www.shell.no>.

- (99) As demonstrated by their strategies, Equinor,¹⁵² Shell¹⁵³ and Total¹⁵⁴ have a proactive approach towards the development of CCS. More broadly, the Norwegian oil and gas sector has set out its ambition to reduce GHG emissions from the petroleum sector in a Roadmap for the NCS, drawn up by the Norwegian Oil and Gas Association and the Federation of Norwegian Industries through KonKraft.¹⁵⁵
- (100) The Northern Lights joint venture is planned to be established in the form of a Norwegian incorporated unlimited shared liability company. The Northern Lights Participants plan to distribute the participants' interest evenly, each holding 1/3 of the shares. Costs, revenues and benefits are also shared in proportion to the participants' ownership share.¹⁵⁶ According to the Norwegian authorities, the joint venture would be non-exclusive and the partners may participate in other storage projects, separately or jointly.

5.3 The granting authority and the legal basis

- (101) The Ministry has overall responsibility for the Project. The Ministry negotiates agreements for State financing of the Project (the State financing agreements together: "the Support Agreements"). The Support Agreements are concluded between the beneficiaries and the Ministry.¹⁵⁷ ESA considers that the Support Agreements constitute the legal basis for granting the financial support under the notified measures. State financing under the Support Agreements is conditional, amongst others, on ESA's approval of the notified measures.
- (102) The Government makes a proposal to Parliament on the funding of Northern Lights, if it proposes funding of at least one of the Capture Projects. The entry into force of the Support Agreements is conditional on the Parliament's decision on implementation and State support to the Project. The Norwegian authorities have explained that should the Parliament's decision require any substantive

¹⁵² As regards Equinor, see for instance: <https://www.equinor.com/en/news/2020-01-06-climate-ambitions-norway.html>; <https://www.equinor.com/en/how-and-why/sustainability.html>; <https://www.equinor.com/content/dam/statoil/image/how-and-why/climate/climate-roadmap-2018-digital.pdf>.

¹⁵³ As regards Shell, see for instance: <https://www.shell.com/energy-and-innovation/the-energy-future/what-is-shells-net-carbon-footprint-ambition.html>; <http://www.shell.com/sustainability/environment/our-approach-sustainability.html>; <http://www.shell.com/sustainability/environment/climate-change.html>; <http://www.total.com/en/commitment/environmental-issues-challenges/climate-change/carbon-intensityenergy-mix>.

¹⁵⁴ As regards Total, see for instance: <http://www.total.com/en/commitment/environmental-issues-challenges/climate-change/carbon-intensityenergy-mix>.

¹⁵⁵ KonKraft is a collaboration arena for the Norwegian Oil and Gas Association, the Federation of Norwegian Industries, the Norwegian Shipowners Association and the Norwegian Confederation of Trade Unions (LO), with LO members Fellesforbundet and Industri Energi. It serves as an agenda-setter for national strategies in the petroleum sector, and works to maintain the competitiveness of the Norwegian Continental shelf, so that Norway remains an attractive area for investment by the Norwegian and international oil and gas industry – including suppliers and the maritime sector. See: <https://www.norskoljeoggass.no/contentassets/63d3f735faa54c488f41c37f66b364ac/roadmap-270220-eng.pdf>; http://konkraft.no/wp-content/uploads/2016/10/Climate_Final_web_.pdf.

¹⁵⁶ For further information on the Northern Lights, see: <https://northernlightsccs.eu/en/about>.

¹⁵⁷ In Norwegian: *Staten ved Olje- og energidepartementet*.

amendments, it would require new negotiations with the beneficiaries and amendments to the Support Agreements.

- (103) As regards aid to the Capture Projects, the Ministry has negotiated support agreements with FOV and Norcem (jointly “the Capture Support Agreements”). According to the Norwegian authorities, the terms and conditions of the Capture Support Agreements are identical for both Capture Projects.¹⁵⁸
- (104) Financial support to the Transport and Storage Project is granted under an agreement negotiated with the Northern Lights Participants (“the Northern Lights Support Agreement”).

5.4 Form of aid, budget, and duration

- (105) Under the Support Agreements, the Project receives, in the form of direct grants: (i) investment aid, covering a share of the beneficiaries’ capital expenditure¹⁵⁹ (“CAPEX”), and (ii) operating aid, covering a share of the beneficiaries’ operational expenditure¹⁶⁰ (“OPEX”). In addition to CAPEX and OPEX, the aid covers compensation for CO₂ emissions captured by FOV and Norcem, not falling under the ETS (section 5.8.4.3.4), CO₂ leakages (section 5.8.5.4.2) and CCS full-chain related risks (section 8.6.4).
- (106) More precisely, the notification concerns the following three measures:
- Investment and operating aid to the FOV Capture Project (“the FOV Measure”).
 - Investment and operating aid to the Norcem Capture Project (“the Norcem Measure”).
 - Investment and operating aid to the Transport and Storage Project (“the Transport and Storage Measure”).
- (107) Investment aid will be granted from the Project’s commencement until completion of the facilities. Operating aid will be granted for a period of 10 years from the completion of the facilities (“the Operating Period”). The Norwegian authorities estimate that the operation of the Project commences in 2024.
- (108) The State funding will be appropriated yearly in the State budget, in accordance with the Parliament’s approval decision, based on actual CAPEX and OPEX.
- (109) The Project’s cost of construction and operation depends on several factors, including how many CO₂ capture projects are selected. The Norwegian authorities consider the estimated budget of the notified measures at two possible levels, the so-called P50 and P85 simulated outcomes. The maximum budget of the measures is the estimated P85 outcome, which is the cost level that has an estimated

¹⁵⁸ The annexes to these agreements differ, due to differences in the scope of the two Capture Projects.

¹⁵⁹ Capital expenditure are funds used by an undertaking to acquire or upgrade physical assets.

¹⁶⁰ Operating expenses are the day-to-day expenses an undertaking incurs to keep their business operational.

probability of non-exceedance of 85%. For more details on the P50 and P85 budget simulation please see section 5.8.3.

- (110) The Government's proposal to the Parliament for funding for the Full-Scale CCS Project will be the P85 cost level. The P85 level is based on cost-risk simulations conducted as part of the Norwegian State's Quality Assurance Process for Large Public Investments (see section 5.8.3 for more details) and explained in the quality assurers' final report of June 24 2020.¹⁶¹ Under the simulated P85 outcome the State's total cost for the Project is NOK 22 200 million.^{162,163,164}
- (111) Should the actual investment and operating cost for the Project exceed the simulated P85 outcome, additional State funding and continuation of the Project will require reapprove by the Norwegian Government and the Parliament.¹⁶⁵
- (112) At P85, the Project is estimated to receive investment aid as follows:
- The FOV Measure: NOK 4 365 million.
 - The Norcem Measure: NOK 3 141 million.
 - The Transport and Storage Measure: NOK 8 169 million.
- (113) Further, at P85, the Project is estimated to receive operating aid as follows:
- The FOV Measure: NOK 2 225 million.
 - The Norcem Measure: NOK 1 172 million.
 - The Transport and Storage Measure: NOK 4 429 million.
- (114) The present decision covers investment and operating aid up to simulated P85 budget of the two Capture Projects and the Transport and Storage Project, as explained above. Nevertheless, should the actual cost of any of the individual projects exceed P85, additional aid to that project is covered by the current decision if: (i) total aid to the project does not exceed eligible costs (paragraph 160 of the EEAG), and (ii) the gain-share mechanism is respected (see sections 5.8.4.3.5 and 5.8.5.4.4).

¹⁶¹ [Kvalitetssikring \(KS2\) av tiltak for demonstrasjon av fullskala CO2-håndtering. Statens prosjektmodell. Rapport nummer D102b. Sluttrapport, 24. juni 2020.](#)

¹⁶² In real 2021 values (no discounting), foreign exchange rates on 2 June 2020. Values from the quality assurers' June 24 final report.

¹⁶³ As explained by the Norwegian authorities, due to the risk diversification effect from financial theory, the total simulated P85 outcome for the Project as a whole is lower than the sum of the simulated P85 outcomes of the two Capture Projects and the Transport and Storage Project.

¹⁶⁴ This amount does not include the potential additional operating support described in section 5.8.4.3.4, which is estimated to be between NOK 0-120 million per year. ESA notes that this additional support is taken into account in funding gap calculations and gain-share mechanism.

¹⁶⁵ ESA notes that under the Support Agreements, the P85 outcome is based on cost/risk simulations conducted by the beneficiaries and reflected in the FEED reports (see paragraphs (78) and (81)). These P85 outcomes are slightly lower than those resulting from the State's Quality Assurance Process and reflected in the final report. Should the actual investment and operating costs exceed the former P85 outcomes, the State and the beneficiaries would have to renegotiate the Support Agreements.

5.5 Aid granting process

- (115) As explained in section 4.4, financing contracts for the Concept and FEED phase were awarded to FOV, Norcem and Equinor.
- (116) Following the award of the Concept and FEED phase financing contracts, the Ministry started negotiations with FOV, Norcem and Equinor, as regards funding of the construction and operation phase.
- (117) The Norwegian authorities have explained that only participants in the competitive process for State funding for Concept and FEED studies were eligible to participate in the selection process for State funding of the construction and operation phase.
- (118) The beneficiaries submitted FEED reports, which include comprehensive descriptions of the project, including locations and timeline for project execution. The FEED reports also include the beneficiaries' cost risk analyses and were subject to the external quality assurance (see section 5.8.3).
- (119) As explained by the Norwegian authorities, the Ministry negotiated with the beneficiaries a cost-sharing mechanism.¹⁶⁶ As part of the negotiations, the beneficiaries submitted an overview of eligible cost items, net present value calculations with and without aid and thresholds for triggering a gain-share mechanism, as well as other financial data. In addition to submitting a FEED report and financial information, the Capture Projects and the Transport and Storage Project engaged an external consultant to conduct an independent third-party review of the cost of capital. As explained in paragraph (110), the Government has to first propose funding for the Project to the Parliament. The Parliament has to authorise both the Project and State funding to the Project.

5.6 The CO₂ Capture Projects

5.6.1 The FOV Capture Project

- (120) As explained in paragraphs (88) to (90), FOV owns and operates a capture facility at a waste-to-energy plant at Klemetsrud, Oslo. The FOV Capture Project can capture approximately 0.4 mtpa of CO₂ from the plant's flue gas.
- (121) Under the Capture Support Agreements, following the completion of the capture facility, the Capture Projects are required to operate the facilities in accordance with the terms of the agreement during the Operating Period.
- (122) The CO₂ is captured from the FOV plant's flue gas, by utilising a post combustion amine-based absorption technology, with CO₂ capture efficiency at 90–95%. The technology used is a Shell Cansolv¹⁶⁷ licenced CO₂ capture technology with Shell proprietary amine DC-103. By applying heat, the amine solution will be regenerated, and highly concentrated CO₂ will be released. This allows the amine to be reused.

¹⁶⁶ See sections 5.8.4.3.5 and 5.8.5.4.4 for more details of the mechanism.

¹⁶⁷ Shell Cansolv is a brand name owned by Shell Catalysts&Technologies Ltd., part of the Shell group. Information on Shell Cansolv is available at: <https://www.shell.com/business-customers/catalysts-technologies/licensed-technologies/emissions-standards/tail-gas-treatment-unit/cansolv.html#iframe=L2NhbnNvbHYtZm9ybQ>.

The captured CO₂ will be compressed and cleaned before it is liquefied. Heat from the waste incineration will be used to regenerate the amine solution.

- (123) The illustrative figure below shows existing installations in grey in the upper left corner and new ones in the top (capture plant) and in the centre (liquefaction, intermediate storage and truck filling station).



Figure 3. 3D illustration of the FOV Capture Project.

- (124) The Klemetsrud plant is situated approximately 10 km from the shore. FOV sends the captured CO₂ to a liquefaction and intermediate storage site at Klemetsrud using a local pipeline. The local pipeline will be installed as part of the capture project.
- (125) The intermediate storage site is planned to consist of four horizontal bullet type vessels¹⁶⁸ storing CO₂ in liquefied form. The intermediate storage site will be owned and operated by FOV.
- (126) From the intermediate storage site, CO₂ is planned to be transported by zero emission tank trucks to an export terminal at Oslo Harbour. FOV outsources the service of tank trucks to an external service provider. The latter owns and operates the trucks. It is not yet known who the external service provider will be.
- (127) At the export terminal at Oslo Harbour, CO₂ is planned to be stored in buffer tanks, consisting of 16 horizontal bullet type vessels, with capacity equal to four days of FOV capture operations. No discharge of CO₂ will normally take place from the buffer tanks.

¹⁶⁸ A horizontal bullet type vessel is a horizontally oriented cylindrical pressure vessel with dished ends.

- (128) The export terminal is also where the shipping point is located (“the Shipping Point”). The Shipping Point is defined in the Support Agreements as “a point at the connection flanges for loading hose/arm at the transport vessel’s manifolds for liquid and gaseous CO₂”. As explained by the Norwegian authorities, in practice, this is the point where the CO₂ enters into the Northern Lights’ owned and operated ships. The ships will transport CO₂ in liquid form to the storage facility every fourth day. CO₂ is loaded from the buffer tanks to the cargo tanks of the ships by using pumps and loading arms located on the quay at the export terminal. The export terminal, including the buffer tanks, pumps and loading arms, is owned and operated by FOV.
- (129) Under the FOV Support Agreement, FOV is obliged to comply with the Norwegian Act and Regulation on public procurement.¹⁶⁹ As explained by the Norwegian authorities, all purchasing follows the main principles of public procurement rules, even if not falling under these rules.
- (130) The main suppliers to the FOV Capture Project are TechnipFMC,¹⁷⁰ as the main contractor, and Shell Cansolv, as the licensor of the capture technology. Whereas several technologies were deemed mature and relevant, Shell Cansolv and TechnipFMC were selected based on an assessment of the commercial proposals and technical guarantees.
- (131) As explained by the Norwegian authorities, the highest sources of cost risk to the P50 outcome¹⁷¹ (about [...] % of the total cost risk) are uncertainty factors related to currency, market, supplier/contractor capabilities and project organisation. Currency fluctuation is the largest uncertainty factor for the P50 outcome. Supplier market development is the second largest uncertainty factor. The third and fourth are supplier/contractor capabilities and the project organisation, including loss of key personnel.
- (132) As explained by the Norwegian authorities, the Klemetsrud plant is a waste incineration plant and emissions from such plants currently do not fall under the ETS Directive. Accordingly, FOV does not have to surrender ETS allowances (see section 3.3.3). At the moment, no other taxes (such as CO₂ tax) apply to FOV’s emissions (see section 3.3.4).
- (133) As further explained in section 5.8.4.3.4, if emissions are not subject to a duty to surrender ETS allowances or pay CO₂ tax if introduced, the Capture Projects receive additional State support in the form of payment per tonne of CO₂ delivered to the Transport and Storage Project.

¹⁶⁹ In Norwegian: *Lov om offentlige anskaffelser (anskaffelsesloven)*, ([LOV-1999-07-16-69](#)), and *Forskrift om offentlige anskaffelser (anskaffelsesforskriften)*, ([FOR-2016-08-12-974](#)). In English: *the Public Procurement Act* and *the Public Procurement Regulation* (respectively).

¹⁷⁰ TechnipFMC is a globally active provider of subsea, onshore, offshore, and surface technologies. See for more information: <https://www.technipfmc.com>.

¹⁷¹ For further explanations concerning the P50 outcome, please see paragraph (170) of this decision.

- (134) Further, there is an upper limit on how much CO₂ the projects can deliver. The Norwegian authorities are responsible for the Transport and Storage Project being able to receive, transport and store approximately 0.4 mtpa of CO₂.
- (135) As explained by the Norwegian authorities, FOV and Norcem are liable for the operation of the capture facility, including any emissions of CO₂ prior to delivery to Northern Lights at the Shipping Point. The State does not carry any liability for leakages of CO₂ at this stage of the Project.

5.6.2 The Norcem Capture Project

- (136) Norcem will own and operate a capture facility at an existing cement factory in Brevik, Telemark county. The Norcem Capture Project will capture up to 0.4 mtpa of CO₂ emitted by the factory, with an envisaged capture rate of 50%. The Operating Period of the Norcem Capture Project is 10 years from the completion of the capture facility.
- (137) The Norcem Capture Project uses amine-based capture technology supplied by Aker Solutions. The captured CO₂ will be compressed and cleaned before it is liquefied. Waste heat recovered from the cement production process will be used to regenerate the amine solution.
- (138) After liquefaction, the CO₂ is transferred through a pipeline from the capture site to storage tanks located close to the harbour area. The liquid CO₂ will be transferred directly from the storage tanks in a pipeline to the pier and onto transport vessels operated by Northern Lights. Norcem will own the pipeline from the storage tanks to the loading point at the harbour. The illustrative figure below shows existing installations in grey and new ones in red, blue, yellow and green.



Figure 4. 3D illustration of the Norcem Capture Project.

- (139) As explained by the Norwegian authorities, some of the Norcem Brevik factory emissions that are captured are partially not subject to the obligation to surrender ETS allowances and no other tax applies to these emissions.¹⁷² To the extent that such emissions are captured, they will qualify for additional support under the Capture Support Agreements, as explained in section 5.8.4.3.4. As explained in paragraph (135), the State does not carry any liability for leakages of CO₂ prior to delivery to Northern Lights' Shipping Point.

¹⁷² CO₂ from biomass such as wood, paper, animal meal.

- (140) According to the Norwegian authorities, Norcem will apply the rules and procedures outlined in the Public Procurement Act to the extent applicable. If not applicable, Norcem is required to apply sound and customary procurement principles and use appropriate procurement procedures.
- (141) Regarding selecting technology suppliers, the Capture Project requires use of technologies that have been tested, developed and matured to a certain level. Norcem's contractual relationship with Aker Solutions dates back to the construction of a research facility for the testing of post combustion CO₂ capturing technologies at the Brevik cement plant. That project was subject to ESA's Decision No 74/13/COL. That decision describes in more detail the selection process of technology suppliers.¹⁷³
- (142) As explained by the Norwegian authorities, the most critical aspects for the project's P50 outcome¹⁷⁴ are the costs and risks connected to integration of the capture facility into the cement plant processes. The integration could have adverse effects on both the operations of and output from the carbon capture facility, as well as the cement production.

5.7 The Transport and Storage Project

5.7.1 General

- (143) The two Capture Projects are located in the eastern part of Norway, while the storage facility and the CO₂ receiving terminal is located in Øygarden in the western part of Norway. The sailing distance between the Capture Projects and the CO₂ receiving terminal is approximately 700 km (one way).
- (144) The ships planned to be used for the Project resemble typical LPG-carriers of moderate size (cargo capacity 7 500 m³) to transport the captured CO₂ to the receiving terminal. Two ships are foreseen to be able to ensure a high uptime of the CO₂ flow through the CCS-chain during the Operating Period. No discharge of captured CO₂ will take place during the voyage. Northern Lights may choose to procure transport services from a third-party provider.
- (145) A new-build onshore CO₂ receiving terminal will act as a hub in the CCS chain, being able to handle up to 1.5 mtpa of CO₂. Whereas 0.8 mtpa is reserved for the Capture Project during the Operating Period, the rest of the 1.5 mtpa storage capacity is to be made available on commercial terms. The terminal will consist of a quay with loading arms for transfer of the CO₂, buffer storage tanks and pumps to bring the CO₂ into a subsea pipeline. The pipeline capacity is 5 mtpa. As explained by the Norwegian authorities, an increased capacity readiness of the pipeline is necessary for cost efficient use of resources and the additional costs are insignificant.
- (146) The pipeline will be approximately 100 km long and will bring the CO₂ from the receiving terminal to a subsea injection well. Through the well, the CO₂ will be

¹⁷³ ESA's Decision No 74/13/COL, paragraph 17.

¹⁷⁴ See paragraph (170).

injected into the Johansen formation,¹⁷⁵ 3 000 m below sea level (the Aurora location in Exploitation License 001). Subsea control and power cables will be extended from an existing offshore platform 35 km away.



Figure 5. 3D illustration of the onshore CO₂ receiving terminal.

- (147) As explained by the Norwegian authorities, the most important input variables for Northern Lights are commercial third-party volumes and tariffs.
- (148) Commercial third-party volumes (volumes over and above CO₂ accepted from the Capture Projects under the Full-Scale CCS Project) are a function of available capacity, which depends on the performance of the injection well(s) and other facilities, the demand for CO₂ transportation and storage services, development of the required regulatory framework and negotiations of acceptable tariff levels. Northern Lights has modelled cash flow scenarios based on no commercial third-party volumes and scenarios where they achieve 0.7 mtpa from one or more third-parties, with sensitivities for start-up in 2025 and 2028.
- (149) The tariff level is set through negotiations between Northern Lights and third-parties. Whereas several tariff models may be possible, the Norwegian authorities consider that third-parties' willingness to pay will be a function of EUA prices and carbon emission taxes, subtracted net cost of developing and operating capture facilities after subsidies. Northern Lights has modelled the cash flow scenarios based on a tariff level of EUR [...] per tonne, with a sensitivity at EUR [...] per tonne, ignoring the net cost of developing and operating capture facilities. The EUR [...]

¹⁷⁵ As explained by the Norwegian authorities, even if the Concept and FEED studies included initially CO₂ storage site within the Smeaheia area, the latter area would have entailed too much risk and the Johansen formation was proposed as a storage site. See [further information](#) on the Johansen formation.

per tonne tariff level is chosen based on the pre-COVID-19 EUA price (currently at around EUR 19 per tonne).

- (150) On 11 January 2019, Norway¹⁷⁶ issued an exploitation licence¹⁷⁷ to Equinor. Prior to the start of injection and storage of CO₂ in the subsea reservoir, the storage operator must also have the required storage permit (see paragraphs (17) and (18)). As explained by the Norwegian authorities, the process for obtaining the storage permit is currently foreseen to take place from 2021 to 2023.
- (151) The main suppliers to the Northern Lights Project remain to be selected. As explained by the Norwegian authorities, Northern Lights will have to comply with the rules and procedures of the Public Procurement Act where applicable.
- (152) Where not covered by these rules, Northern Lights will follow Equinor's normal procurement procedures.¹⁷⁸ The main sourcing method is competitive tendering among qualified tenderers. Potential suppliers are identified through regular supplier market analyses and various qualification/screening systems. All suppliers must meet minimum requirements, including safety, security, sustainability and public registration. For contracts involving high risk, the supplier's management system will need to be qualified.
- (153) Further, and as explained by the Norwegian authorities, Northern Lights assumes liability and risk for the CO₂ from the Capture Projects at the Shipping Point. More information on the liability for leakage is provided in section 5.8.5.4.2.

5.7.2 CCS developments

- (154) The CCS transport and storage is in the very early stage of development. There is not, at present, a functioning market or an observable price level for CO₂ transport and storage services. While there is currently an increasing trend and incentive to reduce CO₂ emissions, there is no guarantee that there will be a demand for carbon transportation and storage from third-party customers.
- (155) At present, there are, apart from the two proposed CO₂ sources for the project, no or only limited Government support mechanisms in Norway or other relevant countries incentivising, subsidising or mandating CO₂ capture and storage. The future evolution of such mechanisms is highly uncertain at present amidst the variety of low carbon policies being pursued by the relevant Governments in the countries from which CO₂ volumes could realistically be sourced by ship.
- (156) In Norway, there are existing storage projects (Sleipner and Snøhvit, see paragraph (5)). However, as explained by the Norwegian authorities, these projects have a different geology (all reservoirs are unique) and consequently different subsurface storage concepts. Moreover, the Snøhvit and Sleipner projects remove CO₂ from natural gas (before further processing at Snøhvit into LNG and at Sleipner into

¹⁷⁶ By King-in-Council according to section 4-1(1) of the Norwegian CO₂ Storage Regulation.

¹⁷⁷ Document No 1135089. [Additional information](#) on the exploitation permit is available on the website of the Norwegian Petroleum Directorate. See also the Ministry's [press release](#) of 11 January 2019.

¹⁷⁸ Equinor's [procurement process](#).

pipeline export) and inject CO₂ into nearby geological formations. Northern Lights aims to be a partially open-source system for providing CO₂ transporting and storage services to third parties (see paragraph (148)).

- (157) According to the Norwegian authorities, the aspect with the biggest influence on the P50 outcome¹⁷⁹ of the Transport and Storage Project is therefore the revenues. As there is no commercial market, the starting point is zero revenues and no business case.
- (158) Northern Lights is, however, working to make this market emerge. If commercial customers materialise, the next question would be what tariff they would be willing to pay for services rendered by Northern Lights. ETS prices can be seen as an alternative cost to CO₂ capture, transport and storage. Whereas before the Covid-19 pandemic the ETS prices were about 26 EUR per tonne, they have recently been even below EUR 20 per tonne. Northern Lights will need a tariff significantly higher than these values to potentially be able to reach a positive business case (in the range EUR 30 to 55 per tonne). As the uncertainty of revenue is extremely high, it is the most critical input influencing the P50 outcome.

5.8 The principles of granting investment and operating aid

5.8.1 Introduction

- (159) As explained in section 5.3, aid to the Capture Projects and to the Transport and Storage Project is granted under Support Agreements, concluded between the Ministry and the beneficiaries. The Support Agreements govern the parties' rights and obligations during the construction and operation phase of the Full Scale CCS Project, including the allocation of investment and operational costs and risks between the beneficiaries and the Norwegian State.

5.8.2 Cost estimation

- (160) The notified measures for the State financing of the construction and operation of the Capture Projects and for the Transport and Storage Project are based on cost estimates from the beneficiaries' FEED reports and the State Quality Assurance process (see section 5.8.3 below for more details).
- (161) According to the Norwegian authorities, the two Capture Projects and the Transport and Storage Project have followed industrial standard project development procedures for their respective industries. This includes development of CAPEX and OPEX estimates to certain maturity levels for the different phases. All projects have completed FEED studies, which is typically the last phase before an investment decision and the execution phase.
- (162) In practice, this means that all cost estimates are developed using detailed information developed in the FEED phase. This includes process flow diagrams, utility flow diagrams, piping and instrument diagrams, heat and material balances, plot plan, layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc. The estimates are prepared in great detail and involve thousands of unit

¹⁷⁹ See paragraph (170).

cost line items. Estimates are developed for single items and quantities and aggregated in a bottom-up approach to reach cost estimate for the total project. Item and quantity costs are extracted from a combination of internal or external cost databases or vendor quotation, reference projects, etc.

- (163) To classify the maturity of the cost estimates, the Capture Projects use the Association for Advanced Cost Engineering (“AAACE”) International classification. This is a commonly used classification system applied in engineering procurement and construction for the process industry. When FEED is completed, the cost estimates should be similar to an AAACE Class 2 cost estimate. Both FOV and Norcem have delivered cost estimates similar to AAACE Class 2. The Transport and Storage Project use Equinor’s internal project development guidelines for requirements to their estimates. These are requirements used for all commercial development projects at Equinor. The delivered cost estimates satisfy Equinor’s internal requirements.
- (164) For FOV, the CAPEX and OPEX estimates are based on detailed input from potential suppliers and internal assessments, using a bottom-up approach. The exception is for maintenance costs for OPEX where, to some extent, a percentage of relevant CAPEX is used. Quantity calculations are based on detailed 3D models or drawings prepared and provided by the main subcontractor TechnipFMC. For unit prices, internal price bases have been used, or reference projects have been used to the extent possible and relevant.
- (165) For Norcem, the CAPEX and OPEX estimates are based on detailed input from potential suppliers and internal assessments, using a bottom-up approach. Quantity calculations and interfaces are based on a detailed Building Information Model. For unit prices, internal price bases have been used, or reference projects have been used to the extent possible and relevant.
- (166) For Northern Lights, the CAPEX estimates for the offshore part of the project has been developed using Equinor internal data based on a portfolio of offshore projects. For the onshore part, quantities are provided by subcontractors and later benchmarked using reference costs. Equipment costs are based on information on pricing from suppliers. Civil work and process facility estimates are based on estimates from subcontractors. CAPEX for the ship transport has been developed based on quotes from shipyards. To estimate resource needs, a master personnel plan has been developed based on experience from previous projects and input from suppliers. Hourly rates have been developed using internal evaluation and the actual hourly rates used in Equinor. OPEX costs are developed using numbers from internal operating experience and input from suppliers. The OPEX costs also include maintenance costs based on documented experience and input from equipment vendors.

5.8.3 State Quality Assurance Process

- (167) The cost estimate for all beneficiaries have further been subjected to external quality assurance under the Norwegian State's Quality Assurance process for large public investments ("QA scheme").¹⁸⁰
- (168) The QA scheme includes using a third-party quality assurer. According to the Norwegian authorities, this is the standard procedure for all large State-run projects and projects with a large share of State funding. The QA scheme comprises two extensive appraisal studies followed by external QA reviews in an investment project's planning process:
- QA1 – Quality assurance of choice of concept before government decision to start a pre-project.
 - QA2 – Quality assurance of the management base and cost estimates before the project is submitted to Parliament for approval and funding.
- (169) Quality assurance of the choice of concept is to be performed by the end of the concept appraisal phase, before a decision is made by the Government to start a pre-project. The purpose of QA1 is to ensure that the decision to start a pre-project and the choice between alternative concepts are subject to political control and also that the documents underlying the decision base are of high quality. QA2 is to be performed before the project is submitted to Parliament for approval and funding. Normally, this is done at the end of the pre-project phase. The control aspect is the main objective of this exercise. The consultant shall review the documentation behind the proposition presented to Parliament, with emphasis on cost estimates. In addition, the QA shall be forward-looking by charting the management challenges in the remaining phases of the project.
- (170) Both the beneficiaries and the Quality Assurer are required to produce base, P50 and P85 cost estimates. The methodology applied is commonly used in cost estimation of large projects and encompasses developing the base cost (no added cost due to risk) and then performing cost risk analysis. Risk impacts are determined by estimating the probability of occurrence and impact of risk events. Once all the data is provided, Monte Carlo simulations are run to determine a probability distribution curve for the costs (so called S-curve).¹⁸¹ The P50 estimate is then determined as the estimate where 50% of all simulated cases show actual costs below P50 and 50% show actual costs above the P50 estimate. The P85 estimate is defined as the estimate where 85% of the simulated cases show actual costs below the P85-estimate and 15% of the show actual costs above the P85.¹⁸²

¹⁸⁰ The external quality assurance under [Norway's quality assurance process for large public investments](#).

¹⁸¹ Monte Carlo simulation is a technique used to understand the impact of risk and uncertainty in financial, project management, cost, and other forecasting models. The methodology use computational algorithms that rely on repeated random sampling to obtain numerical results.

¹⁸² Northern Lights' numbers are provided as Pmean rather than P50. The difference is less than 2% (Pmean > P50 as the cost distribution curve is slightly skewed to the right (higher probability of higher costs than lower costs)).

5.8.4 Financing of construction and operation of the Capture Projects

5.8.4.1 General

- (171) The notified measures concern, firstly, the financing of the construction and operation of the two Capture Projects. The construction of the capture facilities is planned to take place over the four-year period from 2021 to 2024. Following completion, the beneficiaries are further required to operate the facilities during the 10-year Operating Period.
- (172) As explained in paragraph (116), following the award of the Concept and FEED phase financing contracts, the Ministry started negotiations with FOV and Norcem as regards funding of the construction and operation phase. The negotiations were conducted in parallel, and the terms and conditions of the agreements are the same for both beneficiaries.¹⁸³
- (173) Pursuant to the Capture Support Agreements, the Norwegian authorities will grant both investment and operating aid to cover an agreed portion of the beneficiaries' actual investment costs (i.e. CAPEX) and operating cost (i.e. OPEX) for the construction and operation of the capture facilities. Additionally, the Norwegian authorities will make transport and storage of the captured CO₂ available to the beneficiaries free of charge during the 10-year Operating Period.

5.8.4.2 Investment aid

5.8.4.2.1 Eligible investment cost

- (174) During the construction phase, the beneficiaries will be responsible for planning and building the CO₂ capture facilities in accordance with the terms of the Capture Support Agreements. Pursuant to the terms, and in order to realise the project, the State will grant investment support based on actual costs incurred by the beneficiaries when establishing the capture facilities.
- (175) Only eligible investment costs may be subject to state financing under the agreement. The eligible investment costs are the additional costs incurred by the beneficiaries in constructing the capture facilities, as well as the cost for necessary modifications to the production site. Conversely, costs connected to upgrades, improvements or other measures at the production facilities that the beneficiaries would incur regardless of the project, or that exceed what is necessary, will not be compensated.
- (176) Tables 1 and 2 below set out the P50 cost projections for the main CAPEX items for each of the Capture Projects.

No.	Cost item	Nominal		Discounted	
		MNOK	Share (%)	MNOK	Share (%)
1	Process ¹⁸⁴	[...]	[...]%	[...]	[...]%
1a	<i>Engineer. & Proc. Services</i>	[...]	[...]%	[...]	[...]%

¹⁸³ The annex concerning the scope of the project is different for each of the beneficiaries, due to differences between the projects.

¹⁸⁴ Process comprises the CO₂ capture plant, CO₂ treatment modules, truck terminals and intermediate storage at Klemetsrud and harbour.

1b	Equipment and itemized bulk procurement and supply	[...]	[...]%	[...]	[...]%
1c	Construction management	[...]	[...]%	[...]	[...]%
1d	Construction costs	[...]	[...]%	[...]	[...]%
1e	Preliminaries (lump sum)	[...]	[...]%	[...]	[...]%
1f	Estimated Corona discount re-added to CAPEX	[...]	[...]%	[...]	[...]%
2	Civil Work ¹⁸⁵	[...]	[...]%	[...]	[...]%
3	Integration ¹⁸⁶	[...]	[...]%	[...]	[...]%
4	Other cost ¹⁸⁷	[...]	[...]%	[...]	[...]%
5	Owners Organization cost ¹⁸⁸	[...]	[...]%	[...]	[...]%
Total investment cost		4127	100%	3436	100%

Table 1. P50 CAPEX items for the FOV Capture Project.¹⁸⁹

No	Cost item	Real 2019		Discounted	
		MNOK	Share (%)	MNOK	Share (%)
1	Connection to stack ¹⁹⁰	[...]	[...]%	[...]	[...]%
2	Pre-treatment of flue gas ¹⁹¹	[...]	[...]%	[...]	[...]%
3	CO ₂ absorption ¹⁹²	[...]	[...]%	[...]	[...]%
4	Solvent regeneration ¹⁹³	[...]	[...]%	[...]	[...]%
5	Compression, liquefaction and conditioning ¹⁹⁴	[...]	[...]%	[...]	[...]%
6	Transp. to intermed. storage	[...]	[...]%	[...]	[...]%
7	Intermediate storage ¹⁹⁵	[...]	[...]%	[...]	[...]%
8	Harbour and items from intermed. storage to loading ¹⁹⁶	[...]	[...]%	[...]	[...]%
1-8	Process specific subtotal	[...]	[...]%	[...]	[...]%
10	Support systems	[...]	[...]%	[...]	[...]%
11	Allowance	[...]	[...]%	[...]	[...]%

¹⁸⁵ Civil work includes site preparation and engineering/construction of concrete foundations for the plant, underground piping, establishment of rig and demolition of shed/building.

¹⁸⁶ Cost of integrating the CO₂ capture facilities with the waste heat recovery plant and other systems (e.g. connection to exiting flue gas system, external power, steam, district heating).

¹⁸⁷ FOV's insurance costs (construction all risks).

¹⁸⁸ Costs of FOV's staff and owners engineer that is required to run the project.

¹⁸⁹ Discounted numbers using FOV's [5-10]% internal hurdle rate.

¹⁹⁰ Connecting the capture plant to flue gas stack / factory chimney.

¹⁹¹ The flue gas is pre-treated/cleaned to remove any substances that may be harmful to the downstream carbon capture process / equipment.

¹⁹² The CO₂ in the flue gas is captured by use of an amine solvent (CO₂ is absorbed by the solvent)

¹⁹³ Regeneration of solvent by heating it. Remove the absorbed CO₂. Re-use of the solvent.

¹⁹⁴ The CO₂ is purified and pressurized (compressed and liquified) to meet CO₂ specifications for transportation and storage.

¹⁹⁵ Intermediate storage tanks for CO₂.

¹⁹⁶ Facilities/utilities/equipment needed for loading of CO₂ from the intermediate storage tanks to the ship (for transportation of CO₂ to the permanent storage site), e.g. loading arms, power connection, etc.

13	Beneficiary's own costs ¹⁹⁷	[...]	[...]%	[...]	[...]%
1-13	Total base cost	[...]	[...]%	[...]	[...]%
	Contingency	[...]	[...]%	[...]	[...]%
	Total investment cost (P50)	3 113	100%	2 743	100%

Table 2. P50 CAPEX items for the Norcem Capture Project.¹⁹⁸

5.8.4.2.2 Cost-sharing mechanism

- (177) Pursuant to the terms of the Capture Support Agreements, the Norwegian authorities will cover all eligible investment costs up to a certain amount ("Investment level 1"). Above this level, the remaining investment costs will be shared between the beneficiaries and the State at an agreed ratio. The cost-sharing mechanism entails that both the State and the capture beneficiaries will bear risks for construction cost overruns and for delayed completion of the facilities. According to the Norwegian authorities, this mechanism gives the beneficiaries incentives to keep costs as low as possible during the construction phase and incentivises efficiency.
- (178) Norcem and FOV were required to submit proposals for the threshold amount triggering own-contributions. Following the submission of initial offers on 6 December 2019, the State urged the beneficiaries to increase their level of own-contributions thereby lowering the initial investment grant from the State.
- (179) In the final offers delivered on 20 April 2020, the beneficiaries covered 25% of CAPEX above Investment level 1, whereas the State assumed 75%. Investment level 1 for the Norcem project has been set at 1.113 MNOK, which means a maximum contribution by Norcem of 620 MNOK (2019 real value). For the FOV project, Investment Level 1 has been set at 2.302 MNOK, meaning a maximum contribution of 504 MNOK (2019 real value).

Figure 6. The main elements of the investment aid model



¹⁹⁷ Company's project management and related overhead costs.

¹⁹⁸ Discounted numbers using Norcem's [5-10]% internal hurdle rate.

5.8.4.2.3 CAPEX exposure caps

- (180) Given that the actual costs for constructing the capture facilities remain uncertain, the Capture Agreements include a cap on investment cost commitments for both the State and the beneficiaries. According to the Norwegian authorities, such a cap is deemed necessary as neither the State nor the beneficiaries can commit to unlimited financial exposure to finalise the Project. The cap is set at level P85 based on cost estimates delivered as part of the FEED reports.¹⁹⁹ P85 is the cost level that has an estimated non-exceedance probability of 85% (see section 5.8.3).
- (181) In the event of investment cost overruns, but where costs are still below the P85-level, the beneficiaries will be obliged to carry out the projects. In these circumstances, costs will be shared between the State and the beneficiaries according to the agreed ratio for cost-sharing. Conversely, if the incurred investment costs should exceed the P85-level CAPEX, both parties have the possibility to abandon the project. Nevertheless, the beneficiary and the State both have the right to complete the capture facility, provided they cover all eligible investment costs that exceed the cap. In such a case, the other party is required to stand by the agreement. The agreements do not regulate how costs shall be shared if both parties agree to continue despite surpassing the P85 cap. However, the agreements do not prohibit the parties from continuing with the same cost-sharing percentage or a new split.

5.8.4.3 Operating aid

5.8.4.3.1 Introduction

- (182) Following the completion of the construction phase, the beneficiaries are required to operate the facilities for a period of ten years. In order to facilitate operations, the Norwegian authorities will grant operating aid during the Operating Period of 10 years, consisting of (i) fixed operating support, (ii) variable operating support and (iii) potential additional support for captured CO₂ falling outside the ETS regime or CO₂ taxation.

5.8.4.3.2 Eligible operating cost

- (183) The eligible operating costs are the additional costs incurred by the beneficiaries in operating the CO₂ capture facilities. These include running costs for operation and maintenance of the capture facility, as specified in the Capture Support Agreements. Conversely, the beneficiaries shall bear all costs for the operation of the facilities that do not qualify as eligible costs under the Capture Agreements. The OPEX estimates have been established during the Concept and FEED phase and have been further assessed under the QA Scheme (see section 5.8.3).

5.8.4.3.3 Fixed and variable operating aid

- (184) The Norwegian authorities will provide fixed operating aid up to a certain level ("Operating Cost Level 1"). Above this level, the remaining OPEX will be shared between the beneficiaries and the State at an agreed ratio (variable operating support). Variable operating support reflects that operating support above

¹⁹⁹ See paragraph (78).

Operating Cost Level 1 will fluctuate with the actual eligible operating costs incurred.

- (185) Under the Capture Agreements, beneficiaries will cover 25% of eligible OPEX above Operating Cost Level 1, whereas the State will assume 75%. The beneficiaries shall bear all costs for the operation of the facilities that do not qualify as eligible costs under the agreement.
- (186) The beneficiaries proposed the threshold triggering own-contributions as part of their financial offers to participate in the project. Following the submission of offers, the Norwegian State negotiated with the beneficiaries to lower the level further. The beneficiaries proposed the threshold in their indicative offers of 6 December 2019, following which the State urged the beneficiaries to increase the level of own contributions, thereby lowering the level of fixed operating support from the State.
- (187) The beneficiaries submitted proposals for Operating Cost Level 1, as part of their final financial offers to participate in the project, on 20 April 2020. Operating Cost Level 1 for the Norcem project has been set at 56 MNOK per annum, which means an expected contribution by Norcem of NOK 15 million per annum. For the FOV project, Operating Cost Level 1 has been set at NOK 129 million per annum, meaning an expected contribution of NOK 23 million per annum (all figures in real 2019 values).
- (188) The fixed operating support will be adjusted for electricity-charge indexation for the parts of OPEX, concerning electricity charges and inflation for the remaining parts, but otherwise stay fixed throughout the operating period. Fixed operating support is paid regardless of the amount of CO₂ captured, provided that the beneficiaries operate the capture facilities in accordance with the terms of the agreement. Variable operating support is not dependent on the amount of CO₂ captured, but reflects that operating support above Operating Cost Level 1 will fluctuate with the actual eligible operating costs incurred by the beneficiary.
- (189) The State is not obliged to grant operating support for eligible operating costs that exceed the maximum operating budget for the entire Operating Period. The maximum operating budget is the beneficiary's P85 cost estimate prepared in connection with the FEED studies.



Figure 7. Illustration of the financing model for the operation of CO₂ capture facilities.

- (190) According to the Capture Support Agreements, the beneficiaries is entitled to adapt, and if necessary, temporarily discontinue operation of the capture facility, if the operation inflicts a loss due to: (i) total operating costs exceeding the maximum operating costs for the entire operating period and (ii) total operating costs less operating support from the Government exceeding avoided CO₂ costs. If a situation as described above occurs, the parties shall jointly seek to come to an agreed solution for the project.

5.8.4.3.4 Additional operating support

- (191) The ETS Directive does not cover FOV's waste incineration plant at Klemetsrud. Furthermore, some of the CO₂ emissions from Norcem are not covered by the obligation to surrender ETS allowances.
- (192) In order to equalise the capture and storage of CO₂, regardless of whether the emission is subject to a duty to surrender allowances or not, the Government will, during the Operating Period, grant additional support in the form of payment per tonne of CO₂ delivered to the transport and storage operator, which is not subject to a duty to surrender allowances or CO₂ tax.
- (193) The additional support for capturing CO₂ emissions, currently not covered by the ETS, will equal the price under the EUA, to ensure that the effect of the model is neutral with respect to the capture of CO₂ inside or outside the ETS regime. The additional support shall be determined annually, based on the EUA forward price. The EUA forward price shall correspond to the average daily end prices in previous EUA forward contracts with delivery in December of the previous year. The prices must be obtained from the exchange/trading platform that had the largest volume of EUA forward contracts during the first quarter of the previous year and be converted to NOK based on Norges Bank's daily exchange rates.
- (194) According to the Agreement, additional support shall be reduced if the CO₂ that is not subject to surrender of ETS allowances is subject to CO₂ tax (provided a CO₂ tax is introduced). In the event the CO₂ tax is lower than the CO₂ quota price, the Government will grant additional support corresponding to the difference between the CO₂ tax and the CO₂ quota price.
- (195) In the event the CO₂ emissions, which are not subject to a duty to surrender ETS allowances, are subject to a CO₂ tax equal to the CO₂ quota price, the Government shall not grant additional support for the amount of CO₂ that is not subject to the surrender of ETS allowances. In the event the CO₂ tax being higher than the CO₂ quota price, the difference shall be deducted from the beneficiaries' right to additional support for any CO₂ volumes that are not subject to such CO₂ tax. Which CO₂ emissions that are subject to a duty to surrender ETS allowances shall be based on the beneficiary's approved quota accounts submitted to Norwegian environmental authorities.

5.8.4.3.5 Operating aid reduction mechanism and gain-share

- (196) The Norwegian authorities have explained that without the aid, Norcem has a projected negative funding gap (NPV) of NOK [...], while with the aid, the Norcem project has a projected negative NPV of NOK [...] (using a [5-10]% discount rate).

For FOV the projected funding gap is NOK [...] without the aid and NOK [...] with the aid (using a discount rate of [5-10]%).

- (197) The operation of the capture facilities may generate revenues in the form of cost savings, as the beneficiaries – depending on the amount of CO₂ captured – have reduced the need for ETS allowances (or save CO₂ tax, if introduced). In the event that the beneficiaries' accumulated rate of return²⁰⁰ exceeds an agreed level during the Operating Period ("Maximum Return Level 1"), the Capture Support Agreements include a mechanism whereby the amount of operating aid is reduced or capped as follows: if revenues are *lower* than operating costs, operating aid will be reduced to allow for cost coverage. If revenues are *higher* than or equal to operating costs, no operating aid will be paid in that year.
- (198) The Norwegian authorities have explained that the maximum return level triggering the OPEX aid reduction mechanism was proposed by the beneficiaries as part of the negotiations and correspond to market realities, taking into account the risks under the capture project.
- (199) In order to verify the beneficiaries' rate of return during the 10-year Operating Period, the agreements require the beneficiaries to prepare return accounts throughout the aid disbursement period. Pursuant to the Capture Support Agreement between the State and the capture beneficiaries, the return accounts shall as a minimum contain, accrued and accumulated: (a) the beneficiary's Investment Share; (b) the beneficiary's operating share in accordance with clause 18; (c) the beneficiary's avoided CO₂ costs in accordance with clause 18.3; (d) additional support from the State in accordance with clause 19; (e) any other support or grants towards eligible costs that entitle the beneficiary to Support under the Agreement; or (e) accumulated return (Internal Rate of Return/IRR) real before and after tax on (a) to (e) and (f) net present value of (a) to (e) discounted in accordance with provisions set out in an appendix to the Agreement.
- (200) In addition to the operating aid reduction mechanism, the Capture Support Agreements include a gain-share mechanism, which works as follows: if the beneficiaries' accumulated IRR exceeds the Maximum Return Level 1, and the revenues allow for cost coverage and further accumulation of profits, any excess revenue above the Maximum Return Level 1 shall be shared 50:50 between the State and the beneficiaries. A second threshold is also established ("Maximum Return Level 2"), above which revenues will be shared 75:25 between the State and the beneficiaries.
- (201) As part of their indicative financial offers, the beneficiaries were required to propose thresholds 1 and 2, including an explanation of the calculation leading to their offers. This was done to ensure that the thresholds reflect a reasonable rate of return, taking into account the company's normal discount rate and the inherent risks in the capture projects. In its indicative offer, Norcem has suggested Maximum Return Level 1 at [10-15]% and Maximum Return Level 2 at [10-15]%, while FOV has suggested a Maximum Return Level 1 at [10-15]% and a Maximum Return Level 2

²⁰⁰ Accumulated IRR is the achieved Internal Rate of Return on the net cash flow before tax in real terms between final investment decision and the year in question.

at [10-15]%. The indicative offers were subject to negotiations, to ensure that the maximum return levels are set as low as possible.

- (202) The Norwegian authorities have explained that compensation for CO₂ that is not subject to CO₂ quotas/tax and avoided CO₂ costs will be reflected in the revenue/return accounts the beneficiaries are required to keep under the contracts. Hence, additional support for capture of CO₂ that is not subject to quotas is taken into account when calculating the beneficiaries' accumulated project IRR, which will form the trigger point for both reductions of operating support and the gain-share mechanism.

5.8.4.3.6 Cost auditing

- (203) The agreements with Norcem and FOV include several provisions to ensure transparency of the costs incurred and revenues accrued during the support period.
- (204) The beneficiaries are required to keep separate project accounts and return accounts throughout the project period. In order to ensure transparency, the agreements specify that the beneficiaries shall provide the State with full access to all calculations and basic data at all times, as well as the assumptions for the cost calculations (open book principle). The State shall have the same right of access as the beneficiaries to information from the beneficiaries' suppliers.
- (205) Project accounts and return accounts are subject to annual independent audits by a pre-approved auditor. The auditor shall confirm in writing to the Government that all costs charged to the Project Accounts are eligible establishment costs or eligible operating costs in accordance with the agreement. The auditor shall also confirm in writing that the Return Accounts are complete and kept in accordance with the agreement, and that the calculated return and net present value are correct. If the beneficiary has received support beyond what the beneficiary is entitled to under the agreement, the State may claim the unjustified amount repaid with the addition of interest on late payment pursuant to the Act relating to interest on overdue payments.

5.8.5 *Financing of construction and operation of CO₂ Transport and Storage*

5.8.5.1 Introduction

- (206) The notified measures further include the Transport and Storage Measure, under which aid is granted to the partners of Northern Lights, in accordance with the Northern Lights Support Agreement (see sections 5.3 and 5.4).
- (207) Pursuant to the agreement, the Norwegian authorities will grant both investment and operating aid to cover an agreed portion of the beneficiary's actual costs of establishing, operating, monitoring and shutting down the operation of the facilities (investment basis support, additional investment support, operating support and removal support). In addition, the Norwegian authorities have undertaken to cover parts of the costs related to emissions of CO₂ received from the Government-supported Capture Projects during the Operating Period.

5.8.5.2 Compensation model

- (208) According to the Norwegian authorities, the costs related to the development of CO₂ transport and storage are high and the revenue potential is uncertain. As for the

measures in support of CO₂ capture facilities, a key principle under the agreement for the financing of CO₂ transport and storage is that costs and risks related to the establishment and operation of the facilities are shared between the State and Northern Lights.

- (209) The sharing of costs is the primary risk allocation mechanism under the agreement for the establishment and operation of the facilities and means that both increased and reduced costs shall be shared between Northern Lights and the State. Northern Lights is only entitled to claim additional support from the State where this is expressly stated in the agreement.
- (210) The cost-sharing mechanism between the State and Northern Lights will take effect from the beginning. According to the Norwegian authorities, this gives the beneficiary sufficient assurances to invest in the project, and predictability for the State, while incentivising the beneficiary to run operations as efficiently as possible.
- (211) Northern Lights will carry the entire revenue risk, including the consequences for revenue resulting from delayed completion and third-party CO₂ available for commercial transport and storage.
- (212) The only potential revenue stream for Northern Lights during the 10-year Operating Period, both as regards transport and storage of CO₂, is third-party volumes. In this respect, support for the construction and operation of transport and storage facilities presupposes that the beneficiary, free of charge, receives, transports and stores CO₂ from one or two State-supported capture projects in Norway, up to the reserved capacity/capacities, in accordance with the provisions of the agreement throughout the 10-year Operating Period.
- (213) In light of the above, Northern Lights will also administer any surplus capacity and receive all revenue from the use of this for the transport and storage of CO₂ from any third-parties. A gain-share mechanism will be in place in case the Northern Lights' internal rate of return ("IRR") exceeds a certain threshold.

5.8.5.3 Investment aid

5.8.5.3.1 General

- (214) The construction and operation of transport and storage facilities entail that Northern Lights shall design, build, operate and own the installations and facilities necessary for the transport and storage of the captured CO₂ as part of the realisation of the Project. The State will support investments which will provide an annual capacity of 1.5 million tonnes of CO₂ per year. Support for the construction and operation of the transport and storage facilities presupposes that Northern Lights transports and stores CO₂ from one or both of the Capture Projects up to the reserved capacity of 0.8 mtpa of CO₂ during the Operating Period.
- (215) Investments in facilities for CO₂ transport and storage will take place in different phases as the project develops.
- (216) Phase 1 is planned to result in an annual injection capacity of 1.5 mtpa of CO₂ and a pipeline and control system designed to allow for 5 mtpa. Investment aid for the

basis investment comprises support towards procurement of two transportation vessels; onshore facility, pipeline and work connected to the first injection well.

- (217) The Norwegian authorities may also grant additional investment aid in phase 1 in support of procurement of a third vessel and an additional injection well if required. The Norwegian authorities have explained that this contingency is included due to geophysical subsurface uncertainty regarding how many wells are required to reach the 1.5 mtpa capacity. There is also uncertainty with regard to the number of ships needed, as the location of any potential third-party capture facilities are unknown.
- (218) Furthermore, a potential future phase 2 expansion from 1.5 mtpa to 5 mtpa depends, *inter alia*, on the regulatory and market development for CCS. Expansion beyond agreed capacity (1.5 mtpa) is not covered by the State Support Agreement.

5.8.5.3.2 Investment basis aid

- (219) Investment basis aid comprises support for the procurement of two transportation vessels, onshore facilities, pipeline and work related to the first injection well ("phase 1"²⁰¹). These investments are subject to cost-sharing between the Norwegian Government and Northern Lights.
- (220) Pursuant to the terms of the agreement, the Government will bear 80% of the actual eligible investment costs for the establishment of the parts of the facilities that constitute the investment basis, upwards limited to the maximum basis support (P85 budget). The beneficiary will bear the remaining 20% of the investment costs. This cost-sharing mechanism will cover all eligible investment costs.
- (221) Eligible investment costs only comprise the costs necessary to establish the facilities with the agreed capacity in accordance with the agreement. The aid towards the construction of transport and storage facilities is assumed to provide an annual capacity equal to the agreed capacity of 1.5 million tonnes of CO₂ per year. However, to induce third-party volumes, the pipeline is expected to have a total capacity of 5 million tonnes of CO₂ per year, and the cost for this is included in the eligible establishment costs. The extra pipeline capacity does not represent a significant cost increase compared to the construction of a pipeline with a capacity of 1.5 mtpa.
- (222) Eligible costs are limited to the necessary additional costs related to the transport and storage of CO₂. As a main rule, only the direct costs of establishing the facilities are eligible for state support. Investments in other facilities and installations, or investments to expand capacity or optimise State-supported installations, which Northern Lights may undertake based on commercial considerations, are not eligible for State support.
- (223) Specific provisions regulate the allocation of costs in circumstances where non-eligible costs cannot be clearly separated from eligible costs, for instance because

²⁰¹ The costs of drilling the first well fall into the scope of ESA's Decision No 045/17/COL. The costs related to the drilling of the first exploration well are regulated by a separate agreement following the notification of the Concept and FEED studies. This well was drilled during the FEED phase, and the costs related to its drilling are not part of the costs eligible for investment support under the agreement on the financing of the construction and operation of CO₂ transport and storage.

they are related to the same installation or parts of the facilities, same supplier contract or make use of the same project organisation. This mechanism ensures that only costs related to the transport and storage of CO₂ necessary to realise the Project are covered under the agreement.

- (224) Specifically, in the event of capacity expansion and commercial operations during the Operating Period, the operating costs shall be distributed proportionally based on the volume of CO₂. The agreement provides that if the beneficiary incurs non-eligible costs that cannot clearly be separated from or where the amount is affected by the eligible costs, for instance because such costs are related to the same installation or facility parts, the same supplier contract or use of the same project organisation, a proportionate allocation of the total costs shall be made.
- (225) As a main rule, the allocation of the relevant costs between Eligible Costs and Non-Eligible costs shall be based on the ratio between the aided capacity and total capacity to which the costs contribute: (a) an average unit cost per tonne of CO₂ shall be calculated based on the total cost divided by total capacity; (b) Eligible Costs shall constitute the unit cost calculated in accordance with (a), multiplied by aided capacity; and (c) Non-Eligible Costs shall constitute the unit cost calculated in accordance with (a), multiplied by the difference between the total capacity and the aided capacity.
- (226) For costs where it is not possible to identify a specific contribution to capacity beyond the nameplate capacity, but that still exceed what is necessary to achieve the nameplate capacity, the costs shall be allocated in a manner that will realise the overall principle of proportionate distribution of costs, as described above, to the greatest extent possible.
- (227) A corresponding allocation shall be made for costs for measures that are also useful or of value to Northern Lights or its affiliate companies' other business activities.

No.	Cost item	MNOK 2019		Discounted [...]%	
		MNOK	Share (%)	MNOK	Share (%)
1	Owner cost (not included) ²⁰²	[...]		[...]	
2	Study & Project costs until Partner FID ²⁰³	[...]	[...]%	[...]	[...]%
3	Verification well (Eos) ²⁰⁴	[...]	[...]%	[...]	[...]%
4	Partner FID to State FID cost ²⁰⁵	[...]	[...]%	[...]	[...]%
5	Facility onshore ²⁰⁶	[...]	[...]%	[...]	[...]%
6	Pipeline and subsea scope ²⁰⁷	[...]	[...]%	[...]	[...]%
7	Topside modification ²⁰⁸	[...]	[...]%	[...]	[...]%

²⁰² Sunk cost: owner's cost (not included in the table).

²⁰³ Sunk cost: cost from study agreement and project activities from October 2019 to April 2020.

²⁰⁴ Sunk cost: drilling of verification well ("Eos" well), winter 2019/2020.

²⁰⁵ Preparation for implementation (e.g. contracts, studies before start-up of construction).

²⁰⁶ Site, buildings, jetty, plant (substation, storage tanks, loading arm, process systems).

²⁰⁷ Pipelines and subsea installation (cables, pipes and subsea structures).

²⁰⁸ Modification on host platform to monitor and operate Northern Lights subsea structure.

8	Subsurface monitoring ²⁰⁹	[...]	[...]%	[...]	[...]%
9	Drilling and well ²¹⁰	[...]	[...]%	[...]	[...]%
10	Ship (2 ships) ²¹¹	[...]	[...]%	[...]	[...]%
11	Joint Venture cost ²¹²	[...]	[...]%	[...]	[...]%
12	Insurance and risk ²¹³	[...]	[...]%	[...]	[...]%
Total CAPEX (items 1-12)		8 079	100 %	[...]	100 %
Total CAPEX for SSA (items 4-12)		6 837		[...]	

Table 3. Main CAPEX items Northern Lights (basis investment).

- (228) The agreement includes a cap on maximum basis support, corresponding to 80% of the maximum basis budget based on the beneficiary's P85 investment budget.²¹⁴
- (229) If eligible investment costs reach or exceed the maximum level, or it becomes clear that they will, none of the parties are obligated to complete the facilities or provide further funding. If such situation occurs, the parties shall jointly seek to come to an agreed solution for the project. The beneficiary has the right to complete the facilities if covering all costs that exceed the P85 CAPEX estimate. In this scenario, the Norwegian authorities are obligated to grant basis investment support (upwards limited to 80% of the P85 CAPEX estimate), additional investment support, operating aid and removal support in accordance with the Northern Lights Support Agreement. Correspondingly, the beneficiary is obligated to complete the facilities and contribute with its basis investment share (upwards limited to 20% of the P85 CAPEX estimate) if the State undertakes to cover all costs exceeding the P85 level and grant additional investment support, operating aid and removal support in accordance with the Agreement. If none of the parties is willing to cover the costs exceeding the maximum basis budget, the project shall be terminated.



Figure 8. Investment basis aid.

5.8.5.3.3 Additional investment aid

²⁰⁹ Storage Complex Monitoring costs (base line seismic survey, subsurface work).

²¹⁰ Re-entry to Eos well and side-track drilling and completion.

²¹¹ Construction of 2 ships (capacity 7 500 m³) resembling fully pressurised LPG vessels.

²¹² Joint Venture administration, management and business development.

²¹³ Insurance from State FID to production start/Risk from Cost Risk Analysis.

²¹⁴ If the beneficiary accrues Extraordinary Costs, and this results in the Maximum Operating Budget being exceeded, the Government shall grant Operating Support beyond the Maximum Operating Budget, corresponding to 80% of the excess that constitutes Extraordinary Costs, cf. clause 28 of the Agreement.

- (230) The Norwegian Government may also grant additional investment aid (under phase 1) for the procurement of a third vessel and an additional injection well. The Norwegian authorities have explained that this contingency is included, due to geophysical subsurface uncertainty and uncertainty concerning the location of any potential third-party capture facilities.

No.	Cost item	MNOK 2019	
		MNOK	Share (%)
1	Extra well (well #2)	[...]	[...]%
2	Extra ship (ship #3)	[...]	[...]%
Total CAPEX		1 611	100 %

Table 4. Main CAPEX items Northern Lights (additional investment).

- (231) In respect of additional investment aid in support of the procurement of a third vessel and an additional well, the State has undertaken to cover 50% of the actual eligible costs, upwards limited to the maximum additional support, which is set to 1.6 BNOK.²¹⁵ The beneficiary will cover the remaining 50% of the costs related to the additional investments. The beneficiary must notify the Norwegian State before undertaking the additional investments.

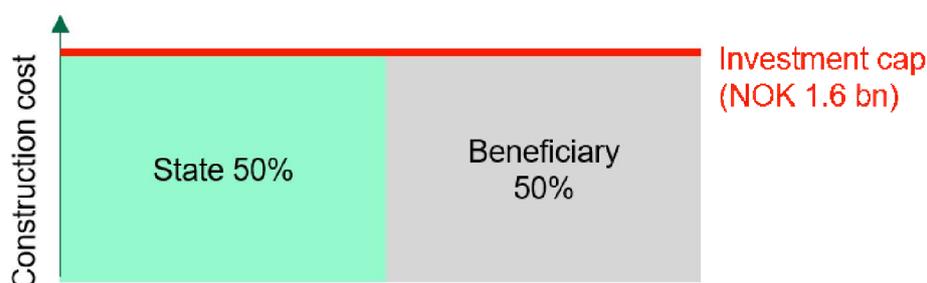


Figure 9. Additional investment aid.

5.8.5.4 Operating aid

5.8.5.4.1 General

- (232) Following the completion of the transport and storage facilities, Northern Lights is required to operate the facilities for a period of 10 years (“the Operating Period”). Northern Lights is further required to reserve capacity in the facilities for reception, transport and storage of CO₂ from the State-supported capture project(s). Each capture operator shall have a reserved capacity for delivery of up to 5 400 m³ of CO₂ at least every four days, upwards limited to a total of 0.4 mtpa of CO₂ each. Northern Lights shall, free of charge, receive, transport and store CO₂ from the Government-supported project(s) up to the reserved capacity, during the Operating Period.
- (233) During the Operating Period, the State will grant annual operating aid based on the beneficiary’s actual eligible operating costs incurred for operation of the facilities

²¹⁵ The 1.6 BNOK is the [...] for one additional ship and one additional well. The cap was agreed between the State and Northern Lights as part of a package of terms for a number of key items.

within the agreed capacity. Operating aid is granted based on transport and storage capacity provided by Northern Lights, regardless of the amount of CO₂ available from the State-supported capture projects.

- (234) Eligible operating costs include ongoing costs for the operation, maintenance and necessary repair of the facilities for transport and storage within the agreed scope (1.5 million tonnes of CO₂ per annum). Investments necessary to operate the facilities as intended and in accordance with agreed capacity may in certain circumstances also be covered under the agreement.
- (235) Pursuant to the terms of the agreement, the Norwegian State has undertaken to cover 95% of Northern Lights' actual eligible operating costs in year 1, 90% in year 2, 85% in year 3, and 80% in year 4 to 10, upwards limited to the maximum operating support. The beneficiary will cover the remaining operating costs throughout the operating period.

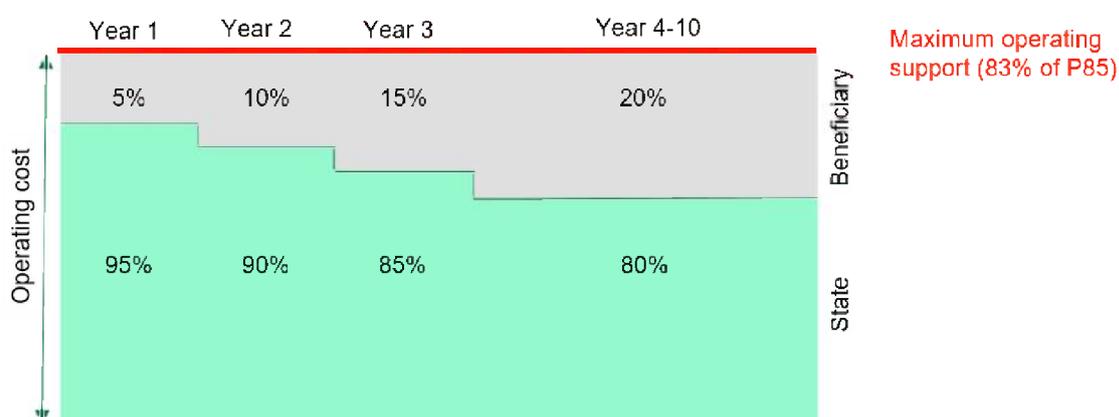


Figure 10. Compensation for the operation of CO₂ transport and storage facilities.

- (236) According to the Norwegian authorities, the operating aid mechanism reflects the risks in the CO₂ transport and storage project. Northern Lights will be obliged to transport and store CO₂ from the Capture Projects free of charge during the operating period, and third-party volumes will likely not materialise in the early phases of operation, meaning Northern Lights will operate at a loss. The reduction of operating support is nonetheless scheduled regardless of Northern Lights' ability to market its capacity and entails a risk for the beneficiary to experience increasing negative cash flow during the operating period.
- (237) The maximum operating support is set to 83% of the maximum operating budget of the ten-year operating period, based on the beneficiary's P85 operating budget and reflects the annual arithmetic average of the State's share of OPEX (95% year 1, 90% year 2, 85% year 3, and 80% year 4 to 10).
- (238) In the event that the maximum operating budget (P85) is exceeded, the beneficiary is not entitled to cease operations or to terminate the Transport and Storage Project. However, if such a situation occurs, the parties shall jointly seek to come to an agreed solution.

- (239) The agreement also includes provisions on cost coverage for extraordinary preventative or corrective measures for the storage site, in order to meet regulatory requirements or governmental orders, which could not have been foreseen as part of the beneficiary's P85 estimates. The purpose of the clause is that if there is a serious HSE risk or risk of leakage of CO₂, there is an exception to the P85 cap on operating costs, meaning that the Government will cover its share of the costs for measures that are required to prevent or rectify the problem. Examples of such measures are additional seismic surveys, additional monitoring measures, well interventions or drilling of a relief well.
- (240) Northern Lights must cover operating costs connected with expansion beyond the agreed scope without state aid. In the event of capacity expansions and commercial operations during the Operating Period, total operating costs shall be distributed proportionally based on the annual amount of CO₂ under the terms of the Agreement, in order to ensure that only eligible costs are covered.

5.8.5.4.2 Cost related to CO₂ leakages

- (241) Under the Northern Lights Support Agreement, risk and liability for CO₂ from the Capture Project, including for emissions, are transferred to Northern Lights upon delivery. Delivery takes place when CO₂ passes the Shipping Point.
- (242) Under the CCS Directive, Northern Lights will be responsible as implemented in Norway in case emissions/leakages occur in the pipeline transportation phase (from receiving terminal to a subsea injection well) and/or in the storage phase. Under the national CO₂ Storage Regulations (which together with an additional chapter in the Pollution Control Regulation implement the CCS Directive in Norway), they will be responsible after unloading CO₂ from a ship at the receiving terminal. The liability also covers leakages of CO₂ stored in the sub-surface storage complex.
- (243) However, since emissions/leakages might develop into substantial losses, the State has chosen to assume parts of the costs for emissions/leakages at the storage stage from CO₂ received from the capture beneficiaries to avoid Northern Lights being compensated for this risk with an increased amount of funding. Northern Lights will bear all liability for CO₂ emissions/leakages from third-party volumes.
- (244) The State will cover 80% of Northern Lights' costs related to emissions/leakages for CO₂ received from the Capture Projects during the Operating Period. Northern Lights will cover the remaining 20% of the emission/leakage costs. This does not apply if the emission/leakage is due to wilful or grossly negligent acts or omissions by personnel in managerial, supervisory or particularly independent positions with Northern Lights, or someone for whom Northern Lights is responsible. In such a case, Northern Lights shall cover any costs related to the emission/leakage. Northern Lights is, however, fully liable for emissions/leakages of CO₂ received from third-party sources and for emissions/leakages of CO₂ received from capture operators after the expiry of the Operating Period.
- (245) Furthermore, there is a potential risk of emissions from the sub-surface storage complex once the CO₂ is stored. The State's liability also covers part of the risk for such emissions.

- (246) If, at the time of the leakage from the sub-surface storage complex, Northern Lights has received both CO₂ from the capture operators during the operating period and from third-party sources, Northern Lights' and the Norwegian authorities' liability are distributed proportionally based on the total volume of CO₂ deposited in the Storage Complex at the time in question. This is a consequence of the fact that Northern Lights bears full liability for emissions/leakages of CO₂ received from third-parties and partial liability for CO₂ received from the Capture Projects during the Operating Period. Northern Lights' liability for emissions/leakages from the storage of CO₂ received from the Capture Projects during the Operating Period is upwards limited to an ETS price of EUR 40 per tonne.²¹⁶ The Norwegian authorities find it reasonable for the State to cover parts of these costs since the potential emissions originate from the Capture Projects and are handled by Northern Lights without remuneration.
- (247) In the event of continued operations after the expiry of the Operating Period, the Norwegian authorities shall still carry parts of the costs for liability related to emissions/leakages of CO₂ received from the Capture Projects and disposed of in the storage complex during the Operating Period. The Norwegian authorities shall otherwise be without liability for CO₂ emissions/leakages. The same applies for the period from the shutdown to the transfer of liability.

5.8.5.4.3 Removal cost

- (248) Upon ceasing operations, Northern Lights is responsible for shutdown, disposal and removal, as well as surveillance and post-closure operations in line with Chapter 7 of the CO₂ Storage Regulations, until the liability for the site has been transferred to the State in line with the CO₂ Storage Regulation, in accordance with section 5-8 of the CO₂ Storage Regulations. The Norwegian authorities will grant closure support towards eligible removal costs for the closure of operations. Closure support is only relevant for CO₂ storage – given the legal requirements pertaining to the administration of such sites.
- (249) Removal support will be granted also if Northern Lights chooses to continue the operation after the expiry of the Operating Period, as a commercial operation period without support from the State. However, the Northern Lights Support Agreement specifies that removal support shall not be paid if Northern Lights, when the operations cease, has achieved a rate of return equal to or higher than Maximum Return Level 1 (as explained further below). This applies irrespective of whether operation ceases upon expiry of the Operating Period or after a subsequent period of commercial operation. If the beneficiary secures third-party volumes, the State's share of support for removal costs is reduced in proportion to the volumes injected for the third-party customers.

5.8.5.4.4 Administration of the storage site and third-party revenues

- (250) The Norwegian authorities have explained that the only potential revenue stream for Northern Lights during the 10-year Operating Period, both as regards transport

²¹⁶ This limitation does not apply if the emission is due wilful or grossly negligence acts or omissions by personnel in managerial, supervisory or particularly independent positions with the beneficiary or someone for which he is responsible. In such case, the beneficiary shall cover any costs related to the emission.

and storage of CO₂, are revenues from third-party CO₂ volumes, utilising the 0.7 mtpa phase 1 surplus capacity.

- (251) According to the Norwegian authorities, the market for third-party volumes and Northern Lights' potential revenue is currently uncertain, as it depends on the price of transport and storage of CO₂ compared to an alternative use (e.g. the ETS price, national carbon taxes and the cost of capture), as well as regulatory conditions. When deciding whether to invest in CCS, potential third-parties (industrial CO₂ emitters) will have to take into account the full costs of the CCS value chain, i.e. costs of capture facilities (including liquefaction, intermediate storage and transport to the delivery point), as well as tariffs for transportation and storage. Hence, to make CCS economically attractive to third-parties, the cost of emissions must increase considerably from today's levels. Such increases will depend on an increase in the EUA price, implementation/increases in national carbon taxes and availability of subsidies for potential capture beneficiaries.
- (252) The tariff level is set through negotiations between Northern Lights and third-parties. According to the Norwegian authorities, several tariff models may be possible, but it is believed that third-parties' willingness to pay will be a function of EUA prices and carbon emission taxes, subtracted net cost of developing and operating capture facilities.
- (253) Concerning profitability and third-party revenues, Northern Lights has conducted a scenario analysis with different assumptions regarding the timing of any third-party revenues and the tariff price Northern Lights may obtain from such sale. According to Northern Lights' projections, under the most pessimistic set of assumptions, i.e. a scenario with no third-party revenues during the 10-year Operating Period, the project is loss making both with and without the aid (NPV with aid NOK [...] million). Under a scenario with third-party revenues starting from year 5 and a tariff price of [...] EUR per tonne CO₂, the project is still loss making both with and without the State funding (NPV with aid NOK [...] million). Furthermore, under a scenario with third-party revenues starting from year 2 and a tariff price of [...] EUR per tonne CO₂, the project is loss making both with and without the State funding (NPV with aid NOK [...] million). Finally, under the best-case scenario, with third-party revenues starting in year 2 and a tariff price of [...] EUR per tonne CO₂, the project continues to have a projected negative NPV, both with and without the State funding, and a negative IRR (NPV with aid NOK [...] million).
- (254) Northern Lights has also conducted a scenario analysis under the same assumptions as above but extending the cash-flow projections over the full 25-year technical lifetime of the assets. The results remain the same for the first three scenarios, i.e. loss making, both with and without the State funding (NPV with the aid estimated to be NOK [...] million, NOK [...] million and NOK [...] million respectively for the three scenarios). Even in the fourth scenario, i.e. the best-case scenario, with third-party revenues starting in year 2 and a tariff price of [...] EUR per tonne of CO₂, the projected NPV of the project is negative, both with and without State funding (NPV with aid NOK [...] million), and only projects an IRR of [...] %.

5.8.5.4.5 Gain-Share Mechanism

- (255) Given the uncertainties with regard to third-party CO₂ volumes and tariff revenues, the Northern Lights Support Agreement includes maximum return level (measured by IRR) and a gain-share mechanism to prevent Northern Lights from obtaining excessive profits (i.e. overcompensation).
- (256) The agreement includes a gain-share mechanism with two trigger points. Maximum Return Level 1 is set to 10% IRR and Maximum Return Level 2 is set to 13.5% IRR, both in real terms before tax. The Norwegian authorities have explained that these return levels were proposed by Northern Lights during the negotiation process and were substantiated by an external report commissioned by Equinor on behalf of Northern Lights.²¹⁷
- (257) The terms of the Northern Lights Support Agreement further specify that the generated net cash flow between Maximum Return Level 1 and Maximum Return Level 2 will be shared with 50% to the beneficiary and 50% to the State. Net cash flow generated after Maximum Return Level 2 shall be shared with 25% to the beneficiary and 75% to the State.
- (258) The Norwegian authorities have explained that the gain-share mechanisms will be in place throughout the 10-year Operating Period. In a scenario where Northern Lights during this period, at its own account and risk, expands capacity beyond the 1.5 mtpa covered by the agreement, a share of the net cash flow generated from the expansion shall be included in the return accounts. The share of such net cash flow to be included in the return accounts shall be determined by the State's share of the contribution to the investment in commercial capacity. Following this, transport and storage will be for the beneficiary's own account and risk.

5.8.5.4.6 Cost auditing

- (259) The Northern Lights Support Agreement includes several provisions to ensure transparency of the costs incurred and revenues accrued during the support period.
- (260) The beneficiary is required to keep separate project accounts and return accounts throughout the project period. In order to ensure transparency, the agreements specify that the beneficiaries at all times shall provide the State with full access to all calculations and basic data, as well as the assumptions for the cost calculations (open book principle). The State shall have the same right of access as the beneficiary to information from the beneficiary's suppliers.
- (261) To monitor compliance with the gain-share mechanism, the beneficiary shall prepare return accounts annually until the point where (if) accumulated IRR approaches Maximum Return Level 1, from which point the return accounts will be prepared and reported to the State on a monthly basis.
- (262) Project accounts and return accounts are subject to an independent audit by a reputable auditor. Such audits shall take place annually. In the event the audits uncover payment of undue amounts, such undue amounts are to be repaid.

²¹⁷ Document No 1131981.

5.9 Cumulation, transparency

- (263) The Norwegian authorities have explained that the notified measures can be cumulated with other aid and also public funding that does not constitute aid under Article 61 of the EEA Agreement. The Norwegian authorities have confirmed that all such funding is accounted for in the Gain-Share Mechanism.
- (264) The Norwegian authorities have confirmed that they will comply with the transparency requirements set out in section 3.2.7 of the EEAG.

6 Presence of state aid

- (265) Article 61(1) of the EEA Agreement reads as follows: "Save as otherwise provided in this Agreement, any aid granted by EC Member States, EFTA States or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Contracting Parties, be incompatible with the functioning of this Agreement."
- (266) The qualification of a measure as aid within the meaning of this provision therefore requires the following cumulative conditions to be met: (i) the measure must be granted by the State or through State resources; (ii) it must confer an advantage on an undertaking; (iii) favour certain undertakings (selectivity); and (iv) threaten to distort competition and affect trade.
- (267) The Norwegian authorities acknowledge that the notified measures fulfil the cumulative criteria in Article 61(1) of the EEA Agreement.
- (268) Firstly, the measures will be funded from the Norwegian State budget and have to be approved by the Norwegian Government and by the Norwegian Parliament (see section 5.3). Financial support is granted to the beneficiaries under the Support Agreements that were negotiated and concluded by the Ministry. ESA therefore considers that the measures are granted from State resources and are imputable to the State, within the meaning of Article 61(1) of the EEA Agreement.
- (269) Secondly, the measures are selective, since funding is granted only to the undertakings that have concluded the Support Agreements with the Ministry. Only undertakings that were chosen for State financing of the Concept and FEED, a phase that preceded the construction and operation phase of the Project, were invited by the Ministry to hold negotiations on State financing of the Project (see paragraph (117))
- (270) Thirdly, by receiving grants under the Support Agreements the beneficiaries will gain competitive advantages that they would not have obtained under normal market conditions. ESA considers that the construction and operation of a project, such as the Project at stake, are part of economic activities and as such to be funded at the expense of undertakings. Thus, the measures constitute an advantage for the beneficiaries.
- (271) As regards the Project's suppliers, ESA considers that since FOV, Norcem and Northern Lights organise the purchases by following procedures that allow contracting on market terms, as described by the Norwegian authorities, and in the

absence of any evidence to the contrary, aid to the Project does not result in an advantage to the suppliers (see paragraphs (129)(140)(151) and (152)).

- (272) Further, as ESA has set out in paragraph 225 of its Guidelines on the notion of state aid,²¹⁸ if the operator of an infrastructure has received state aid or if its resources constitute State resources, it is in a position to grant an advantage to the users of the infrastructure (if they are undertakings) unless the terms of use comply with the market economy operator test, that is to say the infrastructure is made available to the users on market terms.
- (273) Based on information provided by the Norwegian authorities, ESA considers that the commercial use of the transport and storage services will be provided on market terms and the measures will not constitute aid on the user level. ESA based this conclusion on the following considerations:
- Northern Lights operates the free capacity of the Transport and Storage Project on the basis of “open access” principles and is not dedicated to any users or user groups (see paragraphs (148) and (149)).
 - The Norwegian authorities explain that access of third-parties to the free capacity of the transport network and storage site will be granted under non-discriminatory terms in agreements to be approved by the Ministry. Norcem and FOV have also been granted a reserved capacity of the transport network and storage site following a non-discriminatory process for the selection of the Capture Project candidates (see sections 3.3.2, 4.4.2 and 5.5).
 - The only source of revenue over and above the Transport and Storage Measure are commercial users, where the Norwegian authorities indicate that the Northern Lights Participants are motivated to maximise revenues and charge what the market is willing to pay (see paragraphs (148) and (149)).
- (274) Finally, as regards distortion of competition and the effect on trade, ESA concluded already in its decision concerning the preceding Concept and FEED Studies phase that aid to Norcem and Equinor²¹⁹ was liable to distort competition and to affect trade between the Contracting Parties to the EEA Agreement.²²⁰ ESA drew the same conclusion as regards aid to the legal predecessor of FOV, Klemetsrudanlegget AS.²²¹
- (275) ESA has no reasons to depart from its earlier conclusions. The Capture Projects’ beneficiaries are Norcem and FOV. Norcem is the sole producer of cement in Norway and part of the HeidelbergCement group, a global player in cement, aggregates, concrete and downstream activities (see section 5.2.3). FOV operates 11 plants in Oslo, including the Klemetsrud plant and provides district heating and produces electricity using, *inter alia*, imported waste. FOV is 50% owned by the

²¹⁸ [OJ L 342, 21.12.2017, p. 15](#) and EEA Supplement No 82, 21.12.2017, p. 1.

²¹⁹ Statoil ASA at the time (see footnote 133).

²²⁰ ESA’s Decision No 045/17/COL, paragraph 74.

²²¹ *Idem*.

Fortum group, a Finnish State-owned energy company focusing on the Nordic and Baltic countries, Poland, Russia and India (see section 5.2.2).

- (276) The Transport and Storage Project's beneficiary is Northern Lights, whose participants are Equinor, Total and Shell (see section 5.2.4). Northern Lights will offer CO₂ transport and storage to the Capture Projects and third-parties. Following the October 2019 Resolution concerning the London Protocol, export of CO₂ for storage purposes has become more realistic though not yet fully certain (see paragraph (31)). Equinor, Total and Shell are among the largest oil and gas sector undertakings in the world, competing with each other and other undertakings on open markets in the EEA and other countries.
- (277) Hence, all of the beneficiaries are engaged in cross-border activities and active in sectors where competition and trade within the EEA takes place. ESA considers that the measures are therefore liable to distort competition and to affect trade between the Contracting Parties of the EEA Agreement.
- (278) For these reasons, ESA concludes that the notified measures constitute state aid, within the meaning of Article 61(1) of the EEA Agreement.

7 Procedural requirements

- (279) Pursuant to Article 1(3) of Part I of Protocol 3 to the Agreement between the EFTA States on the Establishment of a Surveillance Authority and a Court of Justice ("Protocol 3"): "The EFTA Surveillance Authority shall be informed, in sufficient time to enable it to submit its comments, of any plans to grant or alter aid. The State concerned shall not put its proposed measures into effect until the procedure has resulted in a final decision."
- (280) The Norwegian authorities have notified the measures and have not let the measures enter into force yet. They have therefore complied with the obligations under Article 1(3) of Part I of Protocol 3.

8 Compatibility of the measures

8.1 Introduction

- (281) The Norwegian authorities notified the measures under the EEAG. According to paragraph 13(h) of the EEAG, ESA has identified aid for CO₂ capture, transport and storage, including individual elements of the CCS chain, as one of the environmental and energy measures for which state aid may be declared compatible with the functioning of the EEA Agreement under its Article 61(3)(c).
- (282) Under paragraph 159 of the EEAG, aid may be provided to support fossil fuel, biomass power plants (including co-fired power plants with fossil fuels and biomass) or other industrial installations equipped with CO₂ capture, transport and storage facilities, or individual elements of the CCS chain.
- (283) The notified measures consist of individual investment and operating aid to a project that consists of carbon capture, transport and storage, covering all elements of a CCS chain (see section 5.1).

- (284) Based on the above, ESA considers that the notified measures fall within the scope of the EEAG. ESA has therefore assessed the measures on the basis of the compatibility provisions for individually notified aid to CCS, as set out in sections 3.2 and 3.6 of the EEAG.

8.2 Objective of common interest

- (285) State aid must aim at a well-defined objective of common interest that has been recognised by the Contracting Parties to the EEA Agreement.
- (286) The Contracting Parties consider that CCS technology will play a key role in the protection of the environment and the reduction of CO₂ emissions (see paragraph (10)).
- (287) As explained in paragraph 155 of the EEAG, the CCS Directive and the Commission Communication on the future of CCS in Europe²²² recognise that CCS is a technology that can contribute to mitigating climate change. In the transition to a fully low-carbon economy, CCS technology can reconcile the demand for fossil fuels with the need to reduce greenhouse gas emissions. In some industrial sectors, CCS may currently represent the only technology option able to reduce process-related emissions at the scale needed in the long-term.
- (288) ESA considers in paragraph 156 of the EEAG that in order to promote the long-term decarbonisation objectives, the aid for CCS contributes to the common objective of environmental protection. Further, ESA considered in its Decision No 045/17/COL concerning aid to the Concept and FEED studies – a phase preceding the currently notified construction and operation phase – that CCS contributes to a common objective of environmental protection.²²³ That has been ESA's conclusion throughout its previous decisional practice concerning CCS (see paragraph (39)).
- (289) The Norwegian CCS strategy includes work on the realisation of large-scale demonstration facilities, transport, storage and alternative use of CO₂ and efforts to promote CCS internationally (see paragraph (39)). As explained in ESA's Decision No 045/17/COL, although the CCS technology as such is established, it has not yet reached full commercial-scale demonstration level for the whole process chain.²²⁴
- (290) According to the European Green Deal, the EU industry needs “climate and resource frontrunners” to develop the first commercial applications of breakthrough technologies in key industrial sectors by 2030. Carbon capture and storage is included as one of the priority areas (see paragraph (13)).
- (291) The Project allows to capture up to 0.8 mtpa by the Capture Projects and transport and store 1.5 mtpa of CO₂ by Northern Lights (see section (145)). The Norwegian authorities consider that the Project could be the first large-scale industrial CCS project in Europe.²²⁵ If the Project is successful, this may stimulate other CCS

²²² COM(2013) 180 final, 27.3.2013.

²²³ ESA's Decision No 045/17/COL, paragraph 88.

²²⁴ ESA's Decision No 045/17/COL, paragraph 2.

²²⁵ See [information](#) by Gassnova.

projects on a commercial basis, thus leading to a higher level of environmental protection in line with both the EU's and Norway's CCS ambitions.

- (292) ESA notes that although cross-border transport of CO₂ for storage purposes is currently not yet allowed, the Contracting Parties to the London Protocol adopted in October 2019 a Resolution to resolve this regulatory barrier (see paragraph (31)). The Norwegian Government considers the Resolution to be an international breakthrough for capture, transport and storage of CO₂ across borders that could possibly lead to a faster development of CCS as a climate technology. Norway also looks into co-operation with other countries in Europe regarding storage in the North Sea (see paragraph (32)).
- (293) In view of the above, ESA considers that the notified measures seek to achieve an objective of common interest, i.e. the promotion of environmental protection, in accordance with Article 61(3)(c) of the EEA Agreement.

8.3 Need for state intervention

- (294) In order to assess whether state aid is effective to achieve the identified objective of common interest, it is necessary first to identify the problem that needs to be addressed. State aid should be targeted towards situations where aid can bring a material improvement that the market alone cannot deliver, for example by remedying a market failure or addressing an equity or cohesion concern.
- (295) As explained in paragraph 157 of the EEAG, several initiatives have been taken in the EEA to address negative externalities. In particular, the ETS ensures the internalisation of the costs of GHG emissions, which however may not yet ensure the achievement of the EEA's long-term decarbonisation objectives. ESA therefore presumes that aid for CCS addresses a residual market failure, unless it has evidence that such remaining market failure no longer exists.
- (296) In the initial CCS strategy, Norway's ambition was to realise at least one full-scale CCS demonstration project by 2020 (see paragraph (39)). However, that ambition has not been realised yet. ETS has not yet triggered investments in CCS projects (see sections 3.4 and 5.7.2). ESA considers that EUA prices alone do not provide financial incentive to invest in CCS in the coming years. As noted in the GCCSI 2019 report on Global Status of CCS,²²⁶ the deployment of CCS is currently not happening quickly enough for it to play its role in meeting emission reductions targets at the lowest possible cost.
- (297) As regards the FOV Capture Project, the CO₂ emissions from the Klemetsrud plant are not covered by the ETS. Also, Norway's current CO₂ tax does not apply to the Capture Projects (see section 3.3.4). ESA also notes that it considered aid to be necessary also in the preceding Concept and FEED Studies phase.²²⁷
- (298) Insufficient incentives for investing in CO₂ capture also means that there is no demand for and no private investment in large scale transport and storage facilities. Though certain storage projects exist, there are no large storage facilities open to third-parties for storing industrial emissions yet (see sections 3.4 and 5.7.2). This is

²²⁶ Global Status of CCS 2019 report, page 12.

²²⁷ ESA's Decision No 045/17/COL, paragraph 93.

a further indication that there is a residual market failure that aid to the Project addresses.

- (299) Based on the above, ESA has no reasons to depart in the case at hand from the presumption that aid for CCS addresses a residual market failure and considers that the notified measures are necessary to address a market failure.

8.4 Appropriateness of the state aid

- (300) According to paragraph 35 of the EEAG, an aid measure will not be considered compatible with the functioning of the EEA Agreement, if the same positive contribution to the common objective is achievable through other less distortive policy instruments or other less distortive types of aid instruments.
- (301) Under paragraph 158 of the EEAG, without prejudice in particular to EEA regulations in that field, ESA presumes the appropriateness of aid, provided all other conditions set out in the EEAG for CCS are met. Under the EEAG, both operating aid and investment aid can be granted to CCS.
- (302) The ETS is a market-based instrument to incentivise CO₂ emission reductions. However, ETS has not yet triggered investments in CCS projects and EUA prices alone do not provide the financial incentive to invest in CCS in the coming years (see sections 3.4 and 5.7.2).
- (303) CCS investment and operating costs remain high and CCS technology is not made mandatory by the EU or the EEA EFTA States. Instead, the EU considers funding to CCS under its various support programmes²²⁸ and the Norwegian authorities have a strategy in place that involves State funding to CCS (see section 3.5). The notified measures are also part of implementing that strategy.
- (304) Regulatory intervention would also not solve the problem of a substantial funding gap (negative NPV) of the Capture Projects and the Transport and Storage Project (see paragraphs (196) and (253)).
- (305) The financial documentation provided by the Norwegian authorities show that without the aid, the Capture Projects are projected to have a negative net cashflow in every year of operation. As regards the Transport and Storage Project, it is projected to have a negative NPV even with aid for all modelled scenarios (see paragraphs (253) and (254)).
- (306) As regards the Transport and Storage Project, CO₂ transport and storage services are not provided at the moment. Moreover, export of CO₂ for storage purposes was prohibited until recently under the London Protocol. Although the Contracting Parties to the London Protocol have adopted a Resolution to resolve that regulatory barrier, bilateral agreements between States are still necessary to allow cross-border transport for storage purposes (see paragraph (31)). The evolution of carbon price is an additional factor of uncertainty. Hence, it is not yet certain as of when, and between which States, cross-border CO₂ transport and storage would be

²²⁸ Among the EU's largest potential funding sources to CCS is [the EU Innovation Fund](#). See also the Global Status of CCS 2019 report, page 44.

permitted and actually carried out. The quantities and fee levels of CO₂ transported and stored are also not certain at the moment.

- (307) Consequently, ESA considers that an alternative policy (e.g. regulation) or aid instrument (e.g. a loan or a guarantee) would not be suitable to trigger investment in any element of the Project. ESA concludes that state aid is appropriate for achieving the objective of the notified measures.

8.5 Incentive effect

8.5.1 General

- (308) State aid is only compatible with the functioning of the EEA Agreement if it has an incentive effect. An incentive effect occurs when the aid induces the beneficiary to change its behaviour to further the identified objective of common interest, a change in behaviour which it would not undertake without the aid.
- (309) ESA notes that the Contracting Parties to the EEA Agreement have taken several initiatives to address negative externalities, in particular, the ETS. As explained in paragraph 157 of the EEAG, ETS may not yet ensure the achievement of the EEA's long-term decarbonisation objectives.
- (310) Paragraph 55 of the EEAG states that the incentive effect is to be identified through the counterfactual scenario analysis, comparing the levels of intended activity with aid and without aid. For the assessment of the financial profitability of an investment, two main financial performance indicators are calculated: (i) NPV, and (ii) IRR.
- (311) Moreover, according to paragraph 45 of the EEAG, aid does not present an incentive effect in all cases where work on the project had already started prior to the aid application by the beneficiary to the national authorities.
- (312) Before assessing the incentive effect on the level of each of the beneficiaries separately, ESA notes that already the aid granting process between the State and the beneficiaries suggests that the Project would not be undertaken without state aid. The beneficiaries have negotiated the terms of State funding of the Project since the Concept and FEED studies phase (see section 5.5), the beneficiaries would make the investment without certainty in receiving State funding and the share of State funding in investment and operating costs remains high (see section 5.4).

8.5.2 The Capture Projects

- (313) Without the aid, the FOV Capture Project generates a negative NPV (NOK [...]). With the aid, the FOV Capture Project has a NPV that is still negative (NOK [...]). As regards Norcem, the project has a negative NPV (NOK [...]) without the aid. With the aid, the project generates an NPV that is still negative (NOK [...]).²²⁹
- (314) The Norwegian authorities have calculated the NPVs of each project using FOV's and Norcem's average hurdle rates for discounting ([5-10]% and [5-10]%, respectively). Taking into account the risk profiles of the projects, the NPVs of the

²²⁹ See paragraphs (196) and (253).

Capture Projects would be even more negative if discounted using the risk adjusted cost of capital as reflected in the Gain-Share Mechanism trigger points (see section 5.8.4.3.5).

- (315) With the aid, the IRRs of the Capture Projects are projected to be [...] % for Norcem and [...] % for FOV. These IRRs do not exceed company internal hurdle rates and are substantially lower than the estimated risk adjusted cost of capital, as reflected in the Gain-Share Mechanism trigger points.
- (316) ESA notes that the currently foreseeable ETS allowances development have not resulted in and do not incentivise investments in the Capture Projects. The Norwegian authorities also submitted internal company documentation showing that FOV and Norcem would not participate in the Capture Projects without the aid.²³⁰
- (317) As confirmed by the Norwegian authorities, FOV and Norcem applied for aid before work on the project commenced.
- (318) ESA therefore considers the aid has effectively brought about a change in deciding whether to invest and operate the project for 10 years and that the FOV Measure and the Norcem Measure have an incentive effect.

8.5.3 *The Transport and Storage Project*

- (319) Without the aid, the Transport and Storage Project has a negative NPV under all scenarios considered (between NOK [...] million and NOK [...] million).
- (320) As explained by the Norwegian authorities, different scenarios used to model cash flow expectations result in negative NPV even with aid, with NPV at NOK [...] million under the most optimistic and NOK [...] million under the most pessimistic scenario (see paragraph (253)). ESA notes that under only one of the envisioned scenarios the IRR is slightly positive ([...] %), which is below the cost of capital of [...] %. Thus, the project is lossmaking under all considered scenarios, with and without aid.
- (321) The Norwegian authorities have calculated the NPVs using an [...] % discount rate. Based on the [...] submitted by the Norwegian authorities, this rate is the discount rate [...]. ESA considers that the [...] % discount rate is substantially lower than the estimated risk adjusted cost of capital estimated in an external study submitted by the Norwegian authorities, as reflected in the Gain-Share Mechanism trigger points, which would lead to even more negative NPV estimates.
- (322) Similar to the Capture Projects, ETS allowance prices have not led to investment in CCS transport and storage and it is not foreseeable if and when they would lead to such investments. Future revenues are also uncertain as at the moment cross-border transport of CO₂ for storage purposes is not allowed (see paragraph (31)). The Norwegian authorities also submitted internal company documentation²³¹ showing that the Northern Lights Participants would not participate in the Transport and Storage Project without receiving aid.

²³⁰ Documents No 1138924 and 1138922.

²³¹ Documents No 1130919, 1138934, 1138935, 1138928 and 1138926.

- (323) As confirmed by the Norwegian authorities, the aid application was submitted before work on the project commenced.
- (324) ESA therefore considers the aid has effectively brought about a change in deciding whether to invest and operate the project for 10 years and that the Transport and Storage Measure has an incentive effect.

8.6 Proportionality

8.6.1 General

- (325) According to paragraph 64 of the EEAG, “environmental and energy aid is considered to be proportionate if the aid amount per beneficiary is limited to the minimum needed to achieve the environmental protection objective aimed for”.
- (326) Under paragraph 158 of the EEAG, both operating and investment aid is permitted. Paragraph 160 of the EEAG limits aid to CCS to the additional costs for capture, transport and storage of the CO₂ emitted. It is generally accepted that the counterfactual scenario would consist of a situation where the project is not carried out, as CCS is similar to additional infrastructure not needed to operate an installation. In view of this counterfactual scenario, the eligible costs are defined as the funding gap. Paragraph 14(32) of the EEAG defines ‘funding gap’ as the difference between the positive and negative cash flows over the lifetime of the investment, discounted to their current value (typically using the cost of capital). In line with paragraph 160 of the EEAG, all revenues, including, for instance, cost savings from a reduced need for ETS allowances, are taken into account. Aid can thus be granted up to 100% of the eligible costs, defined as a funding gap.
- (327) As explained in more detail in sections 8.6.2 and 8.6.3 below, ESA considers that in line with paragraph 160 of the EEAG, Norway has demonstrated that the notified measures do not exceed the funding gap of the Capture Projects and the Transport and Storage Project. All of the Support Agreements also include maximum return levels and a Gain-Share Mechanism that would prevent overcompensation.
- (328) The Norwegian authorities have explained that the notified aid can be cumulated with other aid and with public funding that does not constitute aid under Article 61(1) of the EEA Agreement. The Norwegian authorities have confirmed that all such funding is accounted for in the Gain-Share Mechanism (see section 5.9).

8.6.2 The Capture Projects

- (329) As explained in paragraph (196), the funding gap of the FOV and Norcem Capture Projects is estimated to remain negative even with aid (FOV NOK [...] and Norcem NOK [...]).
- (330) With the aid, the IRRs of the Capture Projects are projected to be [...] % for Norcem and [...] % for FOV. ESA reiterates that these IRRs do not exceed company internal hurdle rates and are substantially lower than the estimated risk adjusted cost of capital as reflected in the Gain-Share Mechanism trigger points (see paragraph (315)).
- (331) Although not expected, it is not excluded that the profitability of the Capture Projects could change in the future. For instance, the ETS allowance price could increase,

or CO₂ tax could be extended to cover emissions from the Capture Projects. Capturing, transporting and storing of CO₂ could thereby result in additional cost savings.

- (332) For addressing such situations, the Capture Support Agreements set out an aid reduction mechanism, maximum return levels and a Gain-Share Mechanism.
- (333) The aid reduction mechanism caps or reduces aid if the maximum return level is reached within the Operating Period (section 5.8.4.3.5).
- (334) Under the Gain-Share Mechanism, any excess revenue above certain return levels (trigger points) is to be shared 50:50 and thereafter 75:25 between the State and the beneficiaries.
- (335) These trigger points are [10-15]% and [10-15]% for FOV and [10-15]% and [10-15]% for Norcem. These trigger points represent a range of estimated risk adjusted cost of capital for a particular project based on the weighted average cost of capital ("the WACC") methodology.
- (336) As regards FOV, the Norwegian authorities have submitted a study²³² setting out the parameters of the WACC calculation. ESA considers that the study supports the level of return for the trigger points in the Gain-Share Mechanism.
- (337) As regards Norcem, Norway submits that Norcem proposed the gain-share trigger points/maximum return levels as a commercial component in their offer to the Norwegian authorities. According to the company's internal documents submitted by the Norwegian authorities, the first trigger point is lower than what Norcem would normally see as an investment case upside. In particular, the maximum return levels offered by Norcem are significantly lower than normally expected from investments of this magnitude with comparable uncertainty. The Norwegian authorities also explain that Norcem's offer to the Norwegian authorities sets out that return levels were significantly lower than what Norcem and its parent company normally would expect from a CAPEX investment of this project's magnitude. In this respect, Norcem emphasised in its offer that the Norcem CCS Project is a development project involving new and partly unproven critical technology to be integrated into an industrial production process and that the level of risk and uncertainty in the project is therefore significantly higher than in CAPEX investment in the ordinary course of business. On that basis, ESA considers that the gain-share trigger points have been sufficiently justified. ESA also notes that the gain-share trigger points do not deviate significantly from those of the FOV Capture project.
- (338) ESA therefore considers that the Gain-Share Mechanism constitutes an efficient mechanism for addressing a situation in which, due to the developments on the market and regulation, there is a reduced or no funding gap.
- (339) Even if the Gain-Share Mechanism does not go beyond the Operating Period and does not cover the full lifetime of the asset (paragraph (254)), ESA considers such a mechanism to be justified in this case, because of the projected non-profitability of the Capture Projects without aid, no projected residual market value of the

²³² Document No 1112281.

installations outside the projects and the aim of securing, as high as possible, upfront financial contribution from FOV and Norcem.

- (340) ESA also notes that the Support Agreements entail, for both Capture Projects, the right to deliver CO₂ to Northern Lights free of charge during the Operating Period. This right is limited to 0.4 mtpa of CO₂ for each Capture Project (i.e. the Capture Projects' aided capacities). Whereas this right constitutes an additional advantage for the Capture Projects, ESA considers that the overall financial effect of this right would not lead to overcompensation. Even if the Capture Projects would have to pay tariffs for the CO₂ deliveries to Northern Lights, the State could fully compensate these costs by granting more aid.
- (341) Based on the above, ESA concludes that the FOV Measure and the Norcem Measure are proportionate.

8.6.3 The Transport and Storage Project

- (342) ESA reiterates that, as explained by the Norwegian authorities, different scenarios used to model cash flow expectations of the Transport and Storage Project result in negative NPV even with aid, with NPV at NOK [...] million under the most optimistic and NOK [...] million under the most pessimistic scenario (see paragraph (253)).
- (343) ESA further reiterates that the project is projected to be lossmaking under all considered scenarios, even with aid (see paragraphs (253) and (254)).
- (344) Similar to the Capture Support Agreements, the Northern Lights Support Agreement includes a Gain-Share Mechanism with trigger points set at 10% and 13.5% and using the same State/beneficiary sharing principles as the Capture Support Agreements. These trigger points are in the range of IRRs provided for in an external study submitted by the Norwegian authorities (see paragraph (256)).
- (345) Regarding the first trigger point, the study considers in the analysis as the relevant comparator publicly listed companies by sector, geography and general risk profile. The analysis also takes account the immaturity of the CO₂ transport and storage sector, the small size of the privately financed business of the project compared with listed companies and the high proportion of construction risk in newbuilt projects.
- (346) As regards the second trigger point, the study placed more weight on selected higher risk comparators. That is because the project is unusually exposed to risk of its target market never developing sufficiently to lift returns above the negative level provided by the two Capture Projects. The study considers that in return for accepting this unusual downside risk, it may be appropriate for the project's private sector partner to have the possibility in high upside cases to earn returns higher than would be available to businesses in already mature markets or contractual revenue arrangements providing a high level of certainty.
- (347) Based on the analysis of the external study, ESA considers that the Gain-Share trigger points are sufficiently justified.

(348) ESA also notes that the aided pipeline capacity is 5 mtpa rather than 1.5 mtpa. As explained by the Norwegian authorities, an increased capacity readiness of the pipeline is necessary for cost efficient use of resources, and the additional costs are insignificant in comparison to the construction of a pipeline with a capacity of 1.5 mtpa (see paragraph (145)). At the same time, the Gain-Share Mechanism includes revenues from commercialising transport and storage capacity above 1.5 mtpa. ESA therefore considers that aiding construction of a pipeline with the capacity of 5 mtpa does not lead to overcompensation.

(349) Based on the above, ESA concludes that the Transport and Storage Measure is proportionate.

8.6.4 Compensation related to CO₂ leakages and risks in the interface between capture, transport and storage

(350) As explained in section 5.8.5.4.2, the Northern Lights Projects is liable for leakages related to CO₂ from the Capture Projects after the Shipping Point, limited to 0.4 mtpa of CO₂ for each Capture Project. Should a leakage of CO₂ from the Capture Project occur after the Shipping Point, the State compensates partially Northern Lights' leakage costs. ESA considers that such compensation is proportionate, taking into account the current early phase of CCS transport and storage development and uncertainties related thereto. ESA also takes into account the fact that Northern Lights bears 20% of the costs and is therefore incentivised to avoid any such occurrences.

(351) Under the Support Agreements, the Norwegian authorities also assume financial liability for cross-chain risks between capture, transport and storage during the Operating Period. For instance, if a link in the CCS chain (e.g. a capture or storage facility) could not be completed on time or does not deliver CO₂ or accept deliveries as agreed. As a result, the anticipated cost savings from ETS price could not be realised or delays with completion could lead to waiting costs for the other participants of the Project.

(352) As explained by the Norwegian authorities, the State assuming financial liability for cross-chain risks has a direct bearing impact on the level private investment in the Project. The costs related to cross-chain risks are directly related to the Project that has a high level of uncertainty. Based on the above, ESA considers that the State assuming financial liability is proportionate and does not lead to overcompensation.

8.7 Avoidance of undue negative effects on competition and trade

8.7.1 Introduction

(353) According to paragraph 83 of the EEAG, ESA considers that for the aid to be compatible with the internal market, the negative effects of the aid measure in terms of distortion of competition and impact on trade between the Contracting Parties must be limited and outweighed by the positive effects in terms of contribution to the objective of common interest.

(354) With reference to paragraph 85 of the EEAG, ESA considers that aid for environmental purposes will, by its very nature, tend to favour environmentally friendly products and technologies at the expense of other, more polluting ones.

Furthermore, the effect of the aid will in principle not be viewed as an undue distortion of competition since it is inherently linked to its very objective.

- (355) The overall objective of the Project is to contribute to the development of CCS as a climate change mitigation measure (see section 3.5). The Project also allows to capture and store at least during 10 years up to 0.8 mtpa of CO₂ from the two Capture Projects. Northern Lights has in phase 1 storage capacity of 1.5 mtpa of CO₂ so that Northern Lights can transport and store up to 0.7 mtpa of CO₂ from third-parties (see paragraph (148)). By comparison, in the various scenarios put forward by the Commission's vision for a climate neutral Europe by 2050, CCS contribution ranges from 52 to 606 mtpa in 2050 (see paragraph (12)). This points to an overall limited potential of distortion of competition of the measures.
- (356) ESA notes that, in line with paragraph 93 of the EEAG, if the aid is proportionate, the negative impact of the aid is in principle softened. ESA considers that the measures are proportionate and do not exceed the funding gap of any of the supported projects. See paragraph (196) as regards the Capture Projects and paragraphs (253) and (254) as regards the Transport and Storage Project.
- (357) Further, under paragraph 94 of the EEAG, in order to keep the distortions of competition and trade to a minimum, ESA will place great emphasis on the selection process.
- (358) As explained in paragraph (69), prior to the construction and operation of the Project, the Norwegian authorities financed Concept and FEED studies subject to ESA's Decision No 045/17/COL. In that decision, ESA considered that aid to the Concept and FEED studies was kept to the minimum necessary by way of a competitive selection process and contractual control tools indicating that the distortive effect on trade and competition would be limited. ESA also considered that the Concept and FEED Studies phase enabled to lower aid to the Project and minimise the risk overcompensation.²³³
- (359) In parallel with conducting the Concept and FEED phase, the Ministry initiated negotiations with FOV, Norcem and Equinor for State funding for the construction and operation of the Project (see section 5.5). As explained by the Norwegian authorities, the fact that the Ministry finalises the negotiations of and concludes the Support Agreements does not mean that State funding is secured. State funding negotiated between the beneficiaries and the Ministry has to be approved by the Norwegian Government and ultimately by the Norwegian Parliament. It is still possible that State funding will not be approved. Hence, in negotiating the share of State funding and private contribution, the beneficiaries must consider the Uncertainty as to whether the State share would be considered excessive by the Government and ultimately the Parliament. In addition, the State applies a thorough quality assurance procedure to estimate potential costs (see section 5.8.3). ESA considers that the above procedures limit potential undue distortive effects on competition and trade of the notified measures.
- (360) In the following, ESA assesses potential distortion of competition on the level of the Capture Projects and Northern Lights under section 3.2.6.3 of the EEAG. In line

²³³ ESA's Decision No 045/17/COL, paragraphs 97 and 120.

with paragraph 161 of the EEAG, ESA takes into account whether any knowledge sharing arrangements are in place, whether the infrastructure is open to third-parties and whether the support to individual elements of the CCS chain has a positive impact on other fossil fuel installations owned by the beneficiary.

8.7.2 *The FOV Capture Project*

8.7.2.1 General

- (361) FOV is active in providing incineration treatment services for residual waste that is recycled to electricity and district heating within the greater Oslo area (see section 5.2.2).
- (362) As explained by the Norwegian authorities, any potential of distortion of competition on these markets is limited as the dominant factor is price. The aid is not likely to exceed the funding gap of the FOV Capture Project (see paragraph (196)). In any event, ESA considers that the Gain-Share Mechanism constitutes an efficient mechanism for addressing a situation in which market or regulatory developments would lead to decreased or no funding gap. Further, the Klemetsrud plant does not currently fall under the ETS nor under the CO₂ tax (see sections 3.3.3 and 3.3.4). It is not foreseeable that the FOV Measure would decrease FOV's marginal costs. At the same time, the project entails considerable additional costs. The FOV Measure does not increase production capacity either.
- (363) Nevertheless, the Norwegian authorities consider that in tenders where environment and emission is a factor for assessing bids, the FOV Measure increase FOV's competitiveness. Further, it is possible that Fortum as a 50% FOV shareholder gains a strategic advantage by access to knowledge that is useable in its other projects. However, ESA considers that on balance the FOV Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure.

8.7.2.2 Keeping an inefficient firm afloat

- (364) ESA considers that the aid will not serve to keep an inefficient firm afloat. As confirmed by the Norwegian authorities, FOV is not experiencing financial difficulties. There is also no evidence of overcapacity in the markets concerned. Further, conducting a large-scale industrial CCS project is not yet a market behaviour. The Norwegian authorities chose the Capture Projects through various phases that involved a competitive process and lengthy negotiations (see sections 4.4.2 and 5.5). Though the estimated aid amount is significant (see section 5.4), it is also limited in light of the turnover of the Fortum group.²³⁴

8.7.2.3 Distortion of dynamic incentives

- (365) ESA access to knowledge and learning from implementing the FOV Project could give FOV and its 50% shareholder Fortum a first mover advantage. Whereas FOV operates 11 plants in Oslo, Fortum focuses on the Nordic and Baltic countries, Poland, Russia and India and operates power plants, including co-generation plants, and generates and sells electricity and heat (see section 5.2.2).

²³⁴ Sales in 2019 EUR 5447 million, see: https://www.fortum.com/sites/default/files/investor-documents/fortum_financials2019.pdf.

- (366) ESA considers that a first mover advantage is an inherent feature of funding a project such as the Full-Scale CCS. Further, ESA considers that any potential first mover advantage is mitigated and outweighed by the positive spill-over effects of the Project.
- (367) As regards the CCS technology, it is not provided by Fortum, and the technology providers are chosen in a competitive process (see paragraph (129)). The same technology can be used in other CCS projects in and outside Norway, and not related to Fortum.
- (368) The Capture Support Agreements include comprehensive knowledge sharing arrangements. The beneficiaries are required to facilitate knowledge sharing. Furthermore, beneficiaries will be required to ensure that corresponding obligations are included in supplier contracts. As such, the agreement provides both that knowledge obtained directly by the beneficiaries and the third-parties they engage will be disseminated.
- (369) The knowledge sharing arrangements consist of three elements that apply following the entry into force of the Capture Support Agreements until the end of the Operating Period. First, the beneficiaries arrange for the capture facility to be inspected by third-parties with a view to promoting the transfer of experience and knowledge to other CO₂ projects and to national and international research and development work. Second, the beneficiaries prepare, *inter alia*, knowledge sharing reports. At the end of the Operating Period, the beneficiaries have to prepare a final report. The reports are delivered to the Government, which decides whether and to what extent the reports are made public.
- (370) The Capture Projects' beneficiaries could obtain exclusive IPRs.²³⁵ In order to minimise potential negative effects on competition, the Capture Support Agreements include wide-ranging regulation of use, distribution and licencing of IPRs. First, the Capture Support Agreements presuppose that the beneficiaries only use technology that is openly available in the market. This will contribute and enable transfer of experience and knowledge to other CCS projects in line with the knowledge sharing arrangements described above. Second, if the recipients develop patentable technology financed fully or partially with state aid, it is to be made available by the recipient throughout the EEA by way of licensing or publishing. The beneficiaries are to ensure that a corresponding obligation is included in supplier contracts. All potential interested parties within the EEA shall have the same possibility to acquire/license the technology on the same objective and non-discriminatory terms and conditions.
- (371) As such, all IPRs developed through the Capture Projects by the beneficiaries or their sub-contractors will be made available on non-discriminatory terms to all interested undertakings in the EEA. These provisions reduce the competitive advantage obtained by the beneficiaries, as they will not acquire exclusive technologies that other market players cannot utilise in competition with the recipients. The only advantage the recipients obtain is being able to deliver carbon

²³⁵ Intellectual property rights.

capture technology without the need to purchase licences for the technology they have developed themselves.

- (372) Based on the above, ESA considers it unlikely that the FOV Measure would crowd out investments in CCS technology or result in a concentration of CCS technology in a particular EEA State.

8.7.2.4 Creating or enhancing market power or exclusionary practices

- (373) For the reasons explained in paragraph (91), ESA does not consider that the FOV Measure would allow FOV to decrease its marginal costs or expand capacity on any markets where FOV is active.
- (374) Whilst FOV or its 50% shareholder Fortum could benefit from a first mover advantage, this is mitigated and outweighed by knowledge sharing arrangements under the Capture Support Agreements (see section 8.7.2.3).
- (375) As regards the technology, it is not provided by Fortum and the technology providers are chosen in a competitive process (see paragraph (129)). The same technology can be used in other CCS projects not related to Fortum.
- (376) Therefore, ESA considers that the FOV Measure does not significantly strengthen or maintain market power of either FOV or Fortum in any markets.

8.7.2.5 Artificially altering trade flows or the location of production

- (377) ESA considers that the FOV Measure will not have a significant effect on trade and location. The aid is only granted to FOV. ESA considers it unlikely that the aid will attract more investments in the region where the FOV Capture Project is located. Based on the information submitted by the Norwegian authorities and the information concerning the previous phases leading to the choice of the Capture Projects locations, it does not appear the locations where chosen with the aim of improving general production conditions in these areas (see sections 4.1 to 4.4).
- (378) ESA's conclusion is that the FOV Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure. Therefore, the overall balance is positive.

8.7.3 *The Norcem Capture Project*

8.7.3.1 General

- (379) Norcem is the sole producer of cement in Norway. It has two plants in Brevik and Kjølpsvik, which are among the most modern in Europe as far as energy consumption and limitation of emissions are concerned. Currently, Norcem exports cement and clinker to Sweden, Denmark and Iceland. Over the years, Norcem has also exported to the United States, the United Kingdom, Russia and Western Africa (see section 5.2.3).
- (380) As explained by the Norwegian authorities, the Norcem Measure as such does not allow Norcem to increase sales. Implementing the project also entails significant costs and any upside in cost savings are uncertain and there is a Gain-Share mechanism in place. Moreover, both of Norcem's plants produce close to their capacity (see paragraph (94)).

- (381) On the other hand, the project could benefit Norcem in terms of meeting customers' and consumers' increasing demand for sustainably produced cement. It is also not excluded that Norcem and the HeidelbergCement group gain access to knowledge useable in other projects.
- (382) However, ESA considers that on balance the Norcem Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure.

8.7.3.2 Keeping an inefficient firm afloat

- (383) ESA considers that the aid will not serve to keep an inefficient firm afloat. As confirmed by the Norwegian authorities, Norcem is not experiencing financial difficulties. No evidence points to difficulties on the HeidelbergCement group level.²³⁶ There is also no evidence of overcapacity on the markets concerned. Further, conducting a large-scale industrial CCS project is not yet a market behaviour. ESA reiterates that the Norwegian authorities chose the Capture Projects through various phases that involved a competitive process and lengthy negotiations (see paragraph (364)). Though the aid amount is significant (see section 5.4), it is also limited in light of the turnover of the HeidelbergCement group.²³⁷

8.7.3.3 Distortion of dynamic incentives

- (384) ESA cannot exclude that the Norcem Capture Project gives Norcem and HeidelbergCement a first mover advantage by access to knowledge and learning from implementing CCS technology. HeidelbergCement is one of the largest building material companies in the world. As explained by the Norwegian authorities, it is the number one producer of construction aggregates, the number 2 in cement and number 3 in ready mixed concrete worldwide (see section 5.2.3).
- (385) Similarly, to the FOV Capture Project, ESA considers that a first mover advantage is an inherent feature of funding a project such as the one at stake. Further, any potential first mover advantage is mitigated and outweighed by the positive spill-over effects of the Project.
- (386) As explained in section 8.7.2.3, the Capture Support Agreements include comprehensive knowledge sharing arrangements. The beneficiaries are required to facilitate knowledge sharing and include corresponding obligations in supplier contracts. The Capture Support Agreements include wide-ranging regulation of use, distribution and licencing of IPRs.
- (387) The CCS technology is not provided by Norcem or the HeidelbergCement group, and the technology providers are chosen in a competitive process (see paragraph (140)). The same technology can be used in other CCS projects in and outside Norway, and not related to Norcem or HeidelbergCement.

²³⁶ HeidelbergCement [key financial data 2017, 2018 and 2019](#).

²³⁷ 2019 revenue EUR 18 851.3 million, *idem*.

- (388) Based on the above, ESA considers it unlikely that the Norcem Measure would crowd out investments in CCS technology or result in a concentration of CCS technology in a particular EEA State.

8.7.3.4 Creating or enhancing market power or exclusionary practices

- (389) As explained in paragraph (94), ESA considers that the Norcem Measure as such does not lead to increased sales or capacity. Although Norcem or HeidelbergCement could benefit from a first mover advantage, it is mitigated and outweighed by knowledge sharing arrangements under the Capture Support Agreements (see section 8.7.2.3). ESA reiterates that the same CCS technology can be used in other CCS projects not related to Norcem or HeidelbergCement.
- (390) Therefore, ESA considers that the aid will not significantly strengthen or maintain market power of either Norcem or HeidelbergCement.

8.7.3.5 Artificially altering trade flows or the location of production

- (391) ESA considers that the Norcem Measure will not have a significant effect on trade and location. The aid is only granted to Norcem, operating at nearly full capacity. ESA considers it unlikely that the aid will attract more investments in the region where the Norcem Capture Project is located. ESA reiterates that based on the information submitted by the Norwegian authorities and the information concerning the previous phases leading to the choice of the Capture Projects locations, it does not appear the locations were chosen with the aim of improving general production conditions in these areas (see sections 4.1 to 4.4 and 5.5).
- (392) ESA's conclusion is that the Norcem Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure. Therefore, the overall balance is positive.

8.7.4 Northern Lights

8.7.4.1 General

- (393) Northern Lights will be transporting and storing CO₂, initially from the Capture Projects, and potentially also from third-parties (see section 5.7.1).
- (394) At the moment, CO₂ transporting and storing services are at a very early stage. No large-scale CCS chains are in place yet (see sections 3.4 and 5.7.2). There are two petroleum industry-related storage projects in Norway (see section and 5.7.2). However, differently from Northern Lights, these are not, even partially, "open access" based projects that would rely on storage of CO₂ from third-parties. Development of CO₂ transport and storage services have also been hampered by the fact that cross-border transport of CO₂ for storage purposes is yet allowed though the states are making preparing to allow for it (see section 3.3.5).
- (395) However, these services appear to be emerging in the EEA. For instance, the Porthos project to transport CO₂ from industry in the Port of Rotterdam and store this in empty gas fields beneath the North Sea is being developed (see paragraph (36)).
- (396) Hence, the measure has an impact on Northern Lights' competitiveness with regard to providing the emerging CO₂ transport and storage services in the future.

- (397) The Northern Lights Participants (Equinor, Shell and Total) are all multinational energy sector companies that could benefit from access to storage facilities. As explained by the Norwegian authorities, in producing hydrogen from natural gas or CO₂ from operating refineries, access to a CO₂ storage site could benefit the Participants.²³⁸ Further, the Northern Lights Participants could also benefit in their other CCS projects from access to knowledge gained in implementing the Project.
- (398) However, ESA considers that on balance the Transport and Storage Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure.

8.7.4.2 Keeping an inefficient firm afloat

- (399) ESA considers that the aid will not serve to keep an inefficient firm afloat. Northern Lights has not yet been established. No evidence points to difficulties on the Participants level.²³⁹ Investing in “open access” CCS transport and storage projects is not yet taking place. The Norwegian authorities chose the Transport and Storage Project through various phases that involved a competitive process and lengthy negotiations (see sections 4.4.2, 4.4.4 and 5.5). Though the aid amount is significant (see section 5.4), it is limited in light of the turnover of the Northern Lights Participants.²⁴⁰
- (400) Should the storage operations cease, the Norwegian authorities explain that storage site would not have any residual value for Northern Lights or its Participants, as it cannot be utilised for other commercial purposes. According to the CO₂ Storage Regulations, Northern Lights is obliged to secure and close the storage site when operations cease.²⁴¹ Therefore, Northern Lights is tasked with the shutdown, removal and monitoring in accordance with applicable regulations.
- (401) Even if the storage operations cease, the vessels financed by state aid may still have a commercial value for Northern Lights. However, the residual value of assets is included in the NPV calculations provided by the Norwegian authorities. This helps avoid overcompensation and thereby minimise undue negative effects on competition.

8.7.4.3 Distortion of dynamic incentives

- (402) The Northern Lights Support Agreement contains, like the Capture Support Agreements, extensive knowledge sharing arrangements (see section 8.7.2.3). The beneficiaries are required to facilitate knowledge sharing and include corresponding obligations in supplier contracts. The Northern Lights Support Agreement include wide-ranging regulation of use, distribution and licencing of IPRs.
- (403) ESA considers that these arrangements cater for knowledge and technology dissemination and contribute to mitigating any undue negative effects on competition in the form of first mover advantage for Northern Lights and its

²³⁸ See, for instance, Equinor's ambitions in developing [hydrogen projects](#).

²³⁹ 2019 financial data on [Equinor](#), [Total](#), and [Shell](#).

²⁴⁰ *Idem.*, 2019 revenues Equinor USD 62 911 million; Total USD 14 554 million and Shell USD 344 877 million.

²⁴¹ Chapter 7 of the CO₂ Storage Regulations.

Participants. The Participants are free to compete against each other on future CCS projects on the Norwegian continental shelf or elsewhere.

8.7.4.4 Creating or enhancing market power or exclusionary practices

- (404) ESA reiterates that Northern Lights partially “open access” principle based project relying on storage of CO₂ from third-parties (see paragraphs (145) and (148)). Hence, should it become commercially viable, Northern Lights is motivated to grant access to all third-parties. As explained by the Norwegian authorities, the Northern Lights Participants and third-parties would use the storage service site on non-discriminatory terms. The Northern Lights Support Agreement mandates third party access to storage and transport services on objective and non-discriminatory terms.
- (405) Moreover, storage CO₂ is regulated in Norway under the CO₂ Storage Regulation, implementing the CCS Directive (see sections 3.3.1 and 3.3.2). This regulatory framework further limits the commercial freedom of the storage operator and imposes additional requirements as to the access to, operation and closure of storage sites.
- (406) The Norwegian authorities have explained that third-parties will be granted access to facilities on a non-discriminatory basis, and that this access will be governed by future agreements to be approved by the Ministry (see section 3.3.2). The Authority assumes that this will be in full compliance with the requirements of the CCS Directive.
- (407) Consequently, and as explained by the Norwegian authorities, there are mechanisms in the regulatory framework that prevent Northern Lights from charging excessive profits or from precluding access to the storage site for third-party operators that are not affiliated to Northern Lights. This is a reliable safeguard against spill over-effects and ensures marked-based pricing for all undertakings requesting access to the storage facilities.

8.7.4.5 Artificially altering trade flows or the location of production

- (408) ESA considers that the Transport and Storage Measure will not have a significant effect on trade and location. The Transport and Storage Project is developed on “open access” basis and Norway together with other EEA States is working towards allowing cross-border CO₂ transport for storage purposes (see section 3.3.5 and paragraphs (145) and (148)).
- (409) During the Operating Period, Capture Projects have been reserved 0.8 mtpa of out the available aided storage capacity of 1.5 mtpa CO₂ (see paragraph 5.7.1). Hence, the potential for improving the general production conditions in the area appear to be limited.
- (410) ESA reiterates that based on the information submitted by the Norwegian authorities and the information concerning the previous phases leading to the Project, it does not appear that locations of the Capture Projects or the Transport and Storage Project were chosen with the aim of improving general production conditions in these areas (see sections 4.1 to 4.4 and 5.5).

- (411) ESA's conclusion is that the Transport and Storage Measure does not have any undue distortive effects on competition and trade that would outweigh the positive effects of the measure. Therefore, the overall balance is positive.

8.8 Transparency

- (412) ESA finally notes the Norwegian authorities' commitment to meet the transparency obligation laid down in Section 3.2.7 of the EEAG (see section 5.9).

9 Conclusion

- (413) On the basis of the foregoing assessment, ESA considers that the notified measures for financing the construction and operation of the Project constitute state aid with the meaning of Article 61(1) of the EEA Agreement. Since no doubts are raised that the measures are compatible with the functioning of the EEA Agreement, pursuant to its Article 61(3)(c), ESA has no objections to the implementation of the measures.
- (414) If this letter contains confidential information which should not be disclosed to third-parties, please inform ESA **by 28 August 2020**, identifying the confidential elements and the reasons why the information is considered to be confidential. In doing so, please consult ESA's Guidelines on Professional Secrecy in State Aid Decisions.²⁴² If ESA does not receive a reasoned request by that deadline, you will be deemed to agree to the disclosure to third-parties and to the publication of the full text of the letter on ESA's website: <http://www.eftasurv.int/state-aid/state-aid-register/>.

For the EFTA Surveillance Authority,

Yours faithfully,

Bente Angell-Hansen
President
Responsible College Member

Frank J. Büchel
College Member

Högni Kristjánsson
College Member

For Carsten Zatschler
Countersigning as Director,
Legal and Executive Affairs

[Status]

²⁴² [OJ L 154, 8.6.2006, p. 27](#), and EEA Supplement No 29, 8.6.2006, p. 1.