

Case No: 63992  
Event No: 487151  
Dec. No: 27/09/COL

EFTA SURVEILLANCE  
AUTHORITY

EFTA SURVEILLANCE AUTHORITY DECISION  
of 29 January 2009  
on the carbon capture and storage project at Kårstø

(Norway)

THE EFTA SURVEILLANCE AUTHORITY<sup>1</sup>

Having regard to the Agreement on the European Economic Area<sup>2</sup>, in particular to Articles 61 to 63 and Protocol 26 thereof,

Having regard to the Agreement between the EFTA States on the Establishment of a Surveillance Authority and a Court of Justice,<sup>3</sup> in particular to Article 24 thereof,

Having regard to Article 1(3) of Part I and Article 4(3) of Part II of Protocol 3 to the Surveillance and Court Agreement,<sup>4</sup>

Having regard to the Authority's Guidelines on the application and interpretation of Articles 61 and 62 of the EEA Agreement,<sup>5</sup> in particular the section on state aid for environmental protection,

Whereas:

I. FACTS

1. Procedure

By letter submitted on 22 January 2008 (Event No. 461626) the Norwegian authorities notified pursuant to Article 1(3) of Part I of Protocol 3 their intention to provide state funding to Gassnova SF for the construction of a carbon capture and storage facility at Kårstø, Norway.

By letter submitted on 29 February 2008 (Event No. 465415) the Authority requested additional information. By letter submitted on 4 April 2008 (Event No. 472348) the Norwegian authorities replied to the information request.

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<sup>1</sup> Hereinafter referred to as the Authority.

<sup>2</sup> Hereinafter referred to as the EEA Agreement.

<sup>3</sup> Hereinafter referred to as the Surveillance and Court Agreement.

<sup>4</sup> Hereinafter referred to as Protocol 3.

<sup>5</sup> Guidelines on the application and interpretation of Articles 61 and 62 of the EEA Agreement and Article 1 of Protocol 3 to the Surveillance and Court Agreement, adopted and issued by the Authority on 19 January 1994, published in the Official Journal of the European Union (hereinafter referred to as OJ) L 231 of 03.09.1994 p. 1 and EEA Supplement No. 32 of 03.09.1994 p. 1. The Guidelines were last amended by Decision No. 788/09 of 17 December 2008. Hereinafter referred to as the State Aid Guidelines. The updated version of the State Aid Guidelines is published on the Authority's website: [http://www.eftasurv.int/fieldsOfWork/fieldStateAid/state\\_aid\\_guidelines/](http://www.eftasurv.int/fieldsOfWork/fieldStateAid/state_aid_guidelines/)

By letter submitted on 29 May 2008 (Event No. 478437) the Authority requested further information. By letter submitted on 30 June 2008 (Event No. 483683) the Norwegian authorities replied.

By letter submitted on 5 August 2008 (Event No. 487043) the Authority forwarded further questions to the Norwegian authorities. A response by the Norwegian authorities was submitted on 8 September 2008 (Event No. 490644).

By letter submitted 23 October 2008 (Event No. 495636) the Authority requested an extension of the time limit, set out in Article 4(5) of Part II of Protocol 3 to the Surveillance and Court Agreement. By letter submitted on 24 October 2008 (Event No. 496184) and later by email dated 21 January 2008 (Event No. 505373) the Norwegian authorities agreed to extend the time limit for adopting a final decision until 29 January 2009.

## **2. Description of the proposed measures**

### **2.1 Policy background**

The Norwegian authorities have explained the political background for the proposed measure. According to analyses carried out by the International Energy Agency (the "IEA") economic growth is not feasible without continued use of fossil fuels for several decades to come.<sup>6</sup> However, as stated by the UN, the increasing greenhouse gas emissions resulting from the use of fossil fuels are likely to contribute to irreversible climate change effects.<sup>7</sup> In Norway, energy supply and efficiency as well as the protection of the environment form important elements of the political objectives pursued and are generally given a high priority. As a result of the challenges posed in the context of climate change the Norwegian authorities have awarded special attention to the means by which greenhouse gases can be reduced, in particular carbon capture and storage ("CCS"). The IEA has estimated that, in the power and industrial sectors alone, CCS could contribute to nearly 20% of the reductions needed to reduce greenhouse gas emissions by 2050.<sup>8</sup> On this basis, stressing the need to combat climate change with CCS technologies,<sup>9</sup> the current political agenda in Norway includes a wish to contribute, as much as possible, to the development and world-wide deployment of cost efficient carbon capture technologies.

As part of its CCS policy the Norwegian Government has, as of November 2005, implemented a practice whereby concessions to build new power plants are not awarded if the power plant is not coupled to CCS facility.<sup>10</sup> However, due to the high costs of CCS facilities the result of this practice has been that several plans to build new power plants have been abandoned by their investors. The Norwegian authorities consider that such an

<sup>6</sup> See p. 3 of the executive summary of the report "The World Energy Outlook 2008" issued by the IEA; [http://www.worldenergyoutlook.org/docs/weo2008/WEO2008\\_es\\_english.pdf](http://www.worldenergyoutlook.org/docs/weo2008/WEO2008_es_english.pdf).

<sup>7</sup> See the "Climate Change 2007: Synthesis Report" of 17 November 2007, published by the International Panel on Climate Change of the UN; <http://www.ipcc.ch/ipccreports/ar4-syr.htm>. The IEA has issued statements of a similar character, cf. executive summary of the report "The World energy Outlook 2008".

<sup>8</sup> Press Release 08(20) of 20 October 2008, Paris entitled "IEA urges a quick and global push to develop and deploy carbon capture and storage (CCS) technologies."

<sup>9</sup> See for example executive summary of the book entitled "CO<sub>2</sub> Capture and Storage – A Key Carbon Abatement Option" issued by the IEA in 2008; <http://www.iea.org/Textbase/npsum/ccs2008SUM.pdf>.

<sup>10</sup> This policy forms part of the Norwegian Governments inauguration declaration when taking office, referred to as the "Soria Moria Declaration".

outcome of a strict CCS concession practice bears witness to the generally accepted fact that CCS technologies are still in their infancy and the market for such technologies is only emerging. The costs, in particular the operating costs, of such projects are much higher than under alternative carbon abatement measures such as the EU Emissions Trading Scheme Directive (the “ETS”).<sup>11</sup> Against this background the Norwegian authorities decided to invest in the development of CCS technologies and identified for that purpose an investment opportunity at Kårstø, Norway.

## 2.2 The Kårstø project

### *Introduction*

In 2000 the limited liability company, Naturkraft AS,<sup>12</sup> received a concession to build a power plant at Kårstø, Norway. The concession was received already in 2000, prior to the implementation of the administrative practice of requiring new power plants to be coupled to a CCS. Naturkraft subsequently built a 420 MW gas-fired power plant at Kårstø which became operational in October 2007.

Against this setting, the Norwegian authorities have notified a proposition to fully finance the construction of a CCS facility at Kårstø to capture and store emissions from the power plant (the “Kårstø project”). The facility is intended to remove approximately 1 million tonnes CO<sub>2</sub>, which represents approximately 85% of the emissions from the power plant. It thereby represents a significant reduction of the total CO<sub>2</sub> emissions in Norway.<sup>13</sup>

The Norwegian authorities have moreover explained that it is generally acknowledged that cost reductions – especially those derived from energy consumption – are necessary in order to enable CCS technology to improve and contribute to combating climate change. Against that background the aim of the capture facility at Kårstø is to test full-scale carbon capture using the existing technology of amine based post-combustion solution (see below) and thereby contribute to developing the amine based technology further.<sup>14</sup> By gaining technological knowledge of the construction and operation of a full scale plant, the ultimate goal is that the Kårstø project contributes to reducing costs (especially those derived from energy consumption) and risks so as to enable wide deployment of the CCS technology at affordable prices at a global scale.

The Norwegian authorities have not yet decided which concepts will be employed for the transport and storage. A decision on these concepts is foreseen simultaneously with the adoption of an investment decision on the overall project which is envisaged for the

<sup>11</sup> 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 (OJ L 275, 25.10.2003, p. 32) as amended by Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 (OJ L 338, 13.11.2004, p. 18). Both directives have been incorporated into the EEA Agreement by Decision No. 146/2007 (OJ L 100, 10.4.2008, p. 92 and EEA Supplement No. 19, 10.4.2008, p. 90). Reference to ETS in the following covers, where relevant, also the Norwegian implementing legislation; Law no. 99 entitled “*Lov om kvoteplikt og handel med kvoter for utslipp av klimagasser (klimakvoteloven)*” of 17 December 2004, last amended on 29 June 2007.

<sup>12</sup> Now owned 50/50 by StatoilHydro ASA and Statkraft SF.

<sup>13</sup> Norway’s total CO<sub>2</sub> emissions were, according to Statistisk Sentralbyrå (Statistics Norway), approximately 55 million tonnes in 2007. The notified measure will thus alone be capable of reducing that number by approximately 2%, see <http://www.ssb.no/ssp/utg/200804/04/>.

<sup>14</sup> Technological progress should result in particular from accomplishing process optimisation for a full-scale plant and demonstrating the viability of the technology through long-term operational stability and reliability.



second half of 2009. The construction of the CCS is scheduled to begin immediately after the adoption of the investment decision. The construction period is estimated to be approximately three years in order to have the CCS operational by 2012.

The CCS at Kårstø is to be owned and managed by the 100% state owned company Gassnova SF ("Gassnova") which will also be the direct recipient of the state funding.<sup>15</sup> It appears from the by-laws that the purpose of Gassnova is to manage the interests of the State in relation to the handling of CO<sub>2</sub> (including technology development, capture, transport and storage of CO<sub>2</sub>).<sup>16</sup> It also appears that the work of Gassnova should result in cost reductions in relation to CO<sub>2</sub> handling and that optimal use shall be ensured of CO<sub>2</sub> handling projects by the State or state owned entities. Finally, according to the Norwegian authorities the State shall be involved in, and decide on, cases of commercial importance for Gassnova, such as fixing the prices of carbon capture services provided to third parties.<sup>17</sup>

At an early stage of the project, the Norwegian authorities commissioned the Norwegian Water Resources and Energy Directorate ("NVE") to carry out preparatory work in relation to the Kårstø project. The aim was to provide the authorities with preliminary knowledge of CCS technology and how it could be employed in the context of the Kårstø project. On this basis, the NVE issued a report in December 2006 on the Kårstø project entitled "Carbon Capture and Storage at Kårstø" (the "NVE Report").<sup>18</sup> The NVE Report contains important background and preliminary financial information on the Kårstø project.

#### A. Technology and capacity

The Kårstø project consists of the construction of (i) a carbon capture facility; (ii) transport infrastructure; and (iii) a storage facility. Various solutions for CO<sub>2</sub> storage have been examined, in particular, subsea storage beneath the existing Sleipner field and a new structure in the Utsira formation on the Norwegian continental shelf. However, since no final decision has been taken in terms of which concepts will be employed (neither for transport nor for storage) the description of technical solutions below focuses on the capture facility.

##### (i) Post-combustion technology

Due to the fact that the power plant was constructed prior to the CCS, the capture plant must be retro-fitted to the power plant. The technology best suited to capture CO<sub>2</sub> from an existing power plant is "post-combustion". Other CO<sub>2</sub> capture methods such as "pre-combustion" and "oxy-fuel combustion" can, at least in theory, also be retro-fitted to an existing plant<sup>19</sup>. This would however entail both higher costs and risks as the power plant

<sup>15</sup> Gassnova SF was established on 3 July 2007 as a state enterprise ("*statsforetak*") under Act No. 71 of 30 August 1991.

<sup>16</sup> "*Vedtekter – Gassnova SF*"

<sup>17</sup> The by-laws also provide that the State shall be involved in all matters of principal or political importance.

<sup>18</sup> The report was translated into English and this version was published in May 2007; [http://webb.nve.no/FileArchive/447/NVEreport%202-07\\_b.pdf](http://webb.nve.no/FileArchive/447/NVEreport%202-07_b.pdf)

<sup>19</sup> In post-combustion capture the CO<sub>2</sub> is removed from the power plants flue gasses, that is, after combustion of the fuel. In pre-combustion capture the carbon content of the fuel is removed prior to combustion which produces a hydrogen rich fuel and a CO<sub>2</sub> by-product stream. Oxy-fuel combustion involves steps both prior to and during combustion of the fuel: Nitrogen is removed from the air using an air separation unit and the fuel is combusted with oxygen mixed with CO<sub>2</sub> which is re-circulated to control the

would have to be redesigned and production during the modification period would be lost. Moreover, the fact that the post-combustion technology can be retro-fitted to existing plants relieves power producers from having to decide up-front on whether to equip the power plant with CCS. In practice, post-combustion is therefore also the technology typically applied to conventional power plants.

(ii) Type of plant and size

The capture facility at Kårstø captures CO<sub>2</sub> from a power plant based on gas turbines. It follows from the NVE Report and from a list submitted by the Norwegian authorities that a number of smaller capture facilities for flue-gases already exist. Only one of them captures CO<sub>2</sub> exclusively from gas turbines, namely the Bellingham plant in the USA. Capturing CO<sub>2</sub> from gas turbines involve additional challenges compared to capturing CO<sub>2</sub> from plants based on coal, gas-fired boilers or reformers.<sup>20</sup> The capture capacity of the facility at Kårstø is intended to be ten times larger than the Bellingham plant which captures 100 000 tonnes of CO<sub>2</sub> annually and is the largest existing plant for separation of CO<sub>2</sub> from a gas turbine power plant.<sup>21</sup> Hence, the plant at Kårstø will have a capture capacity of about one million tonnes CO<sub>2</sub> annually.

According to the NVE Report CO<sub>2</sub> capture of this scale has not previously been attempted. There are, however, a number of other planned CCS projects with an envisaged capture capacity of the same level as (or higher than) the Kårstø project. Many of them are based on the post-combustion technology and involve CO<sub>2</sub> capture from fuels such as gas and coal. Although post-combustion capture of CO<sub>2</sub> from power plants based on gas and coal involve differences,<sup>22</sup> the experiences based on gas-fired plants will be useful for projects based on coal-fired power plants. For example, if via the scaling-up in the Kårstø project, a cost efficient manner to build an absorption tower is discovered this will also be useful for the technology of capturing CO<sub>2</sub> from coal-fired plants.<sup>23</sup>

(ii) Absorption medium

The absorption medium of the capture plant at Kårstø is amines which is a well known and tested technology. The process of separating CO<sub>2</sub> from amines and recycling these involve extensive steaming and pumping and thus high energy costs. In the capture plant the flue gas (exhaust gas) is cooled and passed through an absorption column at which point the exhaust gas comes in direct contact with a mixture of water and amines. The CO<sub>2</sub> molecules bind to the amines and this mixture is transferred to another column where it is heated up by steam until the CO<sub>2</sub> is released from the amines. The (CO<sub>2</sub> free) amine

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combustion temperature. This results in a flue gas consisting mainly of CO<sub>2</sub> and steam which after being condensed becomes a highly concentrated CO<sub>2</sub> stream.

<sup>20</sup> Challenges of capturing CO<sub>2</sub> from gas turbines compared to coal-fired plants are high volume, low concentration of CO<sub>2</sub> (about 4% in gas turbines compared to coal with 12%) and high levels of oxygen which reduces the efficiency of many absorbers for capturing CO<sub>2</sub>. The differences are more or less the same between capturing CO<sub>2</sub> from gas turbines, on the one hand, and from gas-fired boilers and reformers, on the other.

<sup>21</sup> Cf. the introduction and page 21 of the NVE Report.

<sup>22</sup> See footnote 20.

<sup>23</sup> In a scaling-up process, the largest and most critical piece of equipment is the absorber (50-60 meter high with a cross section of about 250 square meters). Correct design of its geometry and size is of the utmost importance to obtain the desired operating conditions of the CCS plant. Experiences gained with a high-scale plant will enable future CCS plants to be designed (and operated) in an optimal manner thereby reducing problem phases caused by incorrect design of the plants.

solution is returned to the absorption column while the almost clean CO<sub>2</sub> gas (saturated with steam) is transferred to the compression unit where it is dried and compressed to the necessary level of pressure enabling transportation. The CO<sub>2</sub> is then pumped to storage. Separating CO<sub>2</sub> from the amines and recycling it requires large amounts of heat in the form of steam. The process also requires electrical energy for compression and pumping of cooling water.

### (iii) Capture rate

The plant at Kårstø will first process about 1 240 000 tonnes of CO<sub>2</sub> on an annual basis. With an estimated capture rate of 85% the facility will end-up capturing around one million tonnes CO<sub>2</sub> annually at full capacity. The capture rate of 85% is deliberately chosen although it is technically possible to capture CO<sub>2</sub> at a higher rate (e.g. more than 90%). A capture rate of between 85-90% (from a gas-fired power plant) represents an optimal balance between the energy consumption and capture ability and is hence the most cost efficient.<sup>24</sup>

## B. Costs, financing and duration

The Norwegian State intends to finance 100% of the investment costs of the Kårstø project. It has moreover notified its intention to cover the operating costs for 10 years. The lifetime of the capture plant at Kårstø is, according to the Norwegian authorities, 25 years. The Norwegian authorities have explained that if operating aid is to be granted after the expiry of the notified period, a new notification will be submitted.

### (i) Cost elements

Investment costs related to the capture facility cover the construction of the carbon capture plant (including CO<sub>2</sub> dehydration and compression for transport), site preparation, necessary “tie-ins” (such as infrastructure connections for supply of water and electricity), other installation services during the construction phase (e.g. preparation of roads and quays), administrative costs (e.g. costs for managing the construction process and a preliminary operating team) and a contingency reserve.

Operating costs of the carbon capture facility consists of (i) fixed costs, such as site rental, maintenance, service agreements, property tax; and (ii) variable costs, such as consumption of absorbent, energy (electricity), waste disposal and seawater cooling.

Investment and operating costs for transporting the CO<sub>2</sub> in pipelines to subsea geological structures on the Norwegian continental shelf cover, amongst others, equipment at the capture plant (valves etc.), the landing at Kårstø, route preparation, installation, trenching, rock dumping and procurement of the pipeline itself.

Given that the location for storage has not yet been decided the specific cost elements of this post have not yet been identified.

### (ii) Cost estimates and legal basis

According to the NVE Report estimated investment costs of the CCS project are (i) the planning phase: approx. NOK 330 million (approx. EUR 36.44 million); the capture plant:

<sup>24</sup> A higher capture rate would increase the costs disproportionately.



approx. NOK 3.46 billion (approx. EUR 382 million); and (iii) transport & storage: approx. NOK 1.56 billion (approx. EUR 172.3 million).<sup>25</sup> This totals approx. NOK 5 billion (approx. EUR 552 million) with a margin of uncertainty of +/- 40%. The uncertainty margin reflects that the Kårstø project involves considerable risks, in particular, in terms of technical performance, annual operating hours<sup>26</sup> and the price of electricity due to heavy energy dependency.

As regards operating costs, the NVE Report states that on the basis of 8000 hours of operation, annual costs of capturing CO<sub>2</sub> have been estimated to be about NOK 370 million (approx. EUR 40.86 million) or NOK 700 (approx. EUR 77.3 million) per tonne of CO<sub>2</sub> captured.<sup>27</sup>

It furthermore appears from the NVE Report that a net present value calculation has been made based on 8000 hours operation at full capacity, 25 years lifetime, 5% interest rate, a future electricity price of NOK 0.36/kWh and the allocation over three years of construction costs.<sup>28</sup> There are no revenues, in principle, as the prospects of the sale of CO<sub>2</sub> for enhanced oil recovery has been deemed commercially not feasible. In order to break even the CO<sub>2</sub> captured had to be valued at a minimum of NOK 700 per tonne (used as a “fictive” revenue).

On this basis the Kårstø project is, according to the Norwegian authorities, not profitable. However, the Norwegian authorities have subsequently explained that in the context of ensuring that the power plant, Naturkraft, will face the same costs as if there had been no carbon capture, Naturkraft will pay Gassnova an amount per tonne CO<sub>2</sub> captured, corresponding to the price of allowances. This means that Gassnova will have revenues corresponding to this amount. The Norwegian authorities have explained that it is the relation between the costs of capturing CO<sub>2</sub> and the price of allowances which determines whether a CCS is profitable. Since the price of allowances, which for the past two years have been fluctuating around EUR 20, represents less than a fourth of the costs of capturing CO<sub>2</sub> per tonne (approx. EUR 88) this income of Gassnova will therefore not render the Kårstø project profitable.

The data used in the NVE Report provide the most current and, so far, the only estimate of the investment and operating costs of the Kårstø project. The NVE Report was prepared at an early stage and therefore gives only a preliminary and approximate estimate of the basis for undertaking investments. Gassnova is currently in the process of establishing a complete and more precise overview of the construction and technical elements involved in the CCS project at Kårstø as well as their costs, including the preparation of a new net present value calculation (collectively “the investment basis report”). The investment and operating costs reflected in the investment basis report may be higher than first indicated in the NVE Report. The investment basis report will be submitted as a basis for adopting the investment decision envisaged for the second half of 2009. Once the investment decision has been adopted, the Government will prepare a proposition for investing in the

<sup>25</sup> Page 6 of the NVE Report. Exchange rate: NOK 9.0555 = 1 Euro (The Norwegian Central Bank – 21.01.2009).

<sup>26</sup> Low operating hours means a lower volume of CO<sub>2</sub> and hence higher abatement costs.

<sup>27</sup> Page 6 of the NVE Report.

<sup>28</sup> Page 64 of the NVE Report. Moreover, the net present value calculation shows that the CCS is sensitive to operating hours. Although low operating hours will reduce the operating costs, low operating hours also mean less volume of CO<sub>2</sub> captured resulting in higher costs per tonne CO<sub>2</sub> captured. In other words low operating hours increase the CO<sub>2</sub> abatement costs expressed in EUR/tonne.

Kårstø project for the Parliament. The Parliament decision adopted on this basis will form the legal basis for awarding funding over the state budget on an annual basis to the Kårstø project.

(iii) Measures to avoid overcompensation

As a starting point, the Norwegian State will grant funding to cover the investment and operating costs based on the investment basis report prepared by Gassnova. Operating costs will be awarded on the basis of annually adjusted cost estimates. All costs must be documented and substantiated on the basis of generally approved and accepted accounting standards and routines for financial activities engaged in by the Norwegian State. Moreover, in order to ensure that funding to cover annual operating costs is adjusted to the circumstances ex-post, including taking account of surplus funding (resulting from, for example, shut-downs of the power plant), any surplus is carried over to the following year and deducted from the financing requirements for that year. Any funds received by Gassnova from Naturkraft (the owner of the power plant) will be automatically deducted in the state funding to be provided.

As regards the situation of Naturkraft, under the ETS, power plants are required to submit allowances corresponding to the extent of their emissions. The Norwegian authorities have explained that although Gassnova will capture and store CO<sub>2</sub> emitted by Naturkraft and thereby, in principle, alleviate it from having to surrender allowances, the authorities will ensure that Naturkraft will be faced with the same costs as if the CCS would not be there. In this regard, the Norwegian authorities have explained that as of the point in time when the CCS at Kårstø becomes operational, Naturkraft will pay Gassnova a price equivalent to the cost of allowances.

### 2.3 Technology providers to the Kårstø project

In general, all contracts necessary for purposes of constructing the CCS at Kårstø will be entered into in compliance with applicable public procurement rules. If such rules do not apply, contracts will be negotiated on an arms-length commercial basis.

The necessary steps to start the public procurement process for the capture facility has been commenced whereas the public procurement processes for selecting suppliers for transport and storage solutions will be initiated later.

With respect to the capture facility, a public tender has been carried out throughout the EEA on the basis of applicable public procurement rules in order to select an “owner’s engineer”. This is an entity authorised to manage and carry out the procurement process as a representative for Gassnova. The company Fichtner GmbH & CO. KG has been selected for this purpose and the contract was concluded in February 2008.

The procedure for selecting a contractor who will enter into the engineering, procurement, construction and installation (“EPCI”) contract for the capture facility is carried out in compliance with public procurement rules<sup>29</sup> on the basis of a procedure entitled “competitive dialogue”.<sup>30</sup> The process is currently at phase two during which short-listed

<sup>29</sup> 1999 Public Procurement Act (Law no. 69 of 16 July 1999) and Part III of section 14-2 (cf. 14-1 (2)c) of Royal Decree of 7 April 2006.

<sup>30</sup> The procedure, which covers three phases, was commenced in December 2007 by issuing a public call throughout the EEA for a qualification document. Based on the responses submitted to this call a short-list



candidates will prepare front-end engineering and design studies ("FEED"). Phase two is expected to be completed in February 2009. Phase three will commence in May 2009 and the final award of the EPCI contract is expected to take place in June or July 2009.

The Intellectual Property rights remain the exclusive right of the selected vendor. The know-how Gassnova will acquire as owner and operator of the CCS facility, will be the property of Gassnova. However, general know-how or experience gained with the project is intended to be shared by Gassnova in the context of (i) participating in the network based on the European Commission initiative of early CCS movers; and (ii) outside this framework, at international and national conferences and workshops.

### **3. Comments by the Norwegian authorities**

#### **3.1 Involvement of state aid under Article 61(1) EEA**

The Norwegian authorities have submitted arguments for finding the Kårstø project compatible with the state aid rules. As regards Naturkraft the authorities have argued that during until 2012 the operation of a CCS at Kårstø will not result in the grant of state aid to Naturkraft. In this regard, the authorities have submitted that Naturkraft is obliged to surrender allowances under the current trading period of the ETS and this obligation will not be altered by the fact that its CO<sub>2</sub> emissions will be removed by a CCS. Hence, the financial burden of Naturkraft will remain unchanged. Capture and storage of CO<sub>2</sub> is not covered by the ETS during the trading period of 2008-2012 and the Norwegian authorities have not opted-in CCS facilities. Hence, a power plant with a CCS facility will not be relieved of its duty to surrender allowances.

The Norwegian authorities have further submitted that irrespective of which system will be introduced under the new ETS trading period, the Norwegian authorities will ensure that Naturkraft will face the same financial burden as if there would be no CCS to capture the emissions by the power plant.

#### **3.2 Compatibility under Article 61(3) EEA**

The Norwegian authorities have argued that the state financing of the construction of the CCS at Kårstø is compatible with the functioning of the EEA Agreement by reference to Article 61(3)(b) or 61(3)(c) EEA. The Norwegian authorities have submitted that arguments to substantiate that the project is of a European dimension (as must be demonstrated under Article 61(1)(3)(b)) are concurrent with arguments for demonstrating that the state investment is aimed at a well-defined objective of common interest (as must be demonstrated under Article 61(3)(c)).

##### **3.2.1 The Kårstø Project is aimed at a well defined objective of common European interest**

- (i) The objective of improving CCS technologies is in line with EU policies

The Norwegian authorities have submitted that the policy objectives of the Norwegian authorities, which the state investment in the Kårstø project are aimed at fulfilling, are in line with the policy objectives of the European Union.

The Norwegian authorities give high priority to, and have developed a strict policy on, energy efficiency (including renewable energy sources) and environmental issues such as climate change. They want therefore also to contribute to the development of world-wide deployment of cost efficient CCS technologies. The authorities consider that there is a need for enhancing development and deployment of CCS technologies at affordable prices. At present there is no full scale industrial CCS plant in operation since the costs are too high compared to alternative carbon abatement measures such as purchasing allowances under the ETS. The Norwegian authorities would therefore like to contribute to creating a functioning global market for CCS technologies at affordable prices.

In this spirit the main objective of the Kårstø project is to test full scale carbon capture using current technology and thereby contribute to bringing the technology for amine absorption from gas turbine power plants further with the aim of minimizing investment costs and energy consumption so as to contribute to the global deployment of such technologies at affordable prices. The project is envisaged to be a step forward from the R&D level of CCS technology towards the actual use and functioning of CCS technologies. As the Kårstø Project is, to the knowledge of the Norwegian authorities, the first full scale capture plant in the world, it will represent a major step towards fulfilling Norwegian policy objectives.

The Norwegian authorities argue that the above-mentioned policy objectives based on combating climate change and technology development are concurrent with those of the European Union.

For example, the development of low carbon technologies is a key element in the Seventh Research Framework Programme ("FP7"). It appears that one of the aims of the FP7 is that the objective of energy research is to adapt the current energy system into a more sustainable, competitive and secure one. It appears from the programme overview that focus of the actions under FP7 will be on *"accelerating the development of cost-effective technologies for a more sustainable energy economy for Europe (and the rest of the world) and ensuring that European industry can compete successfully on the global stage."*<sup>31</sup> Specifically with respect to CO<sub>2</sub> capture projects it appears that *"projects in this area should optimise and develop capture techniques for both greenfield and retrofit power generation applications. The expected impact is to decrease the cost of capture down to about 15€ per ton of CO<sub>2</sub> to allow zero emission fossil fuel plants to better compete with other zero emission technologies."*<sup>32</sup>

Moreover, reference is also made to the Commission Communication on the Strategic Energy Technology Plan (the "SET Plan") which provides that *"Europe needs to act now, together, to deliver sustainable, secure and competitive energy. The inter-related challenges of climate change, security of energy supply and competitiveness are multifaceted and require a coordinated response. We are piecing together a far-reaching jigsaw of policies and measures: binding targets for 2020 to reduce greenhouse gas emissions by 20% and ensure 20% of renewable energy sources in the EU energy mix; a*

<sup>31</sup> [http://cordis.europa.eu/fp7/energy/about\\_en.html](http://cordis.europa.eu/fp7/energy/about_en.html)

<sup>32</sup> [http://cordis.europa.eu/fp7/energy/about5\\_en.html](http://cordis.europa.eu/fp7/energy/about5_en.html)

*plan to reduce EU global primary energy use by 20% by 2020; carbon pricing through the Emissions Trading Scheme and energy taxation; a competitive Internal Energy Market; an international energy policy, And now, we need a dedicated policy to accelerate the development and deployment of cost effective low carbon technologies”.*<sup>33</sup>

Finally, the Norwegian authorities refer to the Commission working document entitled the “Technology Map” accompanying the SET Plan and containing a description of the status of key energy technologies for purposes of identifying potential European initiatives that could be part of the SET-Plan. In particular the Technology Map states that the European Commission has identified the main barriers to progressing further with low carbon technologies. “[...] *the high cost of first-of-a-kind plants, needed for demonstrating key technological components and building of confidence in CO<sub>2</sub> emission reduction potentials has been cited as one of the main barriers to progressing further with the technology [...] Focal points of additional work in capture and storage are [...] the development of innovative and more cost-effective capture processes.*”<sup>34</sup>

(ii) The market failure

The Norwegian authorities have stated that the market failure addressed by the state investment in the Kårstø project is that the market price for electricity is insufficient to allow power plants to recuperate the costs of carbon management. Moreover, CCS projects involve considerable risks in terms of technical performance, costs and annual operating hours. Hence, national authorities must contribute to creating a level playing field when desiring to ensure security of supply without increasing CO<sub>2</sub> emissions. In this context, the Norwegian authorities refer to the paragraph quoted above from the Technology Map document in which the European Commission has identified the main barriers to progressing further with low carbon technologies.

Moreover, reference is made to a working document entitled the “Full Impact Assessment” accompanying the SET Plan which states that new energy technologies are expensive and the benefits tend to accrue to the society at large rather than the buyer.<sup>35</sup> The Full Impact Assessment document continues by stating that this means that there is no “*natural market appetite*” for such technologies and that it “*... is recognised as a major market failure because energy is not internalising external costs that are eventually a liability to society*”. It further follows from the Full Impact Assessment document that ETS, which puts a price on emissions, is a driver of innovation both inside and outside Europe but “*the undesired outcome of this could be a European Union carbon constrained market depending on imported technologies, despite the fact that the demand is created domestically.*” It also follows from the Full Impact Assessment document that national authorities ought to guarantee an attractive R&D environment for both the private and public sector and that “*in particular, public research initiatives become necessary*

<sup>33</sup> Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions – A European Strategic Energy Technology Plan (SET-Plan) “Towards a low carbon future”; COM(2007) 723 final.

<sup>34</sup> Commission staff working document accompanying documents to the communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions a European Strategic Energy Technology Plan (SET-Plan) “Technology Map” of 22 November 2007; COM(2007)723 final; SEC(2007) 1510.

<sup>35</sup> Commission staff working document accompanying documents to the communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions a European Strategic Energy Technology Plan (SET-Plan) “Full Impact Assessment” of 22 November 2007; COM(2007)723 final; SEC (2007) 1508.



*where the actions by the private sector are insufficient due to market failures.” It continues by stating that “Available data indicate that government support is therefore strongly needed in energy R&D as companies in the energy sector show a relatively low R&D intensity.” and that “Thus the role and support of EU Member States is therefore essential in energy research (...)”.*

On the basis of the above, the Norwegian authorities have argued that, if left to the market, the CCS at Kårstø – which can benefit the society as a whole – will not be carried out as the rate of return is insufficient from a private investor perspective. Hence the CCS technology projects are in the common European interest but cannot be pursued without government support. On this basis the state investment in the Kårstø project addresses a market failure.

(iii) The Kårstø project’s contribution towards the common European objectives

The Norwegian Government considers that the Kårstø Project will contribute in a concrete, clear and identifiable manner to the European interest of developing CCS technology stated in the above-mentioned policy documents. The Kårstø Project, which involves a high degree of risk, aims to test full scale carbon capture and to contribute to improving the technology of amine absorption from gas turbine power plants with the overall objective of combating climate change. The capture facility at Kårstø will process 1 240 000 tonnes of CO<sub>2</sub> annually and represents therefore a step forward in the research, development and use of new energy technologies. The project will also provide valuable experience related to technology solutions for other full-scale capture plants, thereby contributing to the development of CCS technologies. According to the International Energy Agency, CCS could by 2050 contribute to 20-28 percent of the achievable CO<sub>2</sub> emission reductions.

In conclusion, early development and use of CCS technologies at affordable prices is in the common European interest and the Kårstø project may be considered to have a European dimension. The Kårstø project is a pioneer for further development of CCS technology and it is in the interest of Europe to be at the forefront in developing these technologies.

### 3.2.2 Appropriate instrument

The Norwegian authorities argue that the state investment in the Kårstø Project is an appropriate instrument for addressing the market failure since no regulatory instrument can change the price defining mechanism of the North European electricity market. Power plants can therefore not afford to internalise the costs of carbon capture and storage. The costs of carbon capture and storage per tonne CO<sub>2</sub> are far higher than the alternative costs of purchasing allowances.

### 3.2.3 Incentive effect

The Norwegian authorities argue that the Kårstø project would not have been realised without state funding because investing in the Kårstø project is not profitable and involves great financial and technological risks.

### 3.2.4 Proportionality of the aid

The Norwegian authorities have stated that the state investment in the Kårstø Project is proportionate in that (i) public procurement procedures will be adhered to, (ii) any revenues obtained from delivering a CCS service will be deducted when calculating the aid, and (iii) contract relations with third parties will be negotiated on commercial terms. Hence the investment is limited to the minimum necessary to realise all elements of the Kårstø project.

### 3.2.5 Distortion of competition and effect on trade

The Norwegian authorities argue that the distortion of competition and effects on trade are limited to the level necessary.

## II. ASSESSMENT

### 1. The presence of aid

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.”*

To constitute state aid within the meaning of Article 61(1) EEA, a measure must meet the following four cumulative criteria: the measure must (i) confer on recipients an economic advantage which is not received in the normal course of business; (ii) the advantage must be granted by the State or through state resources; (iii) the measure must be selective by favouring certain undertakings or the production of certain goods; and (iv) it must distort competition and affect trade between the Contracting Parties.

#### 1.1 Economic advantage

In the present case the State will cover expenses for the wholly state owned company, Gassnova, for the purposes of constructing the CCS at Kårstø in Norway. It is settled case law that when the State invests, the question of whether an economic advantage is involved is determined on the basis of the market economy investor principle. This principle serves as a tool for verifying whether the State has acted in a manner that a private investor, operating under normal market conditions, would find acceptable in similar circumstances.<sup>36</sup> If this is the case there is no economic advantage, and hence, no state aid involved. Conversely, if this is not the case state aid is involved if the other conditions of Article 61(1) EEA are met.

<sup>36</sup> This principle is explained in section 3.1 of the State aid Guidelines on application of state aid provisions to public enterprises in the manufacturing sector. The application of the principle has been confirmed amongst others in Joined Cases T-228/99 and T-233/99 *Westdeutsche Landesbank Girozentrale v Commission* [2003] ECR II-435.

- (i) The application of the market economy investor principle to funding awarded to Gassnova

Based on case law, the most important parameter in the test of whether a private investor would have subscribed funding in a similar case is the chance of obtaining a return within a reasonable period of time,<sup>37</sup> having regard to the information available and developments foreseeable at that time.<sup>38</sup> While the analysis may take account also of whether future returns are expected<sup>39</sup> the test must be carried out on the basis of the circumstances prevailing at the time of the transaction.<sup>40</sup>

As stated in the notification from the Norwegian authorities and based on the data in the NVE Report, the CCS at Kårstø is not profitable as there are no revenues. Moreover, even if account is taken of the income generated by the price paid by Naturkraft (corresponding to the price of allowances per tonne CO<sub>2</sub>) the project is still far from profitable as that income corresponds to about one fourth of the estimated costs of capturing one tonne of CO<sub>2</sub> at Kårstø. Hence, not only are no profits expected but the income generated is far from covering the cost involved. The big gap between the allowance price (which has been fluctuating at around EUR 20 per tonne CO<sub>2</sub>) and the cost of capturing CO<sub>2</sub> per tonne<sup>41</sup> (approx. EUR 88) means that it is also uncertain whether the Kårstø project will be profitable some time in the future.

Under such circumstances the Authority considers that a private market investor would normally not undertake a similar investment. Thus, the contribution of state funding corresponding to 100% of the investment costs and operating costs for 10 years of the Kårstø project involves an economic advantage for the recipient company Gassnova.

- (ii) The power plant - Naturkraft

According to the polluter-pays-principle, the polluting undertakings should bear the full cost of the environmental harm arising from their activities. The polluter-pays-principle has been implemented in part by the ETS. As of the introduction of the ETS, power plants emitting CO<sub>2</sub> must surrender allowances, meaning that it represents a cost for power plants to emit CO<sub>2</sub>.<sup>42</sup> On this basis, a question arises as to whether the power plant, Naturkraft is also receiving an economic benefit since Gassnova will remove (i.e. capture and store) CO<sub>2</sub> emitted by Naturkraft.

The Norwegian authorities have explained that Naturkraft will pay a price, equivalent to the cost of allowances, to Gassnova. The Authority considers that the price paid by Naturkraft to Gassnova can be considered to represent payment for the provision of a CCS service by Gassnova. If Naturkraft, as a result of paying for CO<sub>2</sub> abatement measures (such as a CCS service), no longer is liable for surrendering allowances, it is a mere expression of the functioning of the ETS system. The objective of ETS is precisely that undertakings take on the cost of eliminating or reducing emissions in order to be relieved of the cost of surrendering allowances.

<sup>37</sup> Case C-40/85 *Belgium v Commission* [1986] ECR-2231, paragraph 13.

<sup>38</sup> Case T-16/96 *Cityflyer Express v Commission* [1998] ECR-757, paragraph 76.

<sup>39</sup> Case C-305/89 *Italy v Commission* [1991] ECR I-1603, paragraph 20.

<sup>40</sup> Joined Cases T-228/99 and T-233/99 *Westdeutsche Landesbank Girozentrale v Commission* [2003] ECR II-435.

<sup>41</sup> The Norwegian authorities recall in this regard that these numbers are based on the preliminary NVE report and that the estimated costs in the investment report may be even higher.

<sup>42</sup> For a reference to ETS and implementing measures see footnote 11.



However, the price paid by Naturkraft for the CCS service is far from covering the costs of a CCS service. Since there may be a difference for Naturkraft to have the CO<sub>2</sub> captured and stored (compared to just venting it) it cannot be excluded that Naturkraft receives an economic benefit corresponding to the difference between the full costs of a CCS service and the price paid (namely the price of allowances).<sup>43</sup>

## 1.2 Presence of state resources

The aid measure must be granted by the State or through state resources. In the present case, the State itself provides the funding to Gassnova and thus state resources are involved. As regards Naturkraft, state aid may be granted through the intermediary of public undertakings or financial institutions,<sup>44</sup> provided the actions of the public undertaking in this regard are imputable to the State.<sup>45</sup> Gassnova being 100% state controlled qualifies as a public undertaking. Moreover, since commercial issues of Gassnova, including the prices at which services are offered, are decided on by the State the actions of Gassnova are imputable to the State.<sup>46</sup>

## 1.3 Favouring certain undertakings or the production of certain goods

In the present case, the measure favours only Gassnova and possibly Naturkraft and is hence selective.

## 1.4 Distortion of competition and effect on trade between Contracting Parties

In the present case the Norwegian authorities propose to grant funding to Gassnova to construct a CCS facility. There are currently a number of CCS projects planned with an alleged start-up date between 2013-2015 which is a witness of the emerging market of carbon capture and storage. In this context, it is recalled that CCS related technological experience and know-how gained in the context of gas-fired power plants may be applied in the context of CCS activities also on coal-fired power plants (and vice versa). Hence, a certain level of competition also takes place between coal-based CCS projects and gas-fired CCS projects. In such circumstances, the grant of support to an undertaking such as Gassnova will strengthen its position compared to other undertakings which are located in Norway or in other EEA countries and engaged in developing CCS technology and establishing CCS facilities. The fact that the CCS at Kårstø will be among one of the first of its kind on the emerging market of CCS projects may also mean that the company, Gassnova, will benefit from so-called first-mover advantages.

On this basis, the Authority considers that the grant of financial support to Gassnova for the Kårstø project is liable to distort competition and affect trade.

<sup>43</sup> Moreover, different economic or regulatory conditions may entail that Naturkraft receives an economic benefit during the course of the 10 year notified funding period.

<sup>44</sup> This also follows from the Commission Directive 2006/111/EC of 16 November 2006 on the transparency of financial relations between Member States and public undertakings (the "Transparency Directive") OJ L 318, 17.11.2006, p. 17. The Transparency Directive has been incorporated into the EEA Agreement by means of Article 1a of Annex XV; Decision No. 55/2007/COL of 8 June 2007, OJ L 266, 11.10.2007, p. 15 and EEA Supplement No. 48, 11.10.2007, p. 12.

<sup>45</sup> For purposes of the Transparency Directive a public undertaking is defined as an undertaking over which the public authorities may exercise directly or indirectly a dominant influence by virtue of ownership or financial participation.

<sup>46</sup> Case C-482/99 *France v Commission* ("Stardust") [2002] ECR I-4397, at paragraph 24.

Moreover, to the extent that it may be considered that economic benefits resulting from state funding to Gassnova are passed on to Naturkraft, such benefits will strengthen the position of Naturkraft vis-à-vis other power producers. However, Naturkraft operates on the market for power production and since Naturkraft will face the same economic burden as all other power producers it is not obvious that it will obtain competitive advantages on the market for power production.

In any event, it cannot be excluded that different economic or regulatory conditions will entail that Naturkraft receives an economic benefit during the course of the notified aid period. In such a scenario, the aid granted to Naturkraft will strengthen its position as a power producer, thereby distorting competition and affecting trade in the market for power production.

## **2. Conclusion**

In the light of the above, the Authority concludes that the state funding for the Kårstø project constitutes state aid.

## **3. Procedural requirements**

Pursuant to Article 1(3) of Part I of 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”*.

By submitting the notification for purposes of providing funding to the Kårstø project by letter submitted on 22 January 2008 (Event No 461626), the Norwegian authorities have complied with the notification requirement. The measure has not been put into effect. Norway has therefore complied with the standstill obligation.

The Authority can therefore conclude that the Norwegian authorities have respected their obligations pursuant to Article 1(3) of Part I of Protocol 3.

## **4. Compatibility of the aid**

The State aid Guidelines on aid for environmental protection provide that CCS projects are not covered by the guidelines and that the compatibility assessment may be based directly on the provisions of the EEA Agreement, that is, either Article 61(3)(b) on aid to promote the execution of important projects of common European interest or Article 61(3)(c) on aid to facilitate the development of certain economic activities/areas without adversely affecting trading conditions contrary to the common interest.<sup>47</sup>

In its decision of 16 July 2008, the Authority authorised state aid to the establishment of a centre for testing carbon capture technologies, i.e., the “Mongstad Test Centre”.<sup>48</sup> The aid was authorised on the basis of Article 61(3)(c) by reference to EEA policy objectives of combating climate change by means of carbon capture technologies. Following the same approach, without excluding that the project may be eligible under Article 61(3)(b) of the

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<sup>47</sup> See paragraph 69 of the State aid Guidelines.

<sup>48</sup> Decision No. 503/08/COL.

EEA Agreement, the Authority will assess whether the project is eligible under Article 61(3)(c) of the EEA Agreement.

The point of departure for the assessment under Article 61(3)(c) EEA is the policy statement in the State aid Guidelines on aid for environmental protection in which the Authority states that it will take a generally positive attitude towards state aid to fossil fuel power plants with CCS.<sup>49</sup> Even if the CCS in the present case is not undertaken by the power plant, but by a separate undertaking, the Authority takes the same view on such projects. The positive attitude towards such aid is inspired by various policy statements of the European Council expressing the desire to further CCS related research and development and the establishments of CCS.<sup>50</sup> The Commission has also, in its CCS Communication, stated that it recognises the strategic importance of the CCS technology and that it will stimulate the construction of CCS and create conditions for bold industrial investments.<sup>51</sup>

Keeping this in mind, an assessment directly under Article 61(3)(c) EEA should, in line with general state aid principles, be based on the so-called “balancing test” consisting of balancing the positive effects with the negative effects of granting the aid.<sup>52</sup> It is based on the following elements:

1. Is the state aid measure aimed at a well-defined objective of common interest?
2. Is the state aid well designed to deliver the objective of common interest?
  - (a) Is the state aid an appropriate policy instrument?
  - (b) Is there an incentive effect in the sense that the aid changes the behaviour of undertakings?
  - (c) Is the aid proportional, that is, could the same change in behaviour be obtained with less aid?
3. Are the distortions of competition and effect on trade limited, so that the overall balance is positive?

***Re 1: “Is the aim of the measure in the common interest”***

The Authority considers that the Kårstø project addresses the aim of protecting the environment as well as it encourages research and development which both are well defined objectives in the common interest.

**The protection of the environment by establishment of CCS facilities**

The protection of the environment is, according to the Authority’s guidelines, regarded as an objective of EEA interest and to reduce emissions of CO<sub>2</sub> is an important

<sup>49</sup> See section 69.

<sup>50</sup> For example European Council Conclusions of 8-9 March 2007 at point 10 of Annex I in which the Council urges towards “*strengthening R&D and developing the necessary technological, economic and regulatory framework to bring environmentally safe carbon capture and sequestration (CCS) to deployment....*” The view is developed further in Council Conclusions of March and June 2008.

<sup>51</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions “Supporting Early Demonstration of Sustainable Power Generation from Fossil Fuels” of 23 January 2008, COM(2008) 13 final.

<sup>52</sup> This is also in line with the approach taken in the Authority’s Decision No. 503/08/COL of 16 July 2008 on the Mongstad Test Centre.



environmental challenge today.<sup>53</sup> Most recently the Authority recognised this in its decision on the Mongstad Test Centre.<sup>54</sup> Currently, combating climate change via developing carbon capture technologies, is one of the items on top of the European political agenda as confirmed in several Council conclusions.<sup>55</sup> In November 2007 the EU SET Plan recognised the demonstration of the use of CCS in fossil fuels-based power generation as one of the areas in which European technology development should focus resources.<sup>56</sup> In the recently adopted Directive on the geological storage of carbon dioxide it is stated that the envisaged global reduction greenhouse gas emission of 50% by 2050 is technically feasible, but that all mitigation options must be harnessed.<sup>57</sup> In this regard the Commission has stated that CO<sub>2</sub> emissions cannot be reduced by 50% by 2050 if other options (than renewables) such as carbon capture and storage are not used.<sup>58</sup> And, in its CCS Communication the Commission notes that as fossil fuels remain an important part of the European energy mix, CCS technologies represent a crucial element in a portfolio of existing and emerging technologies to reduce CO<sub>2</sub> emissions. However, as also referred to by the Norwegian authorities “...the high cost of first-of-a-kind plants, needed for demonstrating key technological components... has been cited as one of the main barriers to progressing further with the technology...”<sup>59</sup> As a follow-up the Commission has therefore expressed its clear commitment to early effective demonstration of CCS and calls for timely and bold industry and public initiatives in the area of CCS technologies.<sup>60</sup> Finally, a recent evidence of the importance attached to assist financially, and hence accelerate, the demonstration of the first CCS facilities is that under the newly adopted ETS framework (for the trading period 2013-2020) allowances will be set aside from the new entrants’ reserve to provide a guaranteed reward for stored CO<sub>2</sub>.<sup>61</sup>

In conclusion, the protection of the environment by means of cost-effective CCS facilities is in the common interest.

### Research and Development

The mere up-scaling of CO<sub>2</sub> capture at Kårstø, so far un-tested, involves also a certain R&D aspect. However, since the technology employed is already accessible the up-scaling does not fall within the State aid Guidelines on research and development and innovation. The intention is that by testing the amines-based CCS technology opportunities should be created for advancing research and development with the ultimate aim of developing solutions that lead to cost reductions.

From a European policy point of view, R&D and testing of CCS is of common interest. In this regard it appears from the Seventh Research Framework Programme that a key

<sup>53</sup> See section 18 of the State aid Guidelines for environmental protection which refers to the preamble and Article 73(2) EEA.

<sup>54</sup> Decision No. 503/08/COL of 16 July 2008.

<sup>55</sup> Council Conclusions of March 2007 confirmed by Council Conclusions of March and June 2008.

<sup>56</sup> The SET Plan, see footnote 33.

<sup>57</sup> Recital 3 of the Proposal for a Directive on the geological storage of carbon dioxide of 23 January 2008 COM(2008) 18 final, approved by the European Parliament (with amendments) on 17 December 2008; cf. A6-0406/2008 of 15 December 2008. This Directive is not yet incorporated into the EEA Agreement.

<sup>58</sup> See Memo/08/36 of 23 January 2008 on “Questions and Answers on the proposal for a directive on the geological storage of carbon dioxide”.

<sup>59</sup> The Technology Map accompanying the SET Plan, see footnote 34.

<sup>60</sup> The CCS Communication, see footnote 51.

<sup>61</sup> Recital 20 of the proposal for amending Directive 2003/87, COM (2008) 16 final 23.1.2008, as approved by the European Parliament (including amendments) on 17 December 2008; cf. document A6-0406/2008 of 15 December 2008.

element of future R&D is the development of cost-effective low carbon technologies. More specifically, R&D and demonstration of technologies to reduce the adverse environmental impact of fossil fuels, such as cost-effective power plants based on CCS technologies, is encouraged. In this regard, CO<sub>2</sub> projects should optimise and develop techniques to achieve cost reductions.<sup>62</sup> Furthermore, as stated by the Commission there is an interest in stimulating the development of the CCS technology in Europe in order to minimize the risk of being technology dependent.<sup>63</sup> It is thus in the common EEA interest to be at the forefront of developing CCS technologies.

***Re 2: “Is the aid well designed to deliver the objective of common interest”***

The Authority considers that the Kårstø project contributes to achieving the common policy objectives outlined in the policy documents referred to above. The project is in itself capable of making a significant reduction to the total CO<sub>2</sub> emissions in Norway.<sup>64</sup> Moreover, the scale of the carbon capture in this project is allegedly larger than any capture facility in operation so far. As shown in the NVE Report, a high scale of carbon capture results in lower costs per unit captured and a full scale project is therefore also more cost-effective. It moreover includes permanent CO<sub>2</sub> storage which, apart from being key to the environmental benefit is also, so far, a relatively new concept and hence involves an environmental novelty value. The project aims at attempting to identify how the amine absorption technology for CCS can be developed, advanced and improved in order to reduce energy consumption and thus operating costs. It is this cost reduction which may enable widespread broad commercialisation of the technology and allow it to become a crucial and effective technology to combat climate change. While there are other future projects planned with the same capture capacity as Kårstø (or higher), most such CCS projects are based on coal (as opposed to gas turbines) and hence the Kårstø project contributes in a different way to the development of CCS technologies than many other future planned projects.<sup>65</sup> Finally, within the field of CO<sub>2</sub> capture from gas turbines, the Kårstø project is based on an optimal capture rate (85%) as it is the best capture rate in relation to costs.

In addition hereto, the post-combustion technology (on which the Kårstø project is based) is, in practice, the only technology which currently can be retro-fitted into existing gas-fired (or coal-fired power plants). Hence, a potentially high number of existing plants represent future candidates for post-combustion CCS facilities. For the same reason, post-combustion can in an immediate manner address the need for establishment of CCS facilities at relevant European energy sources.

Moreover, the Norwegian authorities have stated their readiness to share general knowledge and experience on the technology solutions of a full-scale CCS means that there are important spill-over effects to other CCS projects as well as to society at large. In this regard, the Kårstø project may contribute to the development of CCS technologies in the EEA.

<sup>62</sup> FP7, reference given in footnotes 31 and 32.

<sup>63</sup> The Full Impact Assessment document states that the undesired outcome of ETS being a driver of technology development could be “... a European Union carbon constrained market depending on imported technologies, despite the fact that the demand is created domestically”, see footnote 35.

<sup>64</sup> See footnote 13.

<sup>65</sup> As explained by the Norwegian authorities, capture from gas sources represent challenges not present when capturing CO<sub>2</sub> from coal, such as a lower CO<sub>2</sub> content (making it harder to capture the CO<sub>2</sub>) and a higher oxygen level (reducing the efficiency of chemicals used).

- *“Is state aid the appropriate instrument”*

The Authority considers that state aid is an appropriate policy instrument for purposes of addressing the market failure of protecting the environment by means of establishing a CCS, such as the one at Kårstø. This is due to the commonly acknowledged market failure consisting of undertakings acting in their own interest without incentives to take into account the costs of negative externalities (pollution) arising from their production.

An essential step on the way to achieving the aim of cutting the operating costs of CCS facilities is to test the technology and learn from the experience gained. The investments undertaken by the State and the lessons taught from the project will contribute to showing how and to what extent CCS based on post-combustion technologies can be made less costly for investors. The state investment can thereby pave the way for making CCS accessible at reasonable costs and thus for more private sector investment in CCS.

The need for State aid is further demonstrated by the regulatory regime put in place by the Norwegian authorities requiring new fossil fuelled power plants to be connected to a CCS. According to the Norwegian authorities, this practice has already, and will in the future, merely mean that some new power plants will not be built because their investors consider it too expensive to establish a CCS facility. Hence, this regulatory instrument has not been sufficiently effective for purposes of furthering the establishment of CCS facilities.

- *“Is there an incentive effect”*

The Authority considers that there is an incentive effect in the present case. As appears from the facts, the CCS at Kårstø is not expected to yield any revenues but involves high operating costs and is hence not profitable. Coupled with the technological risks involved (derived in part from the fact that it will be one of the first of this size in the world and the number of operating hours involved), the only potential fund provider is indeed the State. In other words, the fact that the private market investor test shows that there is aid involved constitutes in this case also the proof of the fulfilment of the incentive effect. The project would not have been carried out without state financing.<sup>66</sup> This is also further supported by the fact that several projects to which the Norwegian State have not contributed funding have been abandoned, such as “Halten CO<sub>2</sub> Value Chain”.<sup>67</sup>

- *“Is the aid proportional”*

Proportionality requires that the aid must be limited to the amount necessary for the project to go ahead. In the view of the Authority there are several measures in place suitable for limiting the aid to the minimum extent necessary for the project to go ahead.

First, the Norwegian authorities have established a mechanism to avoid over-compensation according to which all costs of the Kårstø project must be documented and any surpluses will be deducted in future awards. Costs must be documented and substantiated on the basis of generally approved and accepted accounting standards and routines for financial activities engaged in by the Norwegian State. Thus, if the costs go down the amount of aid will automatically be correspondingly reduced.

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<sup>66</sup> This was also the line taken in Decision No. 503/08/COL of 16 July 2008 on the Mongstad Test Centre.

<sup>67</sup> Press Release of 29 June 2007 by Norske Shell, available at [www.shell.com](http://www.shell.com).



Secondly, the fact that Naturkraft is paying Gassnova an amount corresponding to the allowance price at any given time, which will automatically be deducted in the state funding awarded for the Kårstø project, reduces the amount of state aid involved in the present case to the amount necessary. Thus, if the allowance price goes up, the amount of aid will automatically be correspondingly reduced.

Thirdly, by limiting operating aid to 10 years, the aid is awarded for a period which is shorter than the life time of the plant of 25 years. Any aid beyond the 10-year period will have to be re-notified. While the reason for awarding state funding at the current stage is that the costs and risks of the project for the moment are such that private investors find a CCS investment unattractive, this could change in the future – once lessons have been learnt from the Kårstø project (or other CCS projects). If the market for capturing CO<sub>2</sub> has matured within 10 years, it is possible that further aid will not be necessary. Conversely, if this is not the case, the Norwegian authorities can notify additional operating aid to the Authority. Hence, from an overall perspective, the grant of operating aid over a time frame of 10 years allows time and opportunity for achieving benefits of the aid while limiting the possibility that the state funding will affect market initiatives in the future.

Fourthly, as regards potential state aid to Naturkraft, the aid is limited to the amount necessary for the Kårstø project to go ahead as only costs above the price of allowances would be covered.

For those reasons the Authority considers the state aid to the Kårstø project to be proportional.

***Re 3: “Is the distortion of competition and effect on trade limited”***

It must be verified whether the positive effects outweigh the negative effects on competition.

The potential distortion of competition and effect on trade should be assessed in the light of the global problem of climate change. Energy accounts for 80 % of all greenhouse gas emission in the EU.<sup>68</sup> It is at the root of climate change and most air pollution.<sup>69</sup> However, energy is essential for Europe to function. In this scenario, the need for more energy means a clear requirement for more clean energy. One of the ways of achieving clean energy is the use of functioning carbon capture technologies in particular on highly polluting energy producing undertakings. If regulatory requirements to capture CO<sub>2</sub> are introduced for all undertakings or on all electricity producers, electricity will be very expensive for consumers unless carbon capture is made economically viable. These technologies can only be spread and used to efficiently combat climate change if they are commercially available and affordable.

The Kårstø project addresses a market failure consisting of the lack of investment in CCS technologies which, based on numerous European policy documents, is required as a crucial element for combating climate change and protecting the environment. In this regard the Kårstø project's objective of reducing costs to enable broad access and commercialisation of CCS technologies are benefits that will accrue to the society as a whole.

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<sup>68</sup> Source: European Environment Agency.

<sup>69</sup> Communication from the Commission to the European Council and the European Parliament – An energy policy for Europe; COM (2007) 1 final.

In the view of the Authority, the negative effect on competition resulting from granting state aid to the Kårstø project is limited in the present case.

As regards the aid granted to Gassnova, the aid is limited to building and operating the specific CCS facility at Kårstø. The facility will be constructed and operated on the initiative of the Norwegian authorities. Thus, in the absence of the state aid, the situation would not be that Naturkraft would acquire CCS services from another commercial operator. It would merely be that there would be no CCS facility at Kårstø.

Moreover, the CCS facility will be constructed with a view to catching emissions from only one power plant. To the Authority's knowledge, the Norwegian authorities or Gassnova have no plans to use the facilities to offer CCS services to other power plants, something the Authority assumes already the geographical location of Kårstø would make difficult.

In the longer term, Gassnova will acquire know-how and experience with the CCS technology from the Kårstø project and may use that to compete elsewhere in the EEA. In that regard it is possible that Gassnova will obtain a certain competitive advantage in the market for CCS services. In the Authority's view, this potential competitive advantage is not of a magnitude to alter the otherwise positive assessment of the Kårstø project.

Firstly, a number of CCS projects in other EEA States or elsewhere are on the drawing board<sup>70</sup> and could be in operation along with, or a few years after, the start-up of the Kårstø project. This means that there may be several other competitors with similar know-how and expertise on the market by the time Gassnova has obtained commercially valuable know how from Kårstø.

Secondly, it is recalled that it is the intention of the Norwegian authorities to share knowledge and experience gained in the context of the Kårstø project with market participants at relevant fora (i.e., at conferences and within the European network on CCS) which will benefit other CCS operators in the EEA and serve therefore also to limit negative effects of the aid on competition.

Thirdly, the technology employed in the Kårstø project is commercially accessible already today and, as mentioned above, intellectual property rights will remain with the vendors chosen for the Kårstø project. The vendors will also obtain valuable know-how about the large scale functionality of their technologies and, in that regard compete, in terms of know how with Gassnova.

Finally, the contribution of state funding in the Kårstø case is limited to 10 years (compared to the life-span of the plant of 25 years), limiting the negative effects on competition. Considering that the market for capturing CO<sub>2</sub> has barely developed, the possibility that negative effects resulting from the aid will materialise and outweigh the positive (in terms of achieving the aim of making the CCS technology accessible at affordable costs) are limited.

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<sup>70</sup> According to the information available to the Authority a number of those are initiated by private operators.

Turning to the potential distortion of competition by the aid granted to Naturkraft the Authority has above (cf. page 15), emphasised that potential negative effects should be assessed on the market where Naturkraft operates as an electricity producer. Naturkraft competes mainly with hydropower producers and other gas and coal fired power plants. The fact that an economic burden will be imposed on Naturkraft outweighing the current economic benefits from the CCS facility, makes it difficult to identify a distortion of competition. The Authority would nevertheless take the position that such limited competitive advantage for Naturkraft cannot not outweigh the positive effects of Naturkraft operating as a producer of clean energy.

On the basis of the above, the Authority considers that the positive effects exceed the negative effects as regards the state aid to be granted for the Kårstø project.

## **5. Conclusion**

On the basis of the foregoing assessment, the Authority considers that state aid to the Kårstø project is compatible with the functioning of the EEA Agreement within the meaning of Article 61 of the EEA Agreement.

HAS ADOPTED THIS DECISION:

### **Article 1**

The EFTA Surveillance Authority has decided not to raise objections to the proposed grant of investment aid and operating aid during 10 years for the Kårstø project on the basis of Article 61(3)(c) of the EEA Agreement.

### **Article 2**

The implementation of the measure is accordingly authorised.

### **Article 3**

This Decision is addressed to the Kingdom of Norway.

### **Article 4**

Only the English version is authentic.

Done at Brussels, 29 January 2009.

For the EFTA Surveillance Authority,

A handwritten signature in blue ink, appearing to read "P. Sanderud".

Per Sanderud  
President

A handwritten signature in blue ink, appearing to read "K. Jaeger".

Kurt Jaeger  
College Member