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signed by Mr Jordi AYET PUIGARNAU, Director

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To: Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of
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Subject: ANNEX to the Report on review of Directive 2009/31/EC on the geological
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Accompanying the document

REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT
AND THE COUNCIL on the Climate action progress report, including the
report on the functioning of the European carbon market and the report on
the review of Directive 2009/31/EC on the geological storage of carbon
dioxide (required under Article 21 of Regulation (EU) No 525/2013 of the
European Parliament and of the Council of 21 May 2013 on a mechanism
for monitoring and reporting greenhouse gas emissions and for reporting
other information at national and Union level relevant to climate change
and repealing Decision No 280/2004/EC, under Article 10(5) and Article
21(2) of the Directive 2003/87/EC of the European Parliament and of the
Council of 13 October 2003 establishing a scheme for greenhouse gas
emissions allowance trading within the Community and amending Council
Directive 96/61/EC and under Article 38 of Directive 2009/31/EC of the
European Parliament and of the Council on the geological storage of
carbon dioxide)

Delegations will find attached document COM(2015) 576 final - ANNEX 2.

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ANNEX 2

ANNEX

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

Accompanying the document

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND
THE COUNCIL**

Climate action progress report, including the report on the functioning of the European carbon market and the report on the review of Directive 2009/31/EC on the geological storage of carbon dioxide

(required under Article 21 of Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013 on a mechanism for monitoring and reporting greenhouse gas emissions and for reporting other information at national and Union level relevant to climate change and repealing Decision No 280/2004/EC, under Article 10(5) and Article 21(2) of the Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emissions allowance trading within the Community and amending Council Directive 96/61/EC and under Article 38 of Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide)

{SWD(2015) 246 final}

1. INTRODUCTION

Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide (the Carbon Capture and Storage (CCS) Directive) was adopted as part of the 2009 climate and energy package. It provides a legal framework for the environmentally safe geological storage of carbon dioxide (CO₂). It aims to ensure that there is no significant risk of leakage of CO₂ or damage to public health or the environment, and to prevent any adverse effects on the security of the transport network or storage sites, thereby addressing public concerns. The Directive also contains provisions on the capture and transport components of CCS, though these activities are covered mainly by existing EU environmental legislation, such as the Environmental Impact Assessment Directive¹ and the Industrial Emissions Directive².

The European Commission considers the transposition measures to be complete for all Member States, except for one Member State with which discussions are ongoing. The Commission is advancing with the conformity checks of these measures.

Article 38 of the CCS Directive requires the Commission to assess the CCS Directive in a report to be transmitted by 31 March 2015 to the European Parliament and to the Council and to present a proposal for revision of the Directive if appropriate.

This report, in addition, evaluates the Directive for its effectiveness, efficiency, coherence, relevance and EU added value under the Commission's Regulatory Fitness and Performance (REFIT) programme³.

It also examines the extent of CCS deployment and outlines further steps to be taken regarding the wider economic and policy environment to accelerate deployment.

2. METHODOLOGY

An online survey and consultation of stakeholders and experts were organised to support the findings of this report. More than 100 responses were received to the survey from industry and utilities, research organisations and non-governmental organisations. These were complemented by targeted interviews, literature review and case studies. The Commission further consulted the Member States through the Information Exchange Group formed under Article 27(2) of the Directive. The survey and analysis were based on the review topics listed in Article 38 and the REFIT criteria. Further details are given in the evaluation report⁴.

A constrain of the review is the fact that the number of CCS installations (referring to capture, transport and storage) achieved to date has been much less than expected when the Directive was passed. Only one project - the ROAD project in the Netherlands⁵ - has practical experience with the Directive, other than with exploration permits and the feasibility of retrofitting large combustion plants with CCS. To comprehensively test the content of the

¹ Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment

² Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)

³ The REFIT evaluation of the CCS Directive is listed in the Commission Work Programme for 2015 - A New Start, COM(2014) 910 final

⁴ 'Study to support the review of Directive 2009/31/EC on the geological storage of carbon dioxide (CCS Directive)', Luxembourg: Publications Office of the European Union, 2015.

⁵ The Rotterdam Capture and Storage Demonstration Project, <http://road2020.nl/>

Directive and perform a more in-depth assessment of its effectiveness and efficiency, a larger experience with application of the Directive and with CCS in general would have been necessary.

3. CURRENT DEPLOYMENT OF CCS TECHNOLOGY

In June 2008 the European Council, asked the Commission to propose as soon as possible an incentive mechanism for Member States and the private sector to ensure the construction and operation of up to 12 CCS demonstration plants by 2015 to contribute to mitigation of climate change. This target has not been reached and there are only two large scale CCS plants operating in Europe (both in Norway).

The Commission's position on CCS has been confirmed in a number of policy communications⁶. To reach the decarbonisation targets, CCS will need to be deployed from around 2030 onwards in the fossil fuel power sector.⁷ In the longer term, CCS may be the only option available to reduce direct emission from large scale industrial processes.⁸

So far, one CCS project – the White Rose project in the United Kingdom – has been awarded EUR 300 million under the second call of the NER 300 programme⁹. In addition, the UK has awarded study contracts to the White Rose and Peterhead projects¹⁰. The European Energy Programme for Recovery (EEPR)¹¹ earmarked EUR 1 billion for CCS demonstration projects. Currently, two projects – the ROAD project in the Netherlands and Don Valley in the United Kingdom are ongoing. In total, there are four projects at the planning stage in the EU, which could start operation around 2020. Once operational, these projects would complement the experience of two Norwegian commercial projects, linked to natural gas production – Sleipner and Snøhvit. However, this rate of progress with large-scale CCS in Europe is much slower than expected.

Outside the EU, there are currently 20 large-scale CCS projects either in operation or in construction. These are mostly industrial projects linked to enhanced oil recovery providing additional economic benefits.¹²

Carbon capture and utilisation (CCU) is a relatively new development which offers the potential to reuse CO₂ as a feedstock for several applications. CCU is expected to have much smaller scale impact on climate mitigation than CCS, but it has a number of potential benefits, including adding economic value to CCS projects.

⁶ For example, in the Commission's Communications The Future of Carbon Capture and Storage in Europe, COM(2013)180 and A Roadmap for moving to a competitive low carbon economy in 2050, COM(2011)112.

⁷ Energy Roadmap 2050, COM(2011)885.

⁸ A policy framework for climate and energy in the period from 2020 to 2030, COM(2014)15.

⁹ The NER 300 programme is one of the world's largest funding programmes for innovative low-carbon demonstration projects and has awarded a total of EUR 2.1 billion to 38 renewable energy projects and one CCS project. It is established under Article 10(a)8 of Directive 2003/87/EC and funded by the sale of 300 million emission allowances from the New Entrants' Reserve (NER) set up for the third phase of the EU emissions trading system. See <http://ec.europa.eu/clima/policies/lowcarbon/ner300/>.

¹⁰ For more on the UK CCS commercialisation competition, see <https://www.gov.uk/uk-carbon-capture-and-storage-government-funding-and-support>.

¹¹ Regulation (EU) No 1233/2010 establishing a programme to aid economic recovery by granting Community financial assistance to projects in the field of energy.

¹² GCCSI, 2014, The Global Status of CCS.

4. REVIEW OF THE CCS DIRECTIVE

The CCS Directive provides the legislative framework for addressing environmental, health and safety concerns about the storage of CO₂. It harmonises administrative procedures for the whole cycle of carbon capture, transport and storage across Member States and so creates the necessary legal certainty for investors to construct large-scale installations for CO₂ capture and transport pipelines and to develop CO₂ storage sites.

This section looks at the specific questions the Commission was asked to answer for the REFIT process and Article 38 of the Directive.

Effectiveness and efficiency

The number of CCS installations constructed is much lower than expected due to the lack of a commercial case for the technology, largely because of the global economic downturn and low carbon prices. The lack of practical experience with the technology makes it difficult to assess progress towards objectives such as creating legal certainty, ensuring the installations are safe for the environment and human health and determining efficiency through evaluation of administrative costs or regulatory burden. The lack of practical experience of CCS projects going through the regulatory process described by the CCS Directive also makes it impossible to identify data on the costs of implementation that have fallen on the Member States and therefore to assess the Directive's efficiency.

Relevance

The Directive focuses on the key issues required for a common approach in the development of CCS. The need for action to reduce emissions remains high and the most recent analysis¹³ suggests that this need has become even more urgent.

Coherence

The provisions of the CCS Directive are internally coherent and the Directive is aligned with the overall climate and energy framework.

EU added value

The Directive provides the overall framework, while Member States specify, decide and apply the site-specific details of CCS installations. The evidence so far is that this approach has provided sufficient minimum requirements and guidance to ensure a common approach while leaving Member States sufficient freedom to adapt them to their national circumstances.

Permanence of CO₂ storage

Due to the EU's limited experience with CCS, permanent containment has not yet been fully demonstrated at a large scale. Results from research-scale storage sites and from projects in other countries, in particular from the two large-scale Norwegian projects that have been injecting CO₂ into saline aquifers under the North Sea (since 1996) indicate that safe and long-term storage without leakage is possible.

Need for the Commission to review draft storage permits and draft decisions on transfer of responsibility

So far, only one permit has been awarded under the Directive - to the ROAD project, by the Competent Authority in the Netherlands. The Commission gave a positive opinion on the

¹³ IPCC AR 5 October 2014. <http://www.ipcc.ch/>.

draft permit¹⁴. Referring draft permits to the Commission for review under Article 10 does not significantly prolong the time needed to obtain a permit.

Articles 19 and 20 on financial security and the financial mechanism give Member States enough scope to decide how site operators should prove their ability to safely operate and monitor a storage site up to the point of transfer of responsibility to the Competent Authority.

There is no practical experience with Article 18 on transfer of responsibility. The application of this Article will be examined in the next review of the Directive.

CO₂ stream acceptance criteria, procedure referred to in Article 12, third-party access and transboundary cooperation

There is no practical experience yet with these requirements, so the Commission considers that no action is necessary at this stage. These articles will be examined in the next review of the Directive.

Application of the provisions on large combustion plants

Data on Member States' application of Article 33 on the feasibility of retrofitting installations for CO₂ capture is readily available only for the United Kingdom, where operators of large combustion plants have to demonstrate sufficient space has been set aside to capture CO₂ in the future¹⁵. Some Member States (e.g. Germany, France, Hungary, Poland, Romania, Slovenia and the United Kingdom) have reported that they have applied Article 33, as they gave permits to new fossil fuel power plants of above 300 MW.¹⁶

Prospects for geological storage of CO₂ in third countries

There are currently no plans to store CO₂ in third countries due to the cost of transport and the availability of storage within the EU.

Criteria referred to in Annex I and Annex II on suitability of storage sites and on monitoring plans

The criteria for the characterisation and assessment of storage sites set out in Annex I to the Directive are used to determine the suitability of geological formations for use as storage sites. They are generally viewed by stakeholders as acceptable.

Some stakeholders have reported difficulties in getting geological data from areas explored or used by oil and gas companies. The Commission considers that there is no need for action regarding the Directive. However, it would help new entrants if Member States examined their regulatory processes with a view to promote relinquishment of closed hydrocarbon fields.

¹⁴ Commission Opinion relating to the draft permit for the permanent storage of carbon dioxide in block section P18-4 of block section P18a of the Dutch continental shelf, in accordance with Article 10(1) of Directive 2009/31/EC of 23 April 2009 on the geological storage of carbon dioxide, C(2012)1236.

¹⁵ The United Kingdom has also produced a guidance note which explains what plant developers should consider and demonstrate in their feasibility checks to retrofit for CO₂ capture: *Carbon Capture Readiness (CCR) - A guidance note for Section 36 Electricity Act 1989 consent applications*, URN 09D/810, November 2009, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/43609/Carbon_capture_readiness_-_guidance.pdf.

¹⁶ Report on the Implementation of Directive 2009/31/EC on the geological storage of carbon dioxide, COM(2014)99.

Annex II to the Directive sets out the criteria for establishing and updating the monitoring plans for operation and post-closure. These criteria are generally accepted as workable. The Commission is of the view that it is too early, given the lack of practical experience, to amend the existing technical requirements.

Incentives to apply CCS to installations combusting biomass

The challenges associated with deploying CO₂ capture for biomass plants are not significantly different from those associated with CCS for coal power plants. There are currently no specific incentives in Europe to apply CCS to installations combusting biomass.

Environmental risks of CO₂ transport

The Commission considers that there is no need at this stage for further regulation of CO₂ transport. The risks entailed in transport of CO₂ are no higher than those of the transport of natural gas or oil and there have been no events or suggestions to warrant any change in current regulations.

Need to establish emission performance standards (EPS) for new electricity-generating large combustion plants

In 2011, the Commission investigated the potential impact of emissions performance standards (EPS) for newly built power plants and the interaction with the ETS¹⁷. The study concluded that even under conservative assumptions about the development of the EU ETS, the implementation of EPS from 2020 would not provide additional incentives for CCS deployment.

With the 2030 climate and energy policy framework, including the target of reducing greenhouse gas emissions by at least 40% by 2030 compared to 1990 levels, supported by the October 2014 European Council, the Commission does not consider it necessary or practicable to establish a mandatory requirement for EPS for new power plants. The ongoing reform of the EU ETS, with the proposed introduction of a market stability reserve and the increased ambition of the EU ETS beyond 2020 with the target of reducing emissions by 43% by 2030 compared to 2005, is expected to substantially boost the investment climate for low-carbon technologies over time.

5. CONCLUSIONS

5.1. The CCS Directive

Based on the evaluation study, the Commission finds that the CCS Directive is fit for purpose. Overall, and despite the limited information available so far on its practical application, stakeholders are of the opinion that the Directive provides the regulatory framework needed to ensure safe CO₂ capture, transport and storage while allowing the Member States sufficient flexibility. However, the lack of practical experience of projects going through the regulatory process precludes a robust judgement of the performance of the Directive. There is clear stakeholder concern that reopening the Directive now could be counterproductive as it would bring a period of uncertainty for CCS, which would not be helpful in a sector where investor confidence is already low.

¹⁷ Bloomberg New Energy Finance, 2011, *Emission performance standards: Impacts of power plant CO₂ emission performance standards in the context of the European carbon market*, http://ec.europa.eu/clima/policies/lowcarbon/ccs/docs/impacts_en.pdf.

As regards the REFIT evaluation, the Commission concludes that there is insufficient evidence at this stage to judge the full effectiveness of the Directive, to carry out an efficiency analysis of administrative and regulatory burden and to look at aspects of simplification. Stakeholders and Member States consider the Directive necessary for the safety of geological storage and to provide legal certainty for investors. The Directive is coherent within its own provisions and with other related legislation. As regards EU added value, the Directive is generally considered to provide a good balance between defining an outline approach at EU level and the Member States developing their own detailed and case-specific interpretation.

The next review of the CCS Directive will be carried out when more experience is available with CCS in the EU.

5.2. Enabling policy

It is important to maintain support for commercial-scale demonstration projects both in the power and industry sectors, as this is essential to gain experience, bring down costs and demonstrate safe and reliable underground storage of CO₂. At EU level, the Innovation Fund, which should be endowed with 450 million allowances under the EU ETS, should support CCS besides innovative renewable energy and energy-intensive industry.¹⁸ It is essential for successful demonstration projects that Member States match the EU's financial support, as well as involving the private sector.

Power generation and other industrial projects have long investment cycles, so it is important that Member States consider CCS as part of their long-term planning (ideally up to 2050) to be developed under the future Governance for the Energy Union.

With a view to future CCS deployment, it is important to plan adequate CO₂ transport and storage infrastructure, and consider sharing infrastructure to reduce costs. Advancing knowledge of CO₂ storage capacity and mapping the location of key storage sites and clusters of CO₂ sources would help with the planning of the future transport and storage network. The Connecting Europe Facility can play a role in supporting cross-border transport networks and regional cooperation in this area.

Stepping up research and innovation activities in this area is one of the ten actions identified in the new Strategic Energy Technology Plan to accelerate energy system transformation and create jobs and growth¹⁹. Support will also continue through the EU Framework Programme for Research and Innovation Horizon 2020²⁰.

¹⁸ Proposal amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, COM(2015)337.

¹⁹ Commission communication *Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation*, C(2015)6317 final.

²⁰ Regulation (EU) No 1291/2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020).