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Directorate General Energy
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Dear Sir/ Madam

EUROPEAN COMMISSION – COMMUNICATION FROM THE COMMISSION ON THE FUTURE OF CARBON CAPTURE AND STORAGE IN EUROPE

The Crown Estate welcomes the European Commission's continued commitment to CCS and the opportunity to respond to the communication on the 'Future of Carbon Capture and Storage in Europe' currently being consulted on.

The statements contained in this response are in the context of The Crown Estate's role as the rights owner for the purposes of Carbon Dioxide Storage leasing in the offshore area. This response is informed by The Crown Estate's extensive experience of managing activities (including offshore renewables, marine minerals, telecom cables and petroleum pipelines) within the marine environment and, within its core remit, of balancing economic activity with stewardship of natural resources for future generations to use and enjoy. We are committed to working with government departments, stakeholders and industry in helping to manage the marine environment whilst developing new business opportunities.

For ease of reference, we have addressed the questions posed as part of this consultation in the format provided below. Should any additional information be required in support of our response, please don't hesitate to contact us using the contact details provided below.

General Comments

The focus of our response relates to the UK and moreover, the North Sea basin¹. However there are relevant interactions that have been drawn out in relation to a wider European context.

Commercial and technical viability are two key aspects under which hurdles can be set for CCS. Therefore it is considered that development should be looked at in three phases to help address these hurdles out to 2030, given that the drivers and the market will change over time; (1) the demonstration

¹ The East Irish Sea has potential for storage, but less so in a pan-European context.

phase 2013-17², (2) the mid-phase of supported deployment; and (3) the late phase with projects being developed without the requirement for significant capital grants/ support.

Any policy developed for CCS needs to enable opportunistic deployment for all sectors, e.g. the offshore oil and gas sector, specific CCS project developers as well as the industrial sector. However, it is noted that the latter should be supported by domestic policy and have a clear route to market.

It is our view that this policy should help drive both ends (capture, along with transport and storage) of the chain towards full chain CCS (through incentives and obligations) as well as being clear on how this sits alongside energy security. This should include providing incentives for bringing storage forward at a pace that delivers de-risked stores in parallel with designing and developing new fossil power stations. This will ensure that the phased process can be delivered to time.

Storage sites will need to be proven and at the demonstrably lowest cost and risk which could most effectively be done in the early-mid phases by encouraging oil and gas operators to characterise stores in and around producing fields. In the UK this is critical to enable projects to negotiate a Contract for Difference (CfD). A key theme will be to examine how this can be delivered, given that 'proving' stores will require significant pre-investment. Without committing to future events immediately, it may come to pass that the EU can assist through capital pre-investment for stores and larger scale R&D, as opposed to matched funding, and allowing national mechanisms to deliver CCS within their own energy frameworks. In the UK this will be looked at as part of the key agreed actions that were summarised through the CCS cost reduction taskforce. Any key findings can be shared in both a national and European context.

Enhanced Hydrocarbon Recovery (EHR) is a core activity being considered through the newly formed UK CO₂ Storage Development Group (being led by The Crown Estate) – please refer to the Annex for a *draft* copy of the scope and terms of reference for this group³. It is considered that there is much to be gained from the synergies between EHR and storage, including knowledge transfer and the opportunity for substantial de-risking, particularly in the UK, Norway and Denmark. This type of activity would have a different business model to other types of storage project; for example it may involve tax breaks as the correct incentive mechanism to deliver this type of activity.

In relation to the carbon floor price and its role in the delivery of CCS, we note that whether it's the (UK) carbon price floor or the EU Emissions Trading Scheme (ETS), the level at which CCGTs would be incentivised to build CCS rather than pay the penalty, won't occur until the mid-late 2020's at the earliest (under the current UK carbon floor price trajectory - £30/tonne in 2020 rising to £70/tonne in 2030). Therefore, unabated gas will remain the preference in terms of cost competitiveness and no transport and storage infrastructure will be built until beyond the mid 2020's, which has implications for reducing costs for the technology into the 2030's. This dichotomy needs to be resolved to ensure that CCS is not unduly delayed by a mixture of policy drivers.

It is our view that carbon floor prices are not a driving force in the short to medium term unless they go immediately to £50 (€58/59)/tonne (or thereabouts) and therefore other realistic "mechanisms" are required.

² To be operational between 2017-2020

³ The group would be happy to share knowledge and key findings with DG Energy.

In relation to coal, the carbon price penalty (like CfD's) operates on the emitter and there is no complementary mechanism to enable the storage to be built without complex deals between emitter and storer.

The implications of having many different carbon prices across Europe will affect the "market" and could potentially focus capital to particular regions and therefore away from some countries, which wouldn't be ideal. However realistically, countries within the EU are likely to develop CCS at different rates, therefore any drivers need to make sure first-movers are not disadvantaged. Perhaps focusing R&D on the early movers (North Sea based?) could be a potentially helpful start?

In relation to the North Sea specifically, there is an opportunity for large scale deployment of CCS through the development of infrastructure (pipelines to storage) in a coordinated manner. To this end it would seem prudent for the UK, Norway, the Netherlands and other North sea basin countries to collaborate in order to drive forward early projects (as opposed to looking at an EU wide solutions).

Liability has been seen as a big issue for the investment and deployment of CCS in the UK and we welcome clarification from the Commission that this issue is for each Member State to manage independently. Clarity in the form of a communication advising of such flexibility for Member States, as well as encouraging the use of a probability based approach to timing and quantity of leakage issues as the basis for financial security, would also be welcomed.

We note that CCS in the case of power stations is not about the fuel (coal or gas), but about the lowest cost low-carbon electricity available (whilst ensuring operability and flexibility). As a consequence, setting up virtuous cost reduction cycles via infrastructure support, helps to protect against the global fuel price uncertainty by retaining the choice between coal and gas prices. Specifically in relation to coal and gas CCS projects, there is a potential opportunity for the EU to support such a project (e.g. ROAD or Goldeneye) to deliver learnings and confidence in the sector as soon as possible.

In terms of The Crown Estate, we are in a unique strategic position having the responsibility not only for facilitating access to storage sites, but also in helping to ensure there are no impediments to optimal infrastructure deployment across the UK Continental Shelf. When The Crown Estate comes to (competitive) leasing for CO₂ transportation and storage in the UK, we will need to ensure alignment with the delivery of government policy as well as enabling the least-cost deployment options. We take this opportunity to note the work we are doing in collaboration with the British Geological Society (BGS) on storage appraisal (<http://www.co2stored.co.uk/>). In addition, The Crown Estate is carrying out collaborative work on aquifers with Shell, Herriott Watt University, BGS and the University of Edinburgh to understand the interactions of more than one CO₂ injection point. This work will develop a model accurately depicting the effects of multiple storage sites during and following injection of CO₂ using the Captain Sandstone aquifer as an exemplar, and use this to predict effects and to gather learning that could be applied to other locations around the UK and beyond.

Overall, our perspective of the main obstacles to the delivery of CCS appear to relate to finance and cost (lack of suitable incentives and drivers to drive projects and make them viable); storage (the need to provide up-front proven bankable stores, how they can be accessed and delivered to the market, public acceptance for onshore sites in mainland Europe; and the lack of real power sector economics and drivers (and therefore desire) for CCS deployment.

Specific consultation questions

1) *Should Member States that currently have a high share of coal and gas in their energy mix as well as in industrial processes, and that have not yet done so, be required to:*

a. develop a clear roadmap on how to restructure their electricity generation sector towards non-carbon emitting fuels (nuclear or renewables) by 2050,

Roadmaps are useful tools, and shouldn't be discouraged, to help develop and position a CCS sector in the UK and beyond; however, it is considered that incentives for the power and storage sectors are even more important in moving towards full chain CCS. Roadmaps in themselves will not deliver projects or rectify any problems in delivering the full chain solutions. We see that it is important for policy makers to adopt a "zero or low carbon energy" approach to establish a level playing field for all sectors to prove themselves in delivering CCS. Roadmaps have a benefit if they sit alongside the practical delivery and application of tools that are designed to match the roadmap outcome.

b. develop a national strategy to prepare for the deployment of CCS technology.

We see that the development of a national strategy for the deployment of CCS technology is useful approach to have in the UK. There are a number of points that we take this opportunity to note however:

- What are the business models? As discussed above, there is much to be gained from the synergies between EHR and storage including knowledge transfer and the opportunity for substantial de-risking, particularly in the UK, Norway and Denmark. This type of activity would have a different business model to other types of storage project, for example it could involve tax break incentives.
- A strategy could also help to manage the perception that storage is a risk – by identifying realistic policies and support which help to de-risk storage. This will include resolving the liability position on storage, which is seen to be a barrier.
- In relation to carbon pricing and the award of capital grants, it is considered that match funding and grant systems are not needed at a pan-European level as CCS will ultimately be required in the 2030s and beyond for residual EU emissions from power and industry. If the North Sea basin is the principal storage destination then the question could be about how can the Member States facilitating storage be assisted to "prepare for the future" and how can the "source" member states benefit both during this preparation and beyond – could this be facilitated through new supply chains, new business creation or new infrastructure construction and operation? These aspects need to be considered alongside the EU essential gas and electricity infrastructure policies.
- Need for clear incentives that work from both ends of the CCS chain simultaneously (capture and storage).
- Transport and storage: Exploration, appraisal, accessibility [e.g. existing petroleum licensed operators] – if solved this will assist with the de-risking storage.
- Drivers: fossil fuel dependency for security of supply.

- There is a need to raise money for storage exploration and characterisation in high graded areas. Member States could put in place national mechanisms but could EU also have some form of infrastructure fund as suggested above. In relation to the North Sea specifically, deducting storage exploration from oil and gas operations receipts could assist with deployment.

2) *How should the ETS be re-structured, so that it could also provide meaningful incentives for CCS deployment? Should this be complemented by using instruments based on auctioning revenues, similar to NER300?*

It is considered that the NER process as previously structured was not fit for purpose; however EERP could benefit the sector, e.g. the EERP funding has helped the UK National Grid 29 (5/42 store) project in storage appraisal. We see that a special purpose fund set up by the EU and used solely for storage characterisation in 'high-graded' areas (for activities such as appraisal drilling) is one way of providing significant benefit to the CCS industry (potentially within Horizon 2020). This could be made a priority focus for that source of funding.

We see that the whole financial model for delivery needs to be re-explored by collaborative regional groups such as the UK, with Norway and the Netherlands. This would include how infrastructure could be transported from countries without the benefit of offshore storage solutions. Also, if Enhanced Oil Recovery (EOR) can be made to work, then in the UK for example, there will be a very different model from land-locked countries in mainland Europe.

3) *Should the Commission propose other means of support or consider other policy measures to pave the road towards early deployment, by:*

- a. support through auctioning recycling or other funding approaches*
- b. an Emission Performance Standard*
- c. a CCS certificate system*
- d. another type of policy measure*

The policy measures have to be created holistically and as a bundle to incentivise all elements of the supply chain simultaneously. Therefore an EPS on its own would be insufficient without other mechanisms.

We take this opportunity to highlight that any mechanism that deals exclusively through power generators will not overcome the problem of a lack of incentivisation for storage, which (as outlined in the CCS Cost Reduction Report commissioned by DECC's OCCS, CCSA and The Crown Estate) is key to unlocking CCS. Hence any certificate system needs to be constructed so that storers secure support ahead of generators (e.g. perhaps through a storage capacity certificate type of mechanism). This could be structured such that would-be developers could bid a storage capacity price for a development and the best priced bid receives the certificates for the proposed store. The EU could create a market for storage certificates alongside additional policies such as EPS so that power generators could be required to fit CCS or purchase certificates for a share of their production.

- 4) *Should energy utilities henceforth be required to install CCS-ready equipment for all new investments (coal and potentially also gas) in order to facilitate the necessary CCS retrofit?*

There needs to be a clear route to market for CCS and it requires simultaneous incentivisation of transport and storage. Without this then any retrofit route could be lacking in design and operability.

- 5) *Should fossil fuel providers contribute to CCS demonstration and deployment through specific measures that ensure additional financing?*

There is a need to differentiate between fossil fuel producers and suppliers, as it's really only producers who can deliver storage. Perhaps gas network operators could contribute because they can deliver pipeline infrastructure. We point towards other ideas from other jurisdictions e.g. COAL21 (in Australia), of what could be achieved here, albeit in a limited sense but demonstrating a voluntary desire.

- 6) *What are the main obstacles to ensuring sufficient demonstration of CCS in the EU?*

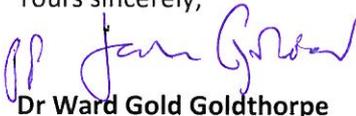
At present, there is an absence of a route to market for CCS. Power emitters are not necessarily experienced or skilled in the fields of transport and storage and combined with the current financials for new build power stations being challenging, they are not driven to pursue CCS opportunities. The power sector needs to see the reason for CCS and needs to have the storage solutions delivered to them.

- 7) *How can public acceptance for CCS be increased?*

We see that this predominantly relates to onshore storage in Europe; however, there is a need to prove the offshore transport and storage aspects to help build confidence in the technology in the UK. If this is able to be achieved, then this may assist onshore Europe, given that public acceptance of infrastructure, landing points and risk mitigation.

Should you have any queries or require any additional information with regard to this matter, please do not hesitate to contact me on 0207 851 5017.

Yours sincerely,



Dr Ward Gold Goldthorpe

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Annex

UK CO₂ Storage Development Group – Draft scope and terms of reference