Offshore Wind consultation responses

March 2020, Rebecca Bell, SCCS Policy & Research Officer

1 Introduction

Like offshore wind, carbon capture and storage (CCS) is going to be an essential part of Scotland's response to the climate emergency and will enable the country to reach net zero greenhouse gas emissions[1]. Both will involve substantial offshore equipment and infrastructure, and strategic planning will be crucial to ensure that the deployment of both is optimised.

The capture of carbon dioxide (CO_2) from industrial and other sources will mostly happen onshore, but CO_2 storage – in porous rocks, around 1km or more below the seabed – will only take place offshore. Transport of CO_2 between onshore sources and offshore storage will therefore be needed: this will involve pipelines and shipping, plus wells to inject the CO_2 into the rock.

CCS will be needed to decarbonise Scotland's industry – particularly where there is a high heat demand, or where there are process emissions; it enables the production of low-carbon hydrogen from methane; and it opens up the possibility of greenhouse gas removal (or negative emissions) by storing CO_2 either from biogenic sources or directly from the air.

The rights to lease the pore space offshore the UK for CO_2 storage are part of the Crown Estate: in Scotland, therefore, this is part of the Scottish Crown Estate, managed by Crown Estate Scotland. Scotland has the capacity to store around 46 gigatonnes of CO_2[2] – much more than is required to tackle its own emissions, and more than most other countries in Europe – so will have the opportunity in future to provide CO_2 storage services for other countries, bringing in additional revenue through the Scottish Crown Estate.

This response to both the draft Offshore Wind Policy Statement[3] and the draft Sectoral Marine Plan for Offshore Wind Energy[4] focuses on where marine planning could further benefit from synergies with the development of CCS and other low-carbon energy and decarbonisation activities.

1 Committee on Climate Change (2019) *Net Zero – The UK's contribution to stopping global warming*. Available at: https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/
2 SCCS, 2009. Opportunities for CO2 Storage around Scotland —an integrated strategic research study. Available at: https://era.ed.ac.uk/bitstream/handle/1842/15718/CO2-JointStudy-Full.pdf?sequence=1&isAllowed=y
3 https://consult.gov.scot/energy-and-climate-change-directorate/draft-offshore-wind-policy-statement/
4 https://consult.gov.scot/marine-scotland/draft-sectoral-marine-plan-for-offshore-wind/

2 Offshore Wind Policy Statement

Question 8: What steps can be taken to improve interactions between offshore wind and other marine sectors?

In its discussion of interactions with other marine sectors and users, the draft policy statement states that "there may still be competition for space with sectors such as commercial fishing, commercial shipping and oil and gas (infrastructure and exploration)."

This discussion should also include CO_2 transport and storage infrastructure, which is part of the CCS chain and will be essential if Scotland is to reach its net zero targets. This infrastructure will be similar in nature to that used by the oil and gas sector – pipelines and wells – and in some cases oil and gas infrastructure could be re-used for CO_2 transport and storage.

CO_2 storage will be in the geological subsurface, in selected areas of porous rock – depleted oil and gas fields and saline aquifers – around 1km or more below the seabed. Although there will be a footprint on the seabed for CO_2 transport, injection and monitoring, this would be nowhere near as large as the area covered by the storage site. CO_2 storage sites in the UK have been categorised and mapped, for example, through CO_2Stored[5].

There is strong potential for synergies between offshore wind and CO_2 transport and storage; however, these are unlikely to be achieved with a case-by-case approach, not least because CO_2 transport and storage infrastructure, and indeed an active CCS sector, are not operating yet. A detailed study is needed to understand how these sectors can coexist, and how benefits and synergies can be maximised; this should then translate into a strategic approach for maximising the decarbonisation potential of the Scottish Marine area[6].

Such a study should include other net-zero uses and infrastructure needs, including hydrogen production, storage and transport. Low-carbon hydrogen can be produced both by electrolysis of water, using renewable electricity (as is envisaged in the draft policy statement), or by steam reforming of methane (i.e. natural gas), with the resulting CO_2 captured and stored. There may be potential to co-locate CO_2 and hydrogen pipelines, minimising disruption to the seabed. Research is being carried out at the University of Edinburgh to understand the potential for storing hydrogen in porous rocks[7].

Direct air CO_2 capture (DAC) technology is a greenhouse gas removal (or negative emissions) technology that is in its infancy, but that is likely to become commercially available as we move towards 2050. There may be the opportunity to run DAC plant offshore, close to CO_2 storage sites, using excess renewable electricity.

5 http://www.co2stored.co.uk/home/about
6 Maximising this potential should be read as doing so without adversely affecting other objectives for the marine environment, such as nature conservation.
7 https://blogs.ed.ac.uk/hystorpor/

Question 24: What can be done, on the part of government and / or others, to strengthen and benefit from the synergies with a) hydrogen and b) the oil and gas sector?

Synergies with hydrogen and the oil and gas sector are important, but synergies with the CCS sector are equally so; it is essential that the offshore wind policy statement does not lock Scotland into a strategy that inadvertently prevents or impedes the deployment of CCS.

Offshore wind is often cited as an opportunity for a just transition for oil and gas workers, since it requires offshore skills and knowledge. The same is true for CO_2 transport and storage, with the addition that the technical skills needed in the oil and gas extraction industry closely mirror the skills needed for CO_2 transport and injection.

There are likely to be similar skills and supply chain issues for all offshore operations, so it would make sense to take a strategic approach to understanding these future skill needs: this should form a core part of the forthcoming Climate Emergency Skills Action Plan.

In the draft policy statement, hydrogen is assumed to be produced using renewable power to electrolyse water. However, in order to efficiently produce hydrogen in bulk, and thus to drive the market for hydrogen in heat and/or transport, it will initially need to be produced using steam methane reforming, with the resulting CO_2 captured and stored.

The Scottish Government has commissioned work to support the development of a hydrogen action plan and hydrogen policy statement[8]: we recommend that this and the offshore wind policy statement should be complemented by a **CCS policy statement and action plan**.

3 Offshore wind energy: draft sectoral marine plan

As stated in our response to the draft policy statement for offshore wind energy, marine planning for offshore wind needs to take into account future uses of the marine area, including CO_2 transport and storage. Ideally, this should be supported by a policy statement and action plan for CCS, to complement those being developed for hydrogen and offshore wind.

A useful early activity would be to overlay the proposed offshore wind licensing sectors with the known CO_2 storage sites, as identified in the CO_2Stored database. This should highlight areas where offshore wind planning is likely to need to take CO_2 transport and storage into consideration. This mapping could be augmented by adding in: existing pipelines and other infrastructure with potential for re-use for CO_2; potential new pipeline routes for CO_2 and hydrogen; and potential shipping routes for CO_2 transport (most likely to Peterhead Port).

Strategic discussions should take place with potential CCS project developers, including: the Acorn CCS Project; Carbon Capture and Storage Association (CCSA) members; relevant teams in UK Government (Department of Business, Energy and Industrial Strategy (BEIS)); Scottish Government; the Oil and Gas Authority and Ofgem; and academics in the SCCS

[8] https://www.arup.com/news-and-events/arup-explores-future-potential-of-hydrogen-with-scottish-government

partnership. This will support a full understanding of the potential for CCS and hydrogen in Scottish seas and the subsurface, and aid the development of a strategic roadmap to maximise decarbonisation. This should include a consideration of the offshore infrastructure needed to support industrial decarbonisation and greenhouse gas removal.

Scottish Carbon Capture & Storage (SCCS) is a research partnership of the British Geological Survey, Heriot-Watt University, the University of Aberdeen, the University of Edinburgh, the University of Strathclyde and the University of Glasgow with associate member the University of St Andrews. SCCS researchers are engaged in innovative applied research and joint projects with industry and government to support the development and commercialisation of carbon capture and storage as a climate change mitigation technology.

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