Call for Evidence: Carbon Capture Usage and Storage (CCUS) 2019

Written evidence submitted by the National Oceanography Centre

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Introduction

The National Oceanography Centre (NOC) is a national research organisation, delivering integrated marine science and technology from the coast to the deep ocean and is one of the top five institutions of its kind in the world. With sites in Liverpool and Southampton, it is the UK's leading centre for sea level science, coastal and deep ocean research and technology development.

The NOC is part of the Natural Environmental Research Council (NERC), which is part of UK Research and Innovation, a new organisation that brings together the UK's seven Research Councils, Innovate UK and Research England to maximise the contribution of each Council and create the best environment for research and innovation to flourish. The vision is to ensure the UK maintains its world-leading position in research and innovation.

1. The Committee on Climate Change sees a role for CCUS in decarbonising a) power b) transport and c) heavy industry. Which of these do you see as delivering a) the biggest environmental benefits and b) the biggest economic benefits to the UK?

2. How essential is CCUS for the UK to meet net zero emissions by 2050?

2.1. CCUS is one of the few technological approaches that has the ability to significantly reduce greenhouse gas emissions from power generation and key industrial processes. Recognition of the potential role of CCUS as a mitigation strategy has risen in tandem with our understanding of the threats posed by climate change, as demonstrated through the Intergovernmental Panel on Climate Change (IPCC) recent statement that without CCUS it will be impossible to meet our goals of limiting global temperature changes below 2°C, and reduce the cost of meeting the limits by up to 70% (IPCC, 2014). Whilst only a handful of large-scale projects are currently active worldwide, the International Energy Agency's Sustainable Development Scenario assumes that CCUS will account for 7% of global cumulative emission reductions by 2040, implying a rapid scale-up in CCUS from the current ~30 Mt per year to 2,300 Mt per year.

2.2. Within the UK a 43% reduction in emission levels relative to 1990 has been achieved without significant investment in CCUS, with most of the reductions being driven by the shift away from coal-fired electricity generation within the power sector. Other sectors (including industry, transport and buildings) have shown little, or no change in their emissions over this period, however, and CCUS is expected to be an essential mitigation approach for carbon-intensive processes such as steel, cement and chemicals production that have few other

reduction strategies. Many of these processes already produce concentrated streams of CO_2 that can be directly used or stored in underground reservoirs, and initiatives such as the Acorn Project, the Teeside Collective and the Caledonia Clean Energy Project are already poised to progress our CCUS capability.

3. What role can CCUS play in a coordinated regional industrial renaissance?

4. What opportunities are there for the UK to play a world-leading role in the development and export of CCUS e.g. technology, equipment, green industrial products, and policy and regulatory frameworks?

4.1. The storage of captured CO_2 can be done in either onshore or offshore reservoirs. Onshore CCUS has been predominantly used in the USA to facilitate Enhanced Oil Recovery (EOR) operations, whereby CO_2 is injected into oil and gas reservoirs to increase the production of hydrocarbons, the CO_2 is subsequently stripped from the resource and reused; this is not storage in a general sense as the CO_2 is not locked away. In contrast the majority of CCS research in the UK and Europe has focussed on offshore storage opportunities, due to a combination of politics, public perception and industrial experience. Europe has a long history of exploiting offshore basins for hydrocarbon production, and as such we have a good understanding of the various potential storage reservoirs in the North Sea, and other European offshore areas.

4.2. The UK is well positioned to exploit our offshore CCUS potential. The North Sea has a large number of oil and gas reservoirs that over time are becoming depleted and hence could be used for storage, along with the potential to use CO_2 EOR to extend the life of the fields. These reservoirs also have existing platforms where the CO_2 could be injected, and many are connected by pipelines to shore side facilities that could be engineered to transport CO_2. There could be synergies around CO_2 sources and transport, including the shipping sector for offshore installations. We have a number of industrial producers of CO_2 that are focussed in close proximity to each other (e.g. the Teesside Collective) making the collection of the captured CO_2 and subsequent transport easier.

4.3. We have a wealth of experience of working in the marine environment and have an increasing technology base in both the onshore and offshore hydrocarbon industries. The UK is at the leading edge in the development of autonomous technology (AUV, AAV, Drones etc.), which is needed for the monitoring of offshore storage facilities. The National Oceanography Centre (NOC), and the UK in general, leads on the development of innovative techniques and approaches around offshore monitoring and survey work. We are developing systems that use the latest in autonomy and sensing systems to detect leaks from reservoirs and pipelines and determine the impacts of such leak on the environment. The NOC leads one of the largest EC funded projects in offshore CCS and has been and is part of many other funded projects in this area.

5. What action is required from Government over the upcoming Spending Review period (expected to cover spending between 2020 and 2023) to ensure three CCUS clusters are operational by the mid-2020s (in line with the BEIS Select Committee recommendations)?

5.1 The current barriers to CCUS are around the cost of the capture of the CO_2, the development of an integrated transport system for taking the CO_2 from the capture point to the storage reservoir, and the monitoring of the reservoir to ensure containment is achieved. With the removal of the UK Government funded demonstration project in 2017 there is currently no full chain CCUS project in the UK, this is in contrast to Norway who are expanding their interest in this arena; currently they operate the longest running offshore CCS reservoir in the world. The Japanese government are funding a demonstration project in offshore CCS and the Department of Energy in the USA have recently funded two projects to look at the feasibility of offshore CCS in the Gulf of Mexico. As discussed above, the UK is well placed to be a world leader in CCS and could export technology and knowhow as well as use the existing reservoirs in the North Sea to store CO_2 and generate wealth from the depleted oil and gas reservoirs. This opportunity may be short lived as without investment we will lose our technological advantage to other nations.

6. What action is required from industry over the same three year period to ensure three CCUS clusters are operational by the mid-2020s (in line with the BEIS Select Committee recommendations)?

7. Given the timelines for CCUS project development, how can long-term policy continuity be ensured that stretches beyond individual Government terms?

8. Can you comment on the effectiveness of existing CCUS funding commitments?

In case of query, please contact:

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