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SCCS response to consultation on the list of proposed projects of common interest for cross-border carbon dioxide transport

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SCCS response to consultation on the list of proposed projects of common interest for cross-border carbon dioxide transport

Dr Philippa Parmiter, Dr Peter Brownsort, 11/08/2017

1 Identification

Scottish Carbon Capture & Storage[1] (SCCS) is a research partnership of British Geological Survey, Heriot-Watt University, the University of Aberdeen, the University of Edinburgh and the University of Strathclyde. Our researchers are engaged in high-level research into carbon capture and storage (CCS), including joint projects with industry. We act as a conduit between academia, industry and government, providing independent advice and policy guidance along with a variety of events and knowledge exchange. We are currently funded by Scottish Government and through our specific project activities.

SCCS is a partner in the proposed CO_2-SAPLING Project[2] submitted for listing as a Project of Common Interest (PCI).

2 Consultation

This consultation[3] seeks views on the need for cross-border carbon dioxide (CO_2) transport from the perspective of EU energy policy, considering security of supply, market integration, competition and sustainability. It also specifically seeks views on four projects submitted for inclusion in the list of PCIs on CO_2 transport.

SCCS welcomes the opportunity to provide views on the need for and benefits of a cross-border CO_2 transport system; our views apply equally to all four projects.

3 Context

Europe has large CO_2 emissions from both energy conversion systems and industrial processes, approaching 3.5 billion tonnes CO_2 in 2015,[4] and has targets to reduce these very significantly by 2050. Much of this reduction will be achieved through efficiency measures and switching to renewable energy sources, however there will remain sizeable CO_2 emissions in the 2050 timescale from remaining fossil fuel use and from industrial processes with inherent CO_2 emissions. In that timescale there is also likely to be a need for negative emission technologies to achieve a growing ambition for net zero emissions and to counteract near-

term overshoot of CO_2 emissions relative to the carbon budget for a safe global warming trajectory.

CCS is a suite of established technologies capable of capturing and permanently sequestering CO_2 on an industrial scale. CO_2 transport is an important element of the CCS industry linking capture and storage locations. CO_2 may be transported as compressed gas by pipeline or as refrigerated liquid by ship, both methods are established in Europe. CCS currently operates globally at a scale of tens of millions of tonnes per year (Mt/yr).[5] With the right incentives and support, including market incentives, stable policy commitment, government leadership and public support, the CCS industry has potential for scale-up to 100s-1000s Mt/yr at build-out rates comparable to those achieved in other large industrial infrastructures such as natural gas.[6]

The EU recognises in its policy framework for climate and energy out to 2030[7] that CCS is a key technology area requiring supportive, complementary policies. This builds on conclusions of the EU's 2050 Energy Roadmap[8] that CCS has a "pivotal role" in achieving transformation to a low-carbon energy system. Although progress on deployment of CCS in Europe has been slow, recognition of its importance and policy support at the EU level has been consistent.

4 Cross-border CO_2 transport

A large-scale CO_2 management system, such as CCS provides, will be necessary to handle Europe's CO_2 emissions before the mid 21st Century in order to achieve existing targets and commitments. Most CO_2 emissions from point sources are sited on land with many of Europe's major emission sites located around the North Sea Basin and in its hinterland, including the main river basins of northern Europe. For a variety of reasons, preferred sites for permanent geological sequestration of CO_2 are located offshore; the North Sea holds the majority of potential European CO_2 storage capacity, mostly in the Norwegian and UK sectors. These geographic constraints dictate that, for the deployment of CCS in Europe, cross-border transport of CO_2 will be required to allow access to storage locations for Member States having little or no CO_2 storage available.

Widespread deployment of CCS, including cross-border CO_2 transport infrastructure to access storage locations, enhances security and sustainability of energy supply as well as market integration and competition in a number of ways. The importance to the power sector of using fossil fuels with CCS to allow balancing of a system with high levels of variable renewable generation is recognised in the EU policy framework.[9] The availability of a CO_2 transport and storage infrastructure will allow Member States to make choices including some continued use of fossil fuels in their national plans for energy. Hydrogen is proposed or under development as a carbon-free fuel for domestic and commercial heat (by replacement of natural gas), for industry, for power generation, and as a transport fuel. Large-scale provision of hydrogen will likely be from steam reforming of natural gas leading to by-product CO_2, which would need to be transported and stored. The availability of CO_2 management

infrastructure would allow low-carbon hydrogen production at multiple sites across Europe, close to points of use, increasing competition and security of supply.

For energy intensive industries and industries with inherent process emissions of CO_2 (such as refining, chemicals, steel, fertiliser and cement making), it is recognised that CCS may be the only technology that can achieve deep reductions in emissions.[10] These are key strategic industries for the EU economy and support millions of jobs.[11] For these industries to be retained in a low-carbon European economy, it is essential that they will have access to CO_2 transport and storage infrastructure in the future. As discussed above, locations imply that this will require a cross-border transport network.

5 Projects submitted for listing as PCIs

Four CO_2 transport projects have applied to be listed as PCIs:[12]

- CO_2 cross-border transport connections between Teesside, Eemshaven and the Norwegian Continental Shelf,
- The Rotterdam Nucleus,
- Teesside CO_2 Hub,
- CO_2-SAPLING Transport Infrastructure Project.

Summaries of the projects have been compiled by the Global CCS Institute.[13]

At this early stage of CCS deployment, SCCS encourages the EC to accept all the projects for listing as potential PCIs and support them all through stages of further definition. As explained in the previous section, cross-border transport of CO_2, as part of the widespread deployment of CCS, will be required to achieve the EU's energy and climate change targets. Each of the four projects has the potential to contribute to this and so all are relevant to EU energy policy.

We gather that all four projects involve the use of ship transport of CO_2 for at least a part of their proposals; we believe this is highly appropriate as shipping is a cost-effective and flexible transport mode for CO_2, well suited to early phases of CCS deployment.[14] We understand that ships themselves cannot receive direct support through PCI processes but that related infrastructure (such as CO_2 liquefaction and loading/unloading facilities) can.

By supporting all the projects, the EC can encourage a degree of collaboration between them to foster development of common standards and techniques. This will stimulate competition in the supply chain through provision of clear specifications for equipment.

Similarly, if compatible systems are developed by a number of projects, this will enhance robustness of the overall CO_2 transport system, providing back up for planned or unplanned downtime at storage sites. Also, in the longer term, this will allow competition between storage sites helping to improve efficiencies and drive down overall costs.

Some of the projects contribute to sustainability and a circular economy through their proposals to reuse existing assets of the oil and gas industry, avoiding decommissioning costs and risks. Careful selection of the physical conditions for transport of CO_2 can also allow the ships to be used for other liquefied gases, such as liquefied petroleum gas, once no longer required for CO_2 transport.

6 Summary

- Europe will need to deploy carbon capture and storage as a large-scale CO_2 management system before mid 21st Century in order to achieve its climate change targets and commitments, while maintaining core industries and the jobs and economic benefits these support.
- The geographical locations of emission sources and the offshore locations of likely geological CO_2 sequestration sites dictate that cross-border transport of CO_2 will be required.
- A European carbon capture and storage network with cross-border transport of CO_2 will enhance market integration and competition, and security and sustainability of supply in both the energy system and in energy intensive industries.
- All four projects submitted for listing as European Projects of Common Interest can contribute significantly to EU objectives, they should be listed as potential PCIs and supported through further definition.
- Collaboration between the projects to develop common standards should be encouraged. This will allow competition within the supply chain, system robustness through back up between projects, and longer-term competition between CO_2 storage providers.

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1 Scottish Carbon Capture & Storage: http://www.sccs.org.uk/

2 CO_2-SAPLING Project: https://pale-blu.com/co2-sapling/

3 EC: https://ec.europa.eu/energy/en/consultations/consultation-list-proposed-projects-common-interest-cross-border-carbon-dioxide

4 Joint Research Centre: http://edgar.jrc.ec.europa.eu/overview.php?v=CO2ts1990-2015

5 GCCSI: http://status.globalccsinstitute.com/

6 IEAGHG: http://www.ieaghg.org/ieaghg-presentations/49-publications/technical-reports/802-2017-tr6-ccs-industry-build-out-rates-comparison-with-industry-analogues

7 EC: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0015&from=EN

8 EC: https://ec.europa.eu/energy/sites/ener/files/documents/2012_energy_roadmap_2050_en_0.pdf

9 EC: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0015&from=EN

10 IEA: https://www.iea.org/publications/freepublications/publication/CarbonCaptureandStorageThesolutionfordeepemissionsreductions.pdf

11 SCCS: http://www.sccs.org.uk/images/expertise/reports/working-papers/wp-2013-04.pdf

12 EC: https://ec.europa.eu/energy/sites/ener/files/documents/3rd_pci_candidates_list_carbon_dioxide.xls

13 GCCSI: https://www.globalccsinstitute.com/projects/projects-common-interest

14 SCCS: http://www.sccs.org.uk/images/expertise/misc/SCCS-CO2-EOR-JIP-Shipping.pdf