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SCCS response to consultation on the list of candidate Projects of Common Interest in cross-border carbon dioxide transport infrastructure

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Dr Philippa Parmiter, Dr Peter Brownsort, Rebecca Bell, 6th June 2019

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, Scottish Funding Council and Scottish Enterprise as well as through our specific project activities.

SCCS was a partner in the CO_2-SAPLING Project[2] when it was submitted for listing in the third (2017) Project of Common Interest (PCI) list.[3] SCCS is no longer involved with that project.

2 Consultation

This consultation[4] seeks views on five candidate projects, submitted for inclusion in the list of PCIs on cross-border CO_2 transport, in terms of their contributions to market integration, sustainability, security of supply and competition from an EU energy policy perspective.

SCCS welcomes the opportunity to provide views on these projects and, more generally, on the need for and benefits of a cross-border CO_2 transport system.

3 Context

Europe has large CO_2 emissions from both energy conversion systems and industrial processes, approaching 3.7 billion tonnes CO_2 in 2017, and has targets to reduce these very significantly by 2050, although there has been no reduction in the last 3 years.[5] Much of the intended reduction is planned through efficiency measures and switching to renewable energy sources; however, there will remain sizeable CO_2 emissions in the 2050 timescale from difficult-to-avoid 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, already included in targets for a number of states, 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, train or truck; these methods are all established in Europe. CCS currently operates globally at a scale of around forty million tonnes per year (Mt/yr) of CO_2.[6] 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.[7]

The EU recognises in its policy framework for climate and energy out to 2030[8] that CCS is a key technology area requiring supportive, complementary policies. This builds on conclusions of the EU's 2050 Energy Roadmap[9] that CCS has a "pivotal role" in achieving transformation to a low-carbon energy system. Although progress on deployment of CCS in Europe has to date 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 and updated 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 (but not only) 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 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.[10] The availability of a CO_2 transport and storage infrastructure will allow states to make choices including some continued use of fossil fuels in their national plans for energy, at least in the medium term. Hydrogen is proposed and 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 is most likely, at least in the medium term, to be from steam reforming of natural gas leading to by-product CO_2, which will need to be transported and stored. The availability of CO_2 management infrastructure will 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.[11] These are key strategic industries for the EU economy and support millions of jobs.[12] 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 for their captured CO_2 in the future. As discussed above, geographical locations imply that this will require a cross-border transport network.

5 Projects submitted for listing as PCIs

Five CO_2 transport projects have applied to be listed as PCIs and are summarised in the consultation reference documents:[13]

- ERVIA Cork CCUS,
- CO2TransPorts,
- CO_2-SAPLING Transport Infrastructure Project,
- Northern Lights,
- ATHOS.

At this early stage of CCS deployment, SCCS encourages the EC to include all the projects for listing as PCIs and support them all through stages of further definition, and as the more advanced projects progress towards construction. 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 five projects has the potential to contribute to this and so all are relevant to EU energy policy.

One of the projects, CO_2-SAPLING, was included in the previous PCI list and has received financial support from the Connecting Europe Facility. This project is one of the most advanced opportunities for realising access to large-scale CO_2 storage in Europe and we strongly encourage the EC to continue to support this project.

Two other projects, CO2TransPorts and Northern Lights, are closely related to entries in the previous PCI list. They also bring significant opportunities for connecting industrial CO_2 capture clusters around the North Sea Basin with early CO_2 storage developments.

The remaining two projects applying, ERVIA Cork CCUS and ATHOS, are at earlier stages of conception. These projects introduce further states and storage sites to the potential European CO_2 transport and storage network.

We gather that three (possibly 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.

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 may also allow the ships to be used for other liquefied gases used in industry, once no longer required for CO_2 transport.

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.

We understand from initial discussion in the new European CCUS Projects Network,[15] of which all five projects are early members, that these projects are keen on such collaboration believing it will reduce cross-chain risks, improve security of operations, improve market and logistic integration, thereby improving ability to finance developments. We believe that collaboration of this type between projects in the short term, leading to a well integrated, efficient CO_2 network and market, is the best way to ensue effective competition in the longer term and so deliver the most cost-effective CO_2 management system for Europe.

6 Summary

- Europe will need to deploy carbon capture and storage as a large-scale CO_2 management system in the 2020s to 2030s 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 preferred 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 five projects submitted for listing as European Projects of Common Interest can contribute significantly to EU objectives. They should be listed as potential PCIs, or remain listed as PCIs, and supported through further definition and into deployment.
- 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 transport and storage providers.

Endnotes:

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

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

[3] EC: https://eur-lex.europa.eu/eli/reg_del/2018/540/oj

[4] EC: https://ec.europa.eu/info/consultations/consultation-list-candidate-projects-common-interest-cross-border-carbon-dioxide-transport-infrastructure_en

[5] European Environment Agency: https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

[6] GCCSI: https://indd.adobe.com/view/2dab1be7-edd0-447d-b020-06242ea2cf3b

[7] IEAGHG, available on request from: https://ieaghg.org/publications/technical-reports/reports-list/10-technical-reviews/802-2017-tr6-ccs-industry-build-out-rates-comparison-with-industry-analogues

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

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

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

[11] IEA: https://www.iea.org/publications/freepublications/publication/CarbonCaptureandStorageThesolutionfordeepemissionsreductions.pdf

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

[13] EC: https://ec.europa.eu/info/sites/info/files/detailed_information_regarding_the_candidate_projects_in_co2_network_0.pdf

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

[15] European CCUS Projects Network: http://www.ccusnetwork.eu/