North Sea Transition Authority

Technology development and deployment

Carbon Storage Stewardship Expectation 4

September 2025

1. Expectation

The North Sea Transition Authority ('NSTA') expects that Carbon Dioxide Appraisal and Storage Licence ('CS Licence') holders will deploy existing technology, and where none exists, collaborate on development and deployment of new technology, across all aspects of their CS Licence.

This means CS Licence holders should:

1.1 Develop and implement a United Kingdom Continental Shelf ('**UKCS**') Technology Plan ('**Technology Plan**') appropriate to carbon storage projects ('**CS projects**').

1.2 Ensure that technology development is embedded in the business cycle.

1.3 Identify relevant technology gaps and appropriate measures to close them.

1.4 Deploy the required technology at appropriate scales in a timely manner

Where the CS Licence holder is an incorporated joint venture, such as a Transport and Storage Company ('**T&SCo**'), the NSTA expects that its shareholder companies will meet the requirements of this Expectation including, but not limited to, enabling access to and uptake of best practice and technology.

The NSTA has a role across the whole technology spectrum and across the full lifecycle of offshore carbon dioxide transportation and storage ('**CO_2 T&S**') activities from initial concept, development, injection and through to store closure, decommissioning and post-injection monitoring.

2. Reason for the Expectation

There is a robust regulatory framework in the UK relating to carbon capture and storage ('**CCS**') including legislation under which the NSTA operates in its role as the licensing and permitting authority for offshore carbon storage. This Expectation supports the NSTA's regulatory role in respect of carbon storage, as established by the Energy Act 2008[1], Energy Act 2023[2] and further elaborated by secondary legislation, including The Storage of Carbon Dioxide (Licensing, etc) Regulations 2010[3] (the '**Storage Regulations**'), and assists CS Licence holders to fulfil their obligations.

2.1 Technology is a key enabler of CO_2 T&S. This Expectation encourages CS Licence holders to deploy proven technologies which can enable the best utilisation of CO_2 T&S resources across the UKCS.

2.2 The NSTA considers that the UKCS supply chain is well-placed to meet the needs of CO_2 T&S, and technologies developed and deployed could potentially be applied in the UKCS and overseas.

2.3 Deploying proven technology can bring improvements and benefits to CO_2 T&S projects and strengthen the suppliers' market for the development and testing of new and innovative technologies.

2.4 Identification of technology gaps and taking measures to develop appropriate new technologies will deliver benefits such as lowering risks to containment, reducing costs and improving operability (including uptime and injection rates) throughout the life cycle of CO_2 T&S projects.

3. Delivering the Expectation

Technology planning

3.1 CS Licence holders are expected to produce a Technology Plan in support of their CO_2 T&S activities, as set out in the NSTA's published Guidance on Applications for a carbon storage permit[4]. The Technology Plan should cover all elements of the CO_2 T&S project, from initial site characterisation to the design and delivery of a complete CO_2 T&S system, and in particular the delivery of the Monitoring Plan against the requirements set out in paragraph 2 of Schedule 2 of the Storage Regulations[3] and those in Annex 2 to EU Directive 2009/31/EC on the geological storage of carbon dioxide[5] (the EU Directive). The Technology Plan should be updated periodically through the Appraisal and Operational Terms.

3.2 The Technology Plan should identify technology solutions across a CS Licence holder's CO_2 T&S activities and determine how best to develop and/or deploy such technologies and include areas where collaboration with other stakeholders may be appropriate (as set out in CS SE 5 (Stakeholder)).

3.3 CS Licence holders are expected to be familiar with the relevant aspects of the NSTA's Technology Insights reports[6] ('**Technology Insights**'). They are expected to screen and, where/if appropriate, select technologies from the report for deployment on their CO_2 T&S activities. CS Licence holders are also strongly encouraged to consider other technology which may not feature in the Technology Insights reports.

Embedding Technology in the business cycle

3.4 Selected technologies from the Technology Insights list are expected to be considered for inclusion by CS Licence holders in their CO_2 T&S system plans and budgets.

3.5 Each technology has measurable delivery stages, defined as a Technology Readiness Level ('**TRL**'), and these should be reflected in the CO_2 T&S system plans and budgets.

Technology gaps

3.6 CS Licence holders are expected to support and collaborate on the development of new technologies to close relevant gaps in available capabilities, for example by increasing the TRL of new technologies. Selection of which technology gaps to close should be influenced by factors including, but not limited to, risk reduction potential and their impact on the project.

3.7 This could be by in-house Research & Development ('**R&D**'), outsourced R&D, and/or collaboration with industry R&D organisations and supply chain companies.

3.8 Early field trials of new technologies, particularly those related to monitoring, are encouraged to derisk their later deployment at scale.

Widespread deployment of technology in a timely manner

3.9 CS Licence holders are expected to make every effort to deploy technologies effectively in line with available industry experience.

3.10 The deployment of technologies included in CO_2 T&S system plans and budgets is expected to be tracked.

3.11 Lessons learned from technology deployment are expected to be captured and shared with industry.

4. Demonstrating Delivery

Information obtained from various sources and engagements between the NSTA and CS Licence holders will help inform the NSTA of the extent to which they may be delivering against this Expectation. These may include, but not be limited to:

4.1 Reporting

The NSTA collects a range of data from CS Licence holders as part of the annual reporting in accordance with paragraph 3 of schedule 2 of the Storage Regulations[3] and may request

additional information or reports (for example using the powers in s112 of the Energy Act 2023[2]). Information may be collected in accordance with any applicable regulations or guidance.

4.2 Stewardship Engagement Meetings

The NSTA will engage with CS Licence holders during the lifecycle of a project. It would be helpful for CS Licence holders to assign a focal point for Technology Plans within their organisations. For any meeting, the NSTA may suggest an agenda to focus on issues that present the greatest stewardship impact, and the agenda will be based on data received, any applicable benchmarking, and delivery against this Expectation.

4.3 Technology Insights

Anonymised feedback on industry's Technology Plans is published annually through Technology Insights[6] reporting, highlighting those technologies with potential for application in CO_2 T&S projects alongside technologies from other offshore energy disciplines (including wells, subsea and facilities) which nonetheless could be applicable to carbon storage.

4.4 Sharing with Industry

CS Licence holders are encouraged to share examples of best practice and lessons learned with industry, through active participation at forums such as conferences, industry-convened workgroups, taskforces, and publications such as academic journals. The NSTA may, on occasion, convene or co-convene events and participation is strongly encouraged to demonstrate delivery of this Expectation.

5. References

1 *Energy Act 2008*

2 *Energy Act 2023*

3 *Guidance on the application for a Carbon Dioxide Appraisal and Storage Licence*

4 *https://www.nstauthority.co.uk/media/15zdvyzq/guidance-on-applications-for-a-carbon-storage-permit.pdf*

5 *EU Directive 2009/31/EC on the geological storage of carbon dioxide*

6 *Current and prior issues of the NSTA Technology Survey & Insights 2024*

North Sea Transition Authority

The North Sea Transition Authority is the business name for the Oil and Gas Authority, a limited company registered in England and Wales with registered number 09666504 and VAT registered number 249433979.
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