North Sea Transition Authority

Data acquisition and use for appraisal and monitoring

Carbon Storage Stewardship Expectation 3

September 2025

1. Expectation

The North Sea Transition Authority ('NSTA') expects that Carbon Dioxide Appraisal and Storage Licence ('CS Licence') holders to acquire and use the right data at the right time in the Appraisal and Operational Terms and Post-Closure Period to appropriately characterise and monitor the store.

This means CS Licence holders should:

1.1 Ensure that the datasets used for site characterisation and monitoring are appropriate and fit for purpose considering the longevity of the proposed store.

1.2 Consider the timing of acquisition of data and assess potential monitoring techniques to ensure the right data is acquired at the right time.

1.3 Fully integrate data into the Storage Site and Complex Characterisation ('**SSCC**'), Containment Risk Assessment ('**CRA**'), Monitoring Plan ('**MP**'), Storage Site Management Plan ('**SSMP**') and the Stakeholder Engagement Plan ('**SEP**').

1.4 Make appropriate use of the data[a] in the Appraisal and Operational Terms and the Post-Closure Period. Data may include, but is not limited to:

- Geophysical data of any suitable type (such as seismic, gravity and other potential fields techniques)
- Well-based data
- Seabed or water column surveys or samples (such as SSS, MBES, ROV/AUV, landers)
- Third-party studies
- Remote sensing data

1.5 Ensure that monitoring data is regularly reviewed and integrated to enable identification of migration of CO_2, significant irregularities, leakages, or non-conformance that may indicate a risk of a significant irregularity or leak.

[a] In this Expectation, "data" means subsurface and surface data used to support the appraisal, characterisation and monitoring of the storage site as required by the Storage of Carbon Dioxide (Licensing etc) Regulations 2010[3].

2. Reason for the Expectation

2.1 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**').

2.2 Data is critical for the appraisal and characterisation of a potential carbon storage site, complex and surrounding area, as required by Annex 1 to EU Directive 2009/31/EC on the geological storage of carbon dioxide[4] (the '**EU Directive**').

2.3 The early acquisition and use of modern data for site characterisation, particularly 3D seismic, is considered best practice for meeting the requirements as set out in the EU Directive as it can aid the identification of risks that may significantly impact the potential for carbon storage at the proposed site (see also CS SE 1 (Risk)[5] and CS SE 2 (Appraisal)[6]) and clarify what may be appropriate for use as a monitoring technology.

2.4 Data acquired for petroleum exploration, appraisal and development may not meet the needs of carbon store appraisal. Therefore, well-timed data acquisition activity supports the appraisal of potential stores, including site characterisation, the appropriate evaluation of risks to containment for the CRA, and the development of the MP, all of which are components of a Storage Permit Application.

2.5 Seismic data is one of the foundations for defining the pre-injection characteristics of the proposed carbon store (i.e. site characterisation). Legacy data may not always adequately image all required elements (e.g., the overburden). The characterisation is expected to be referenced for the duration of the injection period and post-closure phase, which together may be in excess of 50 years.

2.6 Acquisition of appropriate monitoring data at appropriate intervals in the Operational Term, based on risks identified in the CRA[b], and in line with the requirements set out in paragraph 2 of Schedule 2 of the Storage Regulations[3], will ensure that carbon storage permit operators ('**Storage Permit Operators**') can identify whether store behaviour indicates a potential significant irregularity or leakage event.

2.7 A range of monitoring data types should be incorporated into the MP, without over-reliance on a single data type over the lifespan of the store. For example, well data could include a range of data types from injection or monitoring wells; geophysical data could include repeat 1D, 2D or 3D seismic or gravity surveys.

[b] The CRA is a requirement of a Storage Permit Application, as set out in the NSTA's published Guidance: https://www.nstauthority.co.uk/media/8649/guidance-on-the-content-of-an-offshore-carbon-storage-permit-applications.pdf

3. Delivering the Expectation

A. Strategic

A.1 The NSTA expects a data acquisition strategy and plan to be presented as part of a licence application, and for this to be revisited at appropriate intervals during the Appraisal Term, supported by reviews of data quality and appropriateness at key decision points, for example at the ERA Workshop.

A.2 CS Licence holders should deliver all activity, including work programme commitments such as appraisal wells, studies and seismic acquisition and processing or reprocessing in a timely manner to support the characterisation of the storage site, storage complex and surrounding area, and the development of a storage permit application.

A.3 CS Licence holders are expected to work collaboratively with relevant stakeholders, including other CS Licence holders, to take advantage of opportunities to increase data acquisition efficiencies, particularly of monitoring data in the Operational Term. Any mechanisms required to support this should be put in place early, in line with CS SE 5 (Stakeholder)[7]. The CS Licence holder is encouraged to engage with the NSTA to support this.

B. Appraisal Term

To support CS Licence holders in delivering the required elements of a Storage Permit Application:

B.1 Data, in particular seismic, should be of appropriate and sufficient quality to characterise the geological interval containing the proposed carbon storage site, the underburden and overburden. This is particularly important where risks to containment have been identified, for example, legacy wells or faults, and which may need to be incorporated into long-term store management plans.

B.2 Whilst reprocessed legacy data may be acceptable for the early stages of the Appraise Phase, a modern seismic dataset is expected to be in use by the later stages of site characterisation. This is particularly so if the underlying data was acquired over 10 years previously or if the proposed store is a depleted hydrocarbon field and the underlying data was acquired prior to production and/or significant depletion.

B.3 Possible monitoring methods should be included in the Early Risk Assessment[c] (‘**ERA**’) and built into the Appraise Phase data acquisition programme. While seismic is a foundation of site characterisation, a sufficiently wide range of data types should be used as part of the development of the MP, in order to meet the requirements set out in paragraph 3 in Schedule 2 of the Storage Regulations[3].

[c] The Early Risk Assessment requirements are set out in the NSTA’s published Guidance on Applications for a Carbon Storage Permit

B.4 The opportunity to acquire new 3D seismic early for site characterisation, in support of paragraph B.2, is strongly encouraged where 4D seismic is considered as a monitoring technology, as a new characterisation dataset could act as a baseline for monitoring.

B.5 CS Licence holders should regularly review requirements for additional data and studies. Where such requirements have been identified, for example during the ERA, or site characterisation work or monitoring studies, early execution of subsurface and geotechnical feasibility studies is considered best practice in reducing risk and project delay later in the Appraisal Term.

B.6 The ERA, as part of the Appraise Phase licence work programme, is an opportunity to understand the data and studies required to address the risks and any dependencies between them. A detailed and holistic approach at this early stage is encouraged as a way of optimising data acquisition plans, schedules and the delivery of required studies. Collaboration with other CS Licence holders, petroleum licence holders or other relevant companies/organisations, is encouraged to promote efficiencies in data acquisition.

B.7 Where seismic acquisition needs to take place, for example under a CS Licence work programme, CS Licence holders should think early about the survey design and possible requirement for specialist processing to support the characterisation and risk assessment, particularly where risks to containment have been identified. For example, near offset data or specialist processing may be required to improve imaging of the shallow overburden or any secondary containment formations.

C. Operational Term and Post-Closure Period

C.1 Monitoring data should be interpreted and incorporated into all relevant models (for example, static, dynamic, geomechanical) in a prompt manner to support confirmation and demonstration of conformance and containment. Data and its interpretation should be shared with the NSTA as part of regular stewardship engagements (see paragraphs 4.1 and 4.2, below).

C.2 The Storage Permit Operator should have a robust process for integrating monitoring data into the relevant models, such as dynamic reservoir models to ensure that pressure is managed appropriately and in line with relevant permit conditions and that significant irregularities and leaks can be identified and the NSTA informed pursuant to paragraph 3 (6) in Schedule 2 of the Storage Regulations[3].

C.3 Proactive sharing of monitoring data with other Storage Permit Operators, CS Licence holders and other stakeholders is encouraged to increase industry knowledge and technical understanding throughout the store lifecycle, particularly where store behaviour deviates from expected behaviour.

C.4 Where monitoring requirements may change, Storage Permit Operators should engage with the NSTA.

C.5 CS Licence holders are expected to actively pursue new monitoring technologies in line with CS SE 4 (Technology)[8], to take advantage of benefits that may not have been available at the time of the Storage Permit Application or the last update to the MP. Benefits may include increases in speed and ease of deployment, reductions in cost, improvements in imaging and reduction of risk. Storage Permit Operators should discuss any transition from one technology to another with the NSTA.

C.6 Storage Permit Operators are strongly encouraged to actively explore opportunities for increased efficiencies in data acquisition and cost reduction, particularly during the Operational Term, through collaboration with other Storage Permit Operators, CS Licence holders and any other stakeholders who may be planning similar data acquisition programmes. Storage Permit Operators should engage with the NSTA to demonstrate that the proposed collaboration does not have a negative impact on the monitoring of the store.

C.7 Storage Permit Operators should ensure that model updates are continued in the Post-Closure Period to support the development of a Transfer Report[9] as part of an application for termination.

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

CS Licence holders are encouraged to share examples of best practice and lessons learned The NSTA will engage with licensees during the lifecycle of a project. 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 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 also strongly encouraged to demonstrate delivery of this Expectation.

4.4 Data Retention, Reporting and Disclosure

CS Licence holders, exploration operators and Storage Permit Operators under a carbon storage licence are required under s111 of the Energy Act 2023[2] to appoint an Information and Samples Coordinator ('**ISC**'). The ISC should monitor and manage the company's compliance with regards to information and sample retention and reporting in accordance with the Energy Act 2023[2] and related regulations and applicable guidance.

4.5 Proactive review of data

In the Operational Term and Post-Closure Period, Storage Permit Operators should be able to demonstrate that the data acquired and processed under the MP is properly integrated into the relevant models, and that the data acquired continues to be appropriate and meets Permit conditions.

5. References

1 *Energy Act 2008*

2 *Energy Act 2023*

3 *The Storage of Carbon Dioxide (Licensing etc.) Regulations, 2010*

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

5 *Carbon Storage Stewardship Expectation 1 – Risk assessment*

6 *Carbon Storage Stewardship Expectation 2 – Appraisal and subsurface characterisation*

7 *Carbon Storage Stewardship Expectation 5 – Stakeholder engagement*

8 *Carbon Storage Stewardship Expectation 4 – Technology development and deployment*

9 *The Storage of Carbon Dioxide (Termination of Licences) Regulations 2011*

10 *Guidance on Applications for a Carbon Storage Permit*

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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