
N584: Storage Exploration – Screening and Selection of CO2 Sites

Instructor(s): Peter Smith and James Lorseong

Format and Duration

Classroom - 2 Days

Virtual - 4 Sessions

Summary

This course considers the systematic evaluation of regional structure and stratigraphy to identify potential sites for geological storage of CO₂, beginning with the typically wide range CCS development concepts, potentially encompassing onshore or offshore, new or adaptation of existing infrastructure and open aquifers as well as closed structures. It explores identification of potential storage complexes, assessment of storage capacity and relative CO₂ containment risks of potential storage sites. One of the main targets for CO₂ storage is in depleted oil fields which have rock volumes which are already well characterised geologically, and much relevant infrastructure is already in place. CO₂ injection may also generate enhanced oil recovery. This course outlines criteria and approaches that can be used for such screening, based on methods that have already been applied successfully. It concludes with formulation of an indicative development plan and integrated economic/technical criteria for ranking sites for further investigation.

Learning Outcomes

Participants will learn to

1. Evaluate potential storage sites in terms of regional structure and stratigraphy, depths and pressures, reservoir quality
2. Consider storage capacity, injectivity and pressure management in potential storage sites
3. Carry out a risk assessment of legacy wells and infrastructure
4. Undertake a portfolio evaluation adopting a criteria-based scoring methodology
5. Consider the technical, operational and economic criteria in the selection of potential storage sites
6. Formulate an indicative development plan integrating economic, operational and technical criteria for ranking sites for further investigation

Training Method

This is an in-person classroom or virtual interactive classroom course comprising presentations, discussions and case studies.

Who Should Attend

This course is aimed at subsurface oil and gas professionals who are familiar with CCS and would like to understand the issues relating to the screening and selection of potential CO₂ storage sites.

Course Content

Selection of CO₂ storage sites

- Development concept – CO₂ sources, economic drivers, infrastructure
- Onshore vs offshore
- Greenfield vs depleted fields
- Regional stratigraphy – reservoirs and seals



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- Regional structure – open aquifers vs closed structures
- Depth, reservoir pressure and overpressure
- Reservoir quality – injectivity and storage capacity
- Screening estimates of storage capacity
- Pressure management
- Legacy well risk assessment
- Infrastructure re-use – legacy wells
- Infrastructure re-use – pipelines and facilities
- Initial development plan
- Indicative costs

Screening of oilfields and portfolios for CO₂ storage

- Overview of how CO₂ is stored in an oilfield during and after CO₂ EOR.
- Identification of screening criteria that are relevant for CO₂ EOR and storage. These include:
 - Technical criteria (e.g., temperature, pressure, oil composition) that determine whether CO₂ EOR will actually work;
 - Operational criteria (e.g., geography, field maturity, existing infrastructure) that affect the complexity of implementing CO₂ injection
 - Economic criteria (e.g., NPV) that determine whether CO₂ EOR is likely to be commercially attractive
 - Storage-specific criteria (e.g., STOIP, pressure) that determine how much CO₂ can be injected and safely retained permanently
- Building a screening framework, where the criteria are codified into “scores”, weighted according to their relative importance, and the scores are processes into an overall “suitability” score
- Converting the scores into predictions of outcomes (e.g., incremental oil, CO₂ storage efficiency) using analogue-based rules and correlations
- Portfolio screening
 - Data requirements: what needs to be known about each field, and how critical data can be acquired or estimated
 - Batch processing of calculations and post-processing/synthesis of results