
N586: The Geoscience of CCS Using Virtual 3D Outcrop Analogues and Virtual Core

Instructor(s): Tip Meckel and Jurriaan Reijs

Format and Duration

Classroom - 2 Days

Virtual - 3 Sessions

Summary

Carbon Capture and Storage (CCS) is an effective technology for the reduction of CO₂ emissions. This course takes a very practical approach, where key geoscience concepts impacting the success of a CCS project are introduced and explained. Subsequently, the understanding of these concepts is deepened during virtual, interactive, outcrop and core studies, where students observe the key elements of these concepts themselves. For these virtual exercises, excellent CCS project outcrop analogues are used as well as core from real CCS projects. The value of geological observations to CCS projects is illustrated with real examples from various CCS projects around the world that each have a valuable lesson to teach us. Key topics include value drivers, evaluation practices, similarities and differences with oil and gas exploration and production, as well as key lessons learned from industry experience so far.

Business impact: This course will equip geoscientists and petroleum engineers to **explore for the most valuable CCS opportunities** and **define their value more effectively**, leveraging applicable **best practices** from hydrocarbon industry, as well as **key lessons learned and pitfalls** from CCS projects around the world. Participants will learn to make the observations required to **evaluate storage resource leads**, including **risks, opportunities, and uncertainties**.

Learning Outcomes

Participants will learn to:

1. Articulate the case for CCS.
2. Assemble the key CCS concepts and value drivers.
3. Effectively explore for CCS opportunities.
4. Formulate the key geological observations to define and evaluate a storage resource.
5. Apply relevant hydrocarbon industry insight while assessing key differences.
6. Appraise CCS best practices and pitfalls using real examples.

Training Method

This is a virtual classroom course comprising a mixture of lectures, virtual 3D outcrop analogue sessions, exercises, virtual core viewing, and discussion. The interactive environment for outcrop analogue sessions and core viewing is provided through the 3D interactive collaboration tool [Stratbox from Imaged Reality](#).

Who Should Attend

This course is designed for geoscientists and petroleum engineers interested in using their skills for CCS and its effective subsurface evaluation.

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Course Content

Session 01: Introduction and Reservoir

- Introduction to the Geology of CCS
- CCS versus Hydrocarbon Exploration and Production
- CO₂ Behavior in the Subsurface
- Project Summary: The Sleipner example
- Reservoir Geology for Storage Resources
- Virtual 3D Reservoir Outcrop Analogue and Core Viewing
- Reservoir and the Joule Thomson effect
- Reservoir Heterogeneity, Drainage and Trapping

Session 02: Sealing, Exploration, and Evaluation

- Exploring for Carbon Storage Sites
- Project Summary: The In Salah example
- Sealing Mechanisms
- Capillarity Theory for CCS
- Types of Sealing Rock and Containment Risk
- Virtual 3D Seal Outcrop Analogue
- Evaluation of Carbon Storage Opportunities
- Storage Resource Management System

Session 03: Faulting and Value Drivers

- Project Summary: The Snøhvit example
- Fault Geology
- Fault Seal Prediction
- Virtual 3D Fault Outcrop Analogue
- CCS Value Drivers
- Lessons Learnt from Real CO₂ Storage Projects
- Carbon Storage in Practice