Lessons Learned from Carbon Capture and Storage Projects to Date (G577)

Tutor(s)

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Overview

This course is designed to provide information vital to anyone involved with CCS project design. It will provide an introduction to CCS design with a focus on sharing lessons learned from CCS projects in design and operation today. Technical analysis, useful references and practical solutions will be provided.

Duration and Logistics

A 1-day in-person classroom course. An electronic copy of the manual will be provided by the tutor at the end of the course.

Level and Audience

Advanced. This course is suitable for all management and technical staff engaged in carbon capture and storage design and operations. It will provide clear, actionable, technical information that will be immediately applicable to CCS project design.

Objectives

You will learn to:

1. Understand the key elements in the CCS chain, from capture to disposal.
2. Understand the unique challenges faced by CCS, and how these are different from oil and gas, CO2-EOR and midstream projects, with primary reference to project experience and lessons learned.
3. Apply fundamentals of CO2 design, including thermodynamics, chemical reactions, carbon capture, dehydration and compositional control.
4. Understand the risk to CCS pipeline and well integrity due to corrosion, with primary reference to project experience and lessons learned.
5. Review the behavior of CO2 and challenges associated with very low temperatures during operation, with primary reference to project experience and lessons learned.
6. Understand the challenges related to design in order to manage planned and unplanned CO2 releases to atmosphere from CCS projects, with primary reference to project experience and lessons learned.
7. Review the key commercial drivers and risks for CCS that inform design, and understand how these are managed, with primary reference to project experience and lessons learned.
8. Review lessons learned from application of project management and organizational processes to CCS deliver teams, in order to understand how best to deliver CCS project design and execution.

Course Content

Session 1: The global CCS industry in the context of global climate change

- Climate change (for engineers)
- Global decarbonization: progress so far
- The CCS value chain
- CCS and energy transition: future outlook
- Global CCS experience and summary of lessons learned

Session 2: CCS fundamentals

- The full chain, from capture to storage
- DAC and CO2 utilization
- The CCS industrial hub
- Case study: Porthos CCS
- Case study: Baton Rouge corridor CCS
- Energy transition: how CCS enables green energy
- CO2 transport by ship and road tanker
- Case study: Northern Lights CCS
- Case study: Greensand CCS

Session 3: Integrity risks for CCS projects

- Technical need-to-knows (aka the fun bit): thermodynamics, hydraulics, physical behavior and chemical reactions, etc.
- Corrosion risk on CCS projects
- Case study: Gorgon LNG CCS
- Case study: Aramis CCS
- Low temperatures on CCS projects
- Case study: DeepC CCS
- Case study: HyNet CCS
- CO2 venting and unplanned releases
- Case study: venting an onshore CO2 pipeline and injection wells
- Case study: historical CO2 releases and other incidents

Session 4: Lessons learned: how to deliver a good CCS project

- Commercial drivers: opportunities and challenges
- Case study: Quest CCS
- Risk management
- Emerging technologies
- The CCS industry in 2050