EC003: Fundamentals of CCS

Format and Duration
Self-Paced - 5 Hours

Summary

This course provides participants with awareness and understanding of the subsurface needs of CCS projects. It will establish basics such as how much CCS is needed to make a difference to global warming and explore what types of CO2 injection have already happened including dedicated long-term CCS projects, pilot projects and CO2-enhanced oil recovery projects.

Learning Outcomes

Participants will learn to:

1. Understand the role of CCS in CO2 emissions-reductions.
2. Develop awareness of the role of geoscience and reservoir engineering in CCS.
3. Understand CO2 as a fluid in the subsurface and how it differs from oil, gas and water.

Training Method

This is a self-paced e-learning course. Learning materials are structured into short sections, each including interactive text and image content, animations, video, and audio. An end of course quiz is scored to provide the learner with their learning progress. Approximately 5 hours learning time.

Who Should Attend

This course is designed for scientists and engineers working in the energy industry and provides a foundation in key aspects of carbon capture and storage. It forms part of a foundation programme of 4 courses: Fundamentals of CCS (EC003), Geological Storage of CO2 (EC004), Behaviour of CO2 in Reservoirs (EC005) and Monitoring CO2 Storage (EC006).

Course Content

CO2 in the atmosphere and options to cut CO2 emissions

This module outlines the history of greenhouse gases, explores CO2 emissions and how CO2 emissions can be cut. Learning outcomes include; an understanding why we need to reduce the CO2 in the Earth's atmosphere, a realisation of the time scales we need to work to cut greenhouse gas emissions, an appreciation of where the emitted CO2 derives from, and finally you will develop an understanding of where carbon capture and storage fits into the range of strategies that are being adopted to cut greenhouse gas emissions.

Geological CCS, CCS as mitigation strategy

This module outlines geological storage options for CO2 and CCS as a mitigation strategy. Learning outcomes include understanding the main geological options for CCS, develop an appreciate the objectives of geological (and engineering) activities required during CCS projects. You will also start to develop an appreciation of what CCS projects have been developed so far, how much CO2 is locked away annually now and how much more CO2 must be locked up annually to mitigate global warming and finally appreciate the range of industrial activities that need to engage with CCS and knowledge of some of

the main CCS projects in operation

CO2-EOR and CCS: fate of CO2 in the subsurface

The aim of this module will primarily be to look at CO2 injection projects related to enhanced oil recovery, and the fates of CO2 in the subsurface. You'll focus on what CO2-Enhanced Oil Recovery (EOR) is, what the planned role of CO2 hubs and clusters to facilitate large-scale CCS is and to start to understand the storage capacity for CO2 (in a depleted oil field). The module will also touch on an understanding of what happens to CO2 when it is injected into the subsurface and how CO2 injections rates are unlikely to be constant.

CO2 phase behaviour and properties, CO2 trapping

The aim of this module will be to examine how CO2 occurs in CCS sites and how phase behaviour is associated with pressure, temperature and water salinity. The module will also expand on CO2 characteristics to appreciate what happens to water chemistry at high CO2 pressures in addition to understanding how CO2 becomes trapped in the sub-surface despite its buoyancy compared to water.