SPE IMPROVED OIL RECOVERY CONFERENCE
IOR 2026
Enabling IOR: Proven and Emerging Strategies for Maximizing Recovery

SPE International Mid-Continent Section

Reservoir Engineering for CO2 Utilization and Storage (CCUS) in Saline Aquifers and Depleted Oil Fields

Prof Srikanta Mishra, Texas A&M University

Course objectives

Carbon Capture Utilization and Storage (CCUS) is considered to be a potentially effective technology for the reduction of CO_2 emissions from large stationary sources such as power generation units or chemical processing plants. Widespread adoption of CCUS technology is needed to meet the Paris Agreement's goal of limiting the rise in global temperature to below 2°C. The process of CCUS involves: (a) capturing CO_2 before it is emitted into the atmosphere, (b) compressing and transporting the CO_2 to a geologic storage site, and (c) injecting it into the site for long-term sequestration. The geologic storage site could be a deep saline formation for pure storage, or a depleted oil or gas field for CO_2 enhanced oil recovery (EOR) and associated storage. The subsurface operations part of CCUS also provides a mechanism for CO_2 sources to monetize their emissions through tax credits or emissions trading and/or revenue from incremental oil production due to EOR operations.

The feasibility evaluation of CCUS projects and their performance assessment relies heavily on standard petroleum reservoir engineering principles used for oil and gas reservoir management. This 1-day course will provide a hands-on introduction to various reservoir engineering concepts that are relevant for CO_2 storage in deep saline aquifers as well as CO_2 utilization for EOR in depleted oil fields.

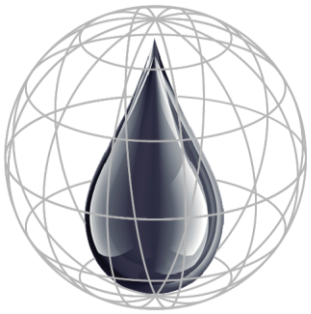
Topics to be Covered

1. Physics of fluid flow in single-phase reservoirs and multi-phase flow conditions
2. Principles of CO_2 storage in saline aquifers including various trapping mechanisms
3. Simple volumetrics based capacity estimates
4. Evaluation of pressure and CO_2 plume migration using simplified models
5. Basics of CO_2-enhanced oil recovery
6. Simple voidage based capacity estimation
7. Assessments of CO_2-EOR projects using analog methods and simplified models
8. Modeling-based performance assessments for CO_2 injection into saline aquifers and CO_2-EOR in depleted oil fields

Course content

Session 1 - Basic concepts (Geological storage primer; single-phase pressure propagation; relative permeability and capillary pressure; two-phase immiscible and miscible displacements)

Session 2 - CO_2 injection in depleted oil fields (CO_2-EOR basics; CO_2-crude oil PVT properties; voidage based capacity estimation; performance assessment with analogs and simplified models)



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Session 3 - CO_2 injection in saline aquifers (saline aquifer characteristics; CO2 properties; capacity estimation; pressure and plume propagation estimation with simplified models)

Session 4 – Role of numerical modeling in performance assessments (CO_2-EOR in depleted oil fields; saline aquifer storage)

Target audience

This course is suitable for professionals in the oil and gas industry looking to broaden their E&P background for decarbonization projects such as CCUS, as well as researchers working in the area of CCUS who may not have a reservoir engineering background.

Instructor Bio

Dr. Srikanta Mishra is Research Professor of Petroleum Engineering at Texas A&M University specializing in Energy Transition and Subsurface Data Analytics, and Honorary Faculty in the Department of Chemical Engineering at Indian Institute of Technology (IIT) Guwahati. He recently retired as Technical Director for Geo-Energy Modeling & Analytics at Battelle Memorial Institute, where he led computational modeling and field data analysis for multiple CO_2 injection projects in saline aquifers and depleted oil fields. He also served as an advisor for World Bank and Asian Development Bank funded CCUS projects in South Africa, Indonesia, China and Mexico. He is a regular instructor of short courses on the foundations of CCUS and hydrogen storage at professional conferences for SPE, AAPG and EAGE, and multiple companies worldwide (e.g., USA, Canada, Australia, Oman, Spain, Portugal). He is a recipient of the IIT(ISM) Dhanbad 2022 Distinguished Alumnus Award for Research and Academic Excellence, the SPE 2022 International Award for Data Science and Engineering Analytics, and the SPE 2021 Distinguished Member award. He was an SPE Global Distinguished Lecturer for 2018-19 on the topic of Big Data Analytics. He is the author of one textbook and ~250 technical publications, and editor of three compiled volumes. He holds a PhD degree from Stanford University, an MS degree from The University of Texas at Austin, and a BTech degree from IIT(ISM) Dhanbad - all in Petroleum Engineering.