# Fundamentals of Gas Storage

## Course Description

This course provides an overview of hydrocarbon and non-hydrocarbon gas storage, including natural gas, LNG, natural gas liquids, LPG, propane, butane, helium and $CO_2$. Participants will learn about the different types of storage facilities (underground and aboveground) and storage requirements. A chapter of CO2 storage, transportation and it use for EOR applications will be developed.

Regional (USA), and gas global supply and demand balances and global trends will be discussed as well as key storage hubs and storage market trends. During this course different underground storage options will be discussed to understand the pros and cons of each storage solution.

The course will be supplemented by practical example problems, case studies analyses, group exercises, and interactive group discussion designed to consolidate and reinforce learning and identify and offer solutions to specific problems associated with gas storage projects.

## Who Should Attend?

This course is designed for professionals with background in reservoir engineering, geology, gas processing and other professionals whom are seeking to gain more knowledge related to gas storage solutions and it operations. The course also appeals to non-technical staff who wish to learn more about gas storage, including support staff, analysts and management in the area of gas supply.

## What You Will Gain:

1. Learn and understand the types of underground and aboveground storage options
2. Understand the strategic importance of storing gas
3. Learn the screening criteria to select reservoir to storage gas
4. Understand the global gas supply and demand projections for the next 20 years and the role of gas storage on it.
5. Identify major risks in gas storage project implementation
6. Estimate average recovery factor for each EOR methods
7. Learn the storage market fundamental
8. Understand the gas storage economics

## Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%)

## Course Content

**Overview of Gas Storage**

- Introduction to Gas Storage Projects
- Why to storage gas?
- What fluids can be storage?
- Type of storage facilities
    - Underground and aboveground facilities
- Basic gas storage terminology

**Petroleum gases**

- Overview of natural gases
    - Natural gas, LNG, LPG, NGL
    - physical properties of petroleum gases

**Types of Underground storage**

- Depleted reservoirs
- Salt caverns
- Aquifers
- Advantages and disadvantages of each method
- Economic considerations

**Types of Above ground storage**

- Storage tanks for Liquefied natural gas (LNG), Liquefied Petroleum Gas (LPG), and Natural Gas Liquids (NGL)

**Risk analysis of gas storage options**

- Risk management of gas storage projects

**Underground Gas Storage Economics**

- Cost of underground facilities
- Capex and Opex
- Transportation cost
- Economic evaluation of gas storage projects
- Markets for natural gas and petroleum gases
    - Marketing of commercial gas storage
    - Gas storage valuation
    - Trading strategies for gas storage