Geothermal Technologies and Well Design (G514)

Tutor(s)

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Overview

This course covers fundamental aspects of geothermal engineering, linking the subsurface to the point of sale (or point of use). It encompasses the main geothermal energy uses, focusing on deep geothermal resources exploitation methods, where wells are required. The course also covers conventional and unconventional geothermal technologies, including closed-loop solutions and hybrid energy development opportunities.

Duration and Logistics

Classroom version: A 2-day course comprising a mix of lectures, case studies and exercises. The manual will be provided in digital format and participants will be required to bring a laptop or tablet computer to follow the lectures and exercises.

Virtual version: Four 3.5-hour interactive online sessions presented over 4 days. A digital manual will be distributed to participants before the course. Some reading is to be completed by participants off-line.

Level and Audience

Advanced. The course is intended for geoscientists wishing to learn the engineering aspects of geothermal project implementation, and oil and gas professionals transitioning towards sustainable energy opportunities.

Objectives

You will learn to:

1. Understand the different way in which a given geothermal energy resource can be exploited, and the associated uses.
2. Describe how open-loop and closed-loop engineering solutions work.
3. Interpret operational aspects of typical geothermal well designs.
4. Identify the uncertainties and risks of different exploitation methods, vis-à-vis resource sustainability over project lifetime.
5. Assess the impact of different well performance and well integrity aspects on ultimate recovery.
6. Discuss and analyse case studies involving different geothermal technologies.

Course Content

Course Details

This course will focus on geothermal resources exploitation methods, where wells are required, covering the following topics:

- Conventional geothermal resources exploitation methods
    - Shallow and deep geothermal resources
    - Conduction vs convection dominated systems
    - Different geothermal energy uses
- Unconventional geothermal resources exploitation methods
    - Closed-loop vs open-loop
    - ‘New generation’ EGS systems
- Examples of deep geothermal well designs
    - Well completions
    - Well performance
    - Well integrity
- Examples of hybrid energy technologies
    - Hydrocarbon wells
    - Mine water
    - CO2-plume geothermal systems