

N665: Natural Hydrogen Exploration

Instructor(s): Dr Jürgen Grötsch

Format and Duration

Classroom - 3 Days

Virtual - 5 Sessions

Summary

In order to change the present-day energy system towards net zero emissions, alternative energy resources need to be developed replacing wood, coal, oil and gas. One of the recent new findings in the Geo-Energy sector is that hydrogen can be found in many places around the globe as natural seeps, similar to what has been observed for oil and gas since many centuries. Many indications point towards a major clean energy resource of the future considering that in the last few years some 300 natural H₂ seeps have been reported and are exponentially rising. The first H₂ exploration companies have formed and the first wells targeting H₂ have been drilled, including a long-term production test in Nebraska. The objective of this course is to introduce natural hydrogen as a potential future clean energy resource and how to explore for it as it may become the next game changer in the energy industry providing a clean and sustainable solution for part of the global energy demand.

Learning Outcomes

Participants will learn to

1. Understand the role of different ‘colours’ of hydrogen.
2. Have a global overview of current hydrogen production and consumption.
3. Be familiar with hydrogen development projects.
4. Understand the global distribution of natural hydrogen seeps.
5. Understand the concept of hydrogen exploration.
6. Understand the main subsurface uncertainties in hydrogen exploration.
7. Discuss the key challenges and risks of hydrogen exploration and development.
8. Address the role of geoscientists in developing hydrogen as a future energy resource.

Training Method

This is an instructor-led course comprising a mixture of lectures, exercises, case studies, discussions and feedback sessions. The course follows the discover, ask and learn approach. The course can also be provided in person or online as required.

Who Should Attend

This course has been designed for geoscientists and energy professionals who are working on energy transition projects and optimizing the portfolio herein. It is recommended for graduate students, staff from the energy industry, as well as employees of the public sector and from regulators.

Course Content

This course provides an overview on hydrogen as an energy resource and the various ‘colours’ of hydrogen. However, natural (white) hydrogen was until now not considered in the developments around the future energy system. This course highlights the current status of knowledge and latest developments around such a potential new energy opportunity, i.e. natural H₂ exploration and production as part of the

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future energy mix. If further developments turn out to be successful, this could result in another unexpected game changer in the energy sector. similar to the unconventional revolution a few decades back. However, further research and investments in exploration are required to conclusively provide answer on size of the prize and feasibility of development of such a new energy resource.

Topics:

Part 1 – Overview of hydrogen in the global energy system

Part 2 – Introduction to the multiple ‘colours’ of hydrogen

Part 3 – Examples of natural hydrogen seeps

Part 4 – The hydrogen system from source to reservoir

Part 5 – Play-based Exploration and Field Development of natural hydrogen

Part 6 – Outlook on opportunities and risks in hydrogen exploration and development