Contribution ID: **184** Type: **Poster Presentation**

Optimization of operational parameters for geological hydrogen storage in a saline aquifer - Sothern North Sea Case Study

Monday, 30 May 2022 15:10 (1h 10m)

Hydrogen has a critical role in meeting the UK's commitment to achieve net zero emissions by 2050. The transition towards net zero has been estimated to require 250-460TWh of hydrogen, making up 20-35% of the UK's final energy consumption in 2050. To facilitate hydrogen supply at the required scale, subsurface hydrogen storage in porous geological formations is essential. In the context of geological gas storage, a number of favourable structures (i.e., disused hydrocarbon reservoirs and saline aquifers) have been identified and studied in the Southern North Sea basin so far, particularly, as suitable candidates for storage of CO2 or natural gas. These structures are strategically located in close proximity to the UK's east coast main industrial clusters, Humberside and Teesside, where the required infrastructure for hydrogen production and transportation within the energy grid can be achieved.

In this study, a cyclic hydrogen storage scenario is developed in a salt induced dome structure within the Bunter Sandstone Formation of the Bacton Group located in the UK sector of the Southern North Sea. The geological model consists of 603,394 active cells which covers an area of 25 km2. The formation reservoir quality is quite good with high net to gross ratio (>80%), average porosity of 22%, and average permeability of approximately 200 mD, top sealed with multiple thick and laterally extensive impermeable formations. The site for this study is selected based on future considerations such as strategic location, potential storage capacity, and storage integrity. For hydrogen storage studies, the multiphase-multicomponent reservoir simulator Eclipse (Schlumberger) is used to evaluate storage capacity and deliverability, hydrogen injection/production rates, and pressure response at each cycle. A hypothetical scenario for hydrogen storage demand based on actual seasonal energy shortages for domestic heating in the Midlands (central region of England) is used to put the outcomes of the simulations into a real-world perspective. This enables us to select optimised operation parameters for subsurface hydrogen storage in order to meet the possible future hydrogen demands within this region.

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References

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Online

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