Contribution ID: **280** Type: **Oral Presentation**

Pore Storage for Green Hydrogen: A Sensitivity Analysis of Geological Parameters at Ketzin Anticline (Germany)

Tuesday, 14 May 2024 11:25 (15 minutes)

The increasing demand for green hydrogen in Europe, particularly in Germany, requires extensive storage capacities to compensate the imbalance between production and consumption. Although salt caverns are known as safe and reliable medium for large scale hydrogen storage, however, these are geographically limited. Therefore, porous reservoirs - such as saline aquifers and depleted hydrocarbon fields - are suggested as alternative solutions.

This study investigates the preliminary feasibility of underground hydrogen storage in Ketzin, Brandenburg, Germany. The Ketzin site was already used for the storage of town gas, natural gas and CO2 as well in the past decades. The potential hydrogen storage unit is the Stuttgart formation, which exhibits fluvial facies characterized by channel and floodplain elements. In this study, we consider a homogenous model for a sensitivity analysis, where porosity, permeability, capillary pressure, relative permeability, hydrodynamic dispersivity as well as salinity of the brine are investigated within their known ranges. The effect of geological parameters is analysed with respect to storage performance such as gas injectivity and productivity as well as sustainability derived from long-term injectivity and productivity.

The results from the sensitivity study reveal that changes in capillary pressure and permeability exhibit the most significant influence on productivity, with variations of up to 150% observed in both positive and negative directions. The sustainability, on the other hand, is significantly negatively influenced by low porosity, low permeability as well as high dispersivity by up to 80 %. However, the results of the high salinity of the water solution have the most positive influence on this index.

The analysis not only holds significant importance in advancing fundamental knowledge on the storage of hydrogen in porous reservoirs and its influencing parameters. It also provides a solid starting point for the systematic evaluation of the feasibility of a prospective regional hydrogen demonstrator. Future work will be carried out with a more complex model including the lithological heterogeneity and focus on the optimization of the operating parameters like the duration of cushion gas injection and storage cycles as well as the injectivity and productivity.

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

Country

Germany

References

Conference Proceedings

I am interested in having my paper published in the proceedings.

Primary author: DÖPP, Lea (GFZ German Research Centre of Geosciences)

Co-authors: Dr ECKEL, Anna-Maria (GFZ German Research Centre of Geosciences); Dr FARKAS, Márton Pál (GFZ German Research Centre of Geosciences); Dr SCHMIDT-HATTENBERGER, Cornelia (GFZ German Research Centre of Geosciences); Prof. SASS, Ingo (GFZ German Research Centre of Geosciences)

Presenter: DÖPP, Lea (GFZ German Research Centre of Geosciences)

Session Classification: MS01

Track Classification: (MS01) Porous Media for a Green World: Energy & Climate