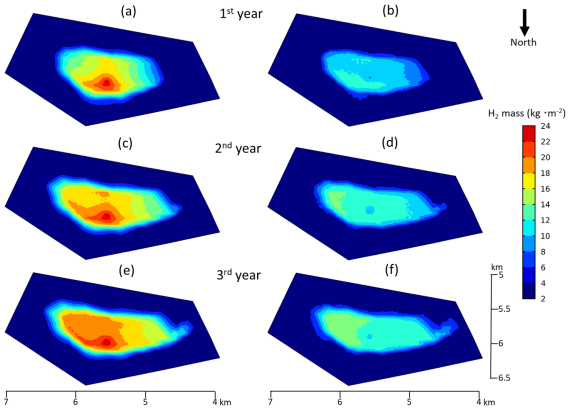
Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16852

Seasonal underground storage of green hydrogen: feasibility study in a saline aquifer.

ALVARO M. SAINZ GARCIA[1,2], FIDEL GRANDIA[3] AND ELENA ABARCA[4]

[1]Amphos21 Consulting S.L.
[2]Université Toulouse III - Paul Sabatie
[3]Amphos21
[4]Amphos 21 Consulting S.L.

Presenting Author: alvaro.sainz@amphos21.com



Green hydrogen, a fuel produced from renewable energy sources such as wind and solar power, is increasingly important in the global energy transition due to its potential to decarbonize various applications. However, its intermittent production presents a challenge for matching energy supply with demand. One solution is to store excess hydrogen in large-scale underground storage facilities.

This study [1] examines the feasibility of storing hydrogen in a saline aquifer located in the Castilla-León region of northern Spain. Using a 3D multiphase numerical model, different extraction well configurations were tested over three annual injection-production cycles. The results demonstrate that underground hydrogen storage in saline aquifers can be operated with reasonable recovery ratios, with a maximum hydrogen recovery ratio of 78% and a global energy efficiency of 30%. One major risk in this type of storage is hydrogen upconing, but this can be minimized by using shallow extraction wells. The efficiency of hydrogen storage is also influenced by geological structures, with steeply dipping formations providing optimal conditions. Overall, the study suggests that underground hydrogen storage in saline aquifers could be a feasible option for seasonal energy storage.

[1] A. Sainz-Garcia, E. Abarca, V. Rubi, F. Grandia, Assessment of feasible strategies for seasonal underground hydrogen storage in a saline aquifer, International Journal of Hydrogen Energy, Volume 42, Issue 26, 2017, https://doi.org/10.1016/j.ijhydene.2017.05.076