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**Technical
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Paper**



Hystories Project – Hydrogen Storage in European Subsurface: main project outcomes and applications for the underground storage industry

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Abstract

The Hystories project (www.hystories.eu) explored Underground Hydrogen Storage (UHS) potential in Europe and gathered geological data from 23 countries. The project was funded by the European Union via the Clean Hydrogen Partnership from 2021 to 2023, bringing together 24 companies, universities and research institutes from across Europe.

The Hystories project aimed to advance understanding of the technical aspects of UHS to support development in Europe. The project identified potential underground hydrogen storage sites in porous media and estimated their total hydrogen storage capacity at 6,850 TWh (19,000 TWh including offshore sites) in the EU and neighbouring countries, to be compared with the already published technical capacity of 13 800 TWh in onshore salt deposits (or 64 400 TWh including offshore sites). A risk analysis method associated with microbial activity in future underground hydrogen storages was proposed covering both salt cavern and porous media H₂ storage. A dozen common steel grades for storage wells were tested for their durability when exposed to hydrogen, and recommendations were issued on the type of steel to be used in transport and storage projects.

The Hystories project also provided technoeconomic assessments to support planning for deployment of UHS in Europe. The project proposed parametric and hydrogen-specific cost models of typified storage site developments (salt cavern and porous media) and proposed reference environmental footprint assessments over the life cycle of a plant. Through an economic optimization of the cost of the future European energy system, optimal hydrogen storage cycles and storage capacity demand per country for either salt cavern and porous media were assessed. A high-level estimation was produced for the cost of developing salt domes, 18 bedded salt deposits, and 800+ porous media traps throughout Europe.

Key words: Hydrogen storage, salt caverns, aquifers, depleted fields