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HyPSTER:

1st Demonstrator for Green Hydrogen Storage in France

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HYPSTER: 1st DEMONSTRATOR FOR GREEN HYDROGEN STORAGE IN FRANCE

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Abstract

France is committed to an energy transition policy to build a decarbonized and competitive economy by developing renewable energies. This policy will involve the short and medium-term need for energy storage due to the intermittent nature of these energy sources. Green Hydrogen, which can be obtained through water electrolysis, is a non-polluting energy carrier with the advantage of being easily stored in varying quantities. Aware of the future needs for energy storage, various actors, both industrial and academic, working in the field of Hydrogen and/or Underground Gas Storage have come together around a project led by Storengy to create a demonstrator for Underground Hydrogen Storage in a salt cavern in France, HYPSTER project.

The project started in 2021 with engineering studies for the subsurface part (completion equipment and wellhead) and surface equipment: PEM electrolyzer 1 MW, a compressor for a pressure of 350 bars (5000 psi), and a truck filling station for the surface part. These installations will allow the production of 400 kg (900 lb) of Hydrogen per day.

The project is ongoing. Workover operations were carried out, and some Nitrogen was injected into the EZ53 well. The next steps are: MIT tests with Nitrogen, then with Hydrogen, and operational Cycling test (100 injection-withdrawal cycles). The Cycling test will be carried out with 2 tons of Hydrogen injected in the annulus between the inner completion and the debrining pipe and stored in the upper part of the salt cavern.

At a second stage, in industrial operation, the working Hydrogen should reach nearly 44 tons with a total capacity of 80 tons.

The risk assessment surrounding Underground Hydrogen Storage (UHS) in a salt cavern demonstrates the safety and low environmental impact of this technology, which is necessary for administrative authorization and public acceptance. This article summarizes the work carried out since January 2021, including key results on studies conducted by various project partners and the initial operations of the first French demonstrator for Underground Hydrogen Storage in a salt cavern.

Key words: Hydrogen, UHS design, salt cavern operations, MIT, safety, microbiological impact.