

## **Hydrogen Pilot Cavern Krummhörn - Demonstration of a Hydrogen Storage Solution**

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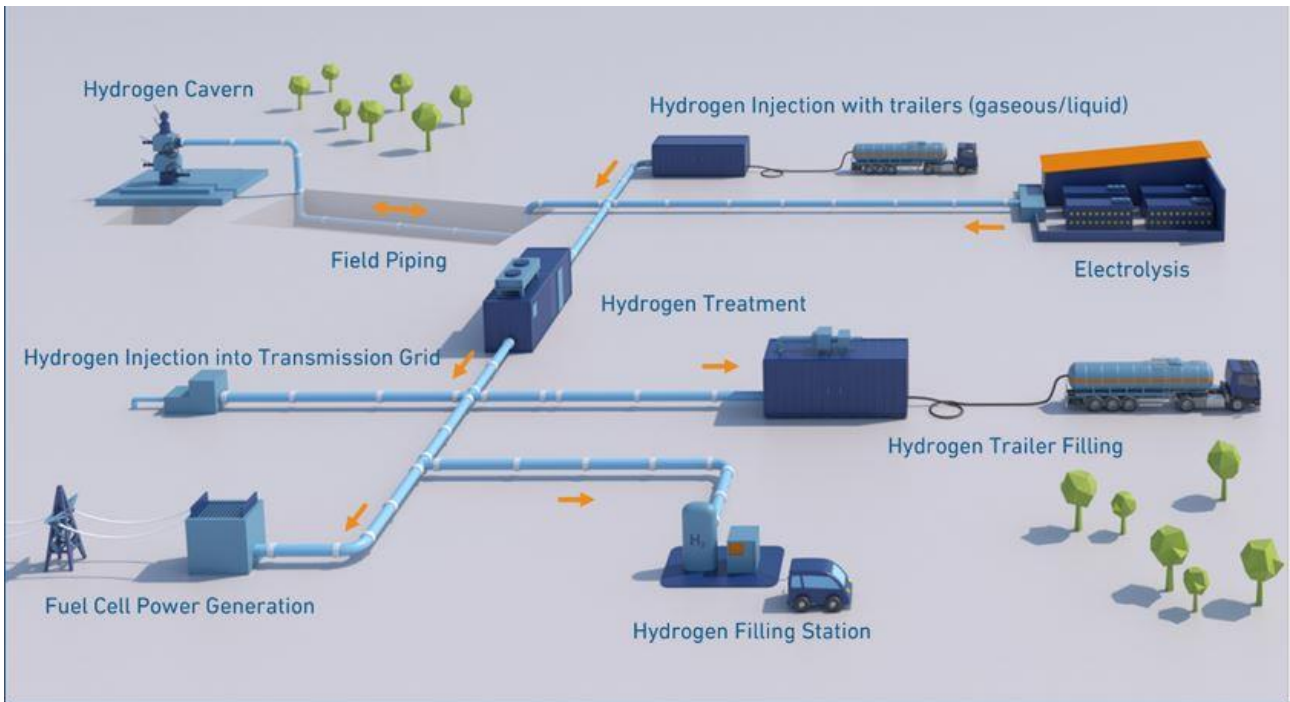
The growing share of renewable energies in the energy mix will require the storage of large amounts of energy in the future. As a consequence, large-volume storage of hydrogen is becoming an essential element of the energy transition and for the development of a hydrogen economy in Germany.

In order to investigate and develop this new storage technology Uniper Energy Storage GmbH (Uniper) aims to construct and operate a 100% hydrogen storage facility under realistic conditions. For this purpose, Uniper is using their salt cavern storage facility in Krummhörn in northern Germany where a test cavern with a geometric volume of about 3,000 m<sup>3</sup> will be constructed by leaching an existing well.

During the test operation at the Krummhörn cavern and well, equipment, related materials and elastomers will be tested for hydrogen compatibility and analyzed in order to gather experience regarding the application of this new storage technology.

Before starting the construction of the pilot cavern, the existing well installation components were investigated in various laboratory tests to determine their general suitability for hydrogen storage operation. Further phases of subsurface construction are the nitrogen/hydrogen tightness test, solution mining of the test cavern, installation of the subsurface completion equipment and the initial H<sub>2</sub> filling. Subsequently, an approx. two years long test phase will be performed to investigate major aspects of H<sub>2</sub> storage operations. The concept for the implementation of the subsurface scope was developed together with DEEP.KBB GmbH.

Since the entire process chain is intended to be investigated in real operation a hydrogen test facility will be built on the site of the former Krummhörn natural gas storage facility. The aim is to research the operational and safety-related differences to natural gas and to gain insights for the development of a large-scale hydrogen storage facility.



Hydrogen Test Facility

The hydrogen test facility will be connected to the test cavern via an existing natural gas pipeline. The hydrogen is supplied via an electrolyser or a trailer connection panel and compressed by an H<sub>2</sub> compressor before being stored in the cavern. After withdrawal the hydrogen is processed in a treatment plant and dried by using adsorption and absorption technologies.

Hence, in the pilot project, the construction, operation and further use of hydrogen storage are to be investigated in a holistic approach in order to be able to transfer the findings to large scale cavern storage facilities and to develop a storage solution for green hydrogen. The aim of this paper is to present the material investigations, executed procedures and project steps of the hydrogen pilot project at Uniper's cavern site in Krummhörn.