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679 Plank Road
Clifton Park, NY 12065, USA

Telephone: +1 518-579-6587
www.solutionmining.org

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Sebastian Boor, Uniper Energy Storage GmbH, Düsseldorf, Germany

Martin Strzeja, Uniper Energy Storage GmbH, Düsseldorf, Germany

Jürgen Kepplinger, DEEP.KBB GmbH, Hannover, Germany

Nikolaus Weber, DEEP.KBB GmbH, Hannover, Germany

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Sebastian Boor¹, Martin Strzeja¹, Jürgen Kepplinger², Nikolaus Weber²

¹ Uniper Energy Storage GmbH, Franziusstr. 12, 40219 Düsseldorf, Germany

² DEEP.KBB GmbH, Baumschulenallee 16, 30625 Hannover, Germany

Abstract

In Uniper's Hydrogen Pilot Cavern (HPC) project, the construction, operation and further use of hydrogen are to be investigated in a holistic approach in order to be able to transfer the findings to large-scale cavern storage facilities and develop a storage solution for green hydrogen. This paper describes the material investigations, procedures and project steps that have already been performed in the hydrogen pilot project at Uniper's cavern site in Krummhörn.

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 m³ (about 106,000 ft³) will be constructed by leaching an existing well.

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 milestones and phases of subsurface construction are the nitrogen/hydrogen tightness test, solution mining of the pilot cavern, installation of the subsurface completion equipment and the initial H₂ filling. Subsequently, an approx. two years long test phase will be performed to investigate major aspects of typical H₂ storage operations. The concept for the implementation of the subsurface scope was developed together with DEEP.KBB GmbH (DEEP.KBB).

Key words: salt cavern, hydrogen storage, Uniper, HPC Krummhörn, pilot project