

SOLUTION MINING RESEARCH INSTITUTE

679 Plank Road
Clifton Park, NY 12065, USA

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

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Paper



Technology Readiness Assessment of equipment required to support the development and operation of subsurface hydrogen storage facilities in the UK and Europe

Christopher McMichael

AtkinsRéalis – Glasgow, Scotland

Andy Moffat – AtkinsRéalis, Silvan Hoth – Equinor, Jamie Slingsby - SSE

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Christopher McMichael¹, Andy Moffat¹, Silvan Hoth², Jamie Slingsby³

(1) AtkinsRéalis, (2) Equinor, (3) SSE

Abstract

Nations across the world have committed to legally binding commitments to reduce their carbon emissions to net zero by 2050 (or before). The storage of hydrogen within salt caverns is a fundamental aspect of many countries net zero strategy. With limited deployment of hydrogen storage to date and a requirement for service industries to build capability and capacity to meet these targets it is essential that the industry understands the risk associated with Technical Readiness for this net zero transition and the steps required to expedite these.

Furthermore in some instances governmental funding stipulates a TRL requirement therefore there is a necessity to underpin the status of equipment specific to each project to ensure funding is received. AtkinsRéalis are developing the designs for several new hydrogen storage facilities and as part of these works the technology which is required to develop, complete and operate the salt caverns has been identified and its Technology Readiness Level (TRL) assessed against industry recognised TRL frameworks. This paper focuses on the subsurface technology including:

- Tubing and casing
- Cement
- Completion equipment including SSSV and production packers
- Wellhead and Christmas trees
- Intervention equipment including temporary (but essential) equipment such as plugs, work over units etc.

Part of the TRL process is the assessment of the technology against specific project parameters such as flow rates, pressure envelopes and temperatures where these can change the TRL assessment for specific technologies. Within this paper we will:

1. Introduce the basis of Technology Readiness Level and the framework adopted for the assessment.
2. Identify the key subsurface technologies required for hydrogen storage in salt caverns.
3. Systematically identify the TRL status for the subsurface technology required to develop, complete and operate the cavern storage.
4. Discuss technologies which require specific focus from industry.
5. Conclude on the future qualification process which could be adopted and the timescale for execution required to meet net zero target dates.
6. Provide a project case study for context – UK based Aldbrough Hydrogen Storage project.

Key words: Hydrogen, Technology Readiness Level, TRL, Qualification, Hydrogen salt cavern storage.