OPERATE-H2

Optimize Underground Hydrogen Storage

Application Area

Sector: Climate and Energy Transition

Area: Hydrogen

Industry: Hydrogen Storage

Market: Underground Hydrogen Storage

Partnership Opportunities

We are seeking a partner with an interest in providing a test data set for technology demonstration. This capability and application area is available for a:
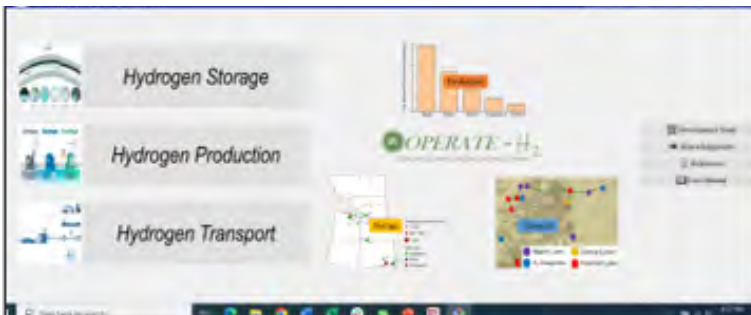
- ☑ Cooperative Agreement
- ☐ Open Source
- ☑ Tech Assistance

Contact

BDPM Name: Marc Witkowski

Email: witk@lanl.gov

Phone: (+1) 505-551-2384

Overview

For the hydrogen economy to be realized by the year 2035, underground hydrogen storage (UHS) in porous rocks, including saline aquifers and depleted gas reservoirs, will be a key mechanism to make hydrogen a cost-competitive energy alternative. Accurate predictions will be imperative to understand how hydrogen will perform long-term in a UHS environment both at injection and extraction.

OPERATE-H2 is a first-of-its-kind risk assessment and optimization toolset for underground hydrogen storage. The tool incorporates accurate physics-based numerical simulations and efficient machine learning models to provide in-depth risk analysis and optimize performance. The OPERATE-H2 analysis can provide real-time predictions to impact project planning, site selection, and monitoring decisions. Proof-of-concept testing is in process.

Specialization/Application Areas

UHS is currently being tested at the pilot scale as the hydrogen demand signals for long-term hydrogen storage are still unknown.

The 2023 announcement of the seven Regional Clean Hydrogen Hubs may provide channels for OPERATE-H2 to be tested in an operational environment. Hydrogen storage is the first module of OPERATE-H2. Hydrogen production and transport are under development to provide a comprehensive toolkit that addresses the full life cycle of hydrogen

NNSA
National Nuclear Security Administration