

# CLEAN RESOURCES

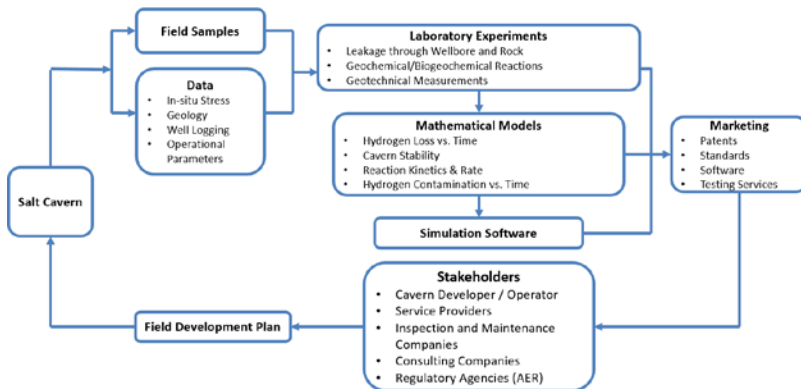
## CLEAN TECHNOLOGY

### HYDROGEN

## FUNDING DETAILS

# Hydrogen Storage in Alberta's Salt Caverns: Risk Assessment, Design Criteria, and Operational Optimization

University of Alberta researchers will collaborate with industry to evaluate and optimize hydrogen storage in salt caverns developed by solution mining in Alberta's salt formations. Alberta government's roadmap and industrial plans for producing blue and green hydrogen will require safe and efficient technologies for large-scale hydrogen storage. Alberta's salt caverns have been historically used to store natural gas, petrochemical products, and waste materials by energy and utility companies. Storing small and reactive hydrogen molecules in such systems with frequent injection and withdrawal cycles introduces significant technical challenges which is the focus of the proposed project.



The proposed process flow diagram to develop laboratory and modelling tools required for design, development, operation, and maintenance of hydrogen caverns.



**RECIPIENT:**  
**University of  
Alberta – Dr. Hassan  
Dehghanpour**



**PARTNERS:**  
**Keyera, Sanjel,  
Cenovus Energy,  
FluidInsight**



**TOTAL BUDGET:**  
**\$1,113,000**



**AI HCOE FUNDING:**  
**\$500,000**



**PROJECT DATES:**  
**MAR 2023 –  
MAR 2025**



**PROJECT TRL:**  
**Start: 3  
End: 7**

## APPLICATION

This project aims at developing and applying the required laboratory setups, testing protocols, and mathematical models to assess and optimize the storage of hydrogen in salt caverns for the first time in Canada.



## PROJECT GOALS

The project involves three main phases:

- 1) field-data collection and analysis
- 2) laboratory experiment, mathematical modelling, and software development
- 3) field implementation

Publication of the laboratory and field results will facilitate the transfer of the knowledge to other companies to be used in different salt formations in Alberta and across Canada.

## BENEFITS TO ALBERTA

- 1) **HQSP Training:** 3 postdoctoral fellows, 4 PhD, and 2 MSc students will be trained to conduct the project tasks. The HQSP will be ready to be hired to be involved in the emerging hydrogen industry, in particular in subsurface hydrogen storage.
- 2) **Investment Attraction:** Salt cavern storage will require \$2.5 billion of direct investment, and \$5 billion of indirect investment related to the purchase and installation of surface equipment (compressors, pipelines, and control systems).
- 3) **New Economic Sectors:** Successful commercialization of the proposed technology will promote the production of hydrogen. This will pave the way for the development of the following new industries in Alberta.



**10 Publications**



**9 Students Trained**



**4 Patents**



**10-20 Project Jobs**



**50-100 Future Jobs**



**New Products/Services**



**2 Spinoff Companies**



**10-20 kt/yr Project GHGs**



**4,000-6,000 kt/yr Future GHGs**

**CURRENT STATUS**

**MAR 2023**

Project agreement executed and project initiated.