ALBERTA INNOVATES

CLEAN RESOURCES

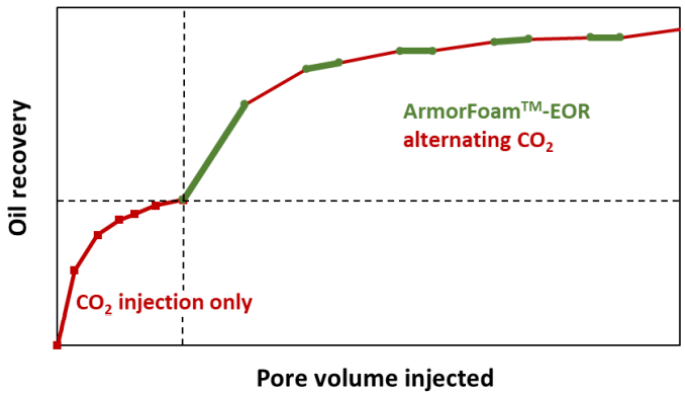
ADVANCED HYDROCARBONS

CLEANER HYDROCARBON PRODUCTION – RECOVERY TECHNOLOGIES

Increased Oil Recovered from CO_2 EOR Project via Innovative Nanoparticle Stabilized Foam

Maximizing underground pore space for CO_2 storage is strategically important for Alberta to meet its net zero emission objectives. Many old reservoirs contain pore space that is occupied by un-recoverable oil and water from primary production methods. CO_2 injection can lead to reservoir "short circuiting" which increases CO_2 recycling of recompression power and associated added emissions.

Cnergreen has developed a nanoparticle stabilized foam "ArmorFoam™" technology to mitigate reservoir fluid short circuiting. This project will establish the baseline CO_2 EOR performance, identify potential short circuits and volumes, assess how ArmorFoam™ performs under laboratory conditions, and associated estimated costs for a potential field trial in 2022.



FUNDING DETAILS

RECIPIENT:
Cnergreen Corporation

PARTNERS:
Enhance Energy Inc.

TOTAL BUDGET:
$780,000

AI FUNDING:
$200,000

PROJECT DATES:
FEB 2022 – AUG 2022

PROJECT TRL:
Start: 6
End: 7

APPLICATION

This project applies ArmorFoam™ to CO_2 EOR, whereby foam is injected into the reservoir and remains viscous and stable in the presence of reservoir oil, water, gas and rock. The foam blocks reservoir short circuits and forces injected CO_2 into new reservoir regions to contact hard-to-reach oil and "sweep" the oil to the production well. ArmorFoam™ can be used in Hydraulic Fracturing well short-circuit prevention, Thermal Heavy Oil recovery, and waterflood sweep enhancement.

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PROJECT GOALS

The project includes:

- Formulating an ArmorFoam™ for Enhance Energy's specific reservoir conditions
- Conducting core floods with the ArmorFoam™ on an Enhance reservoir proxy core to observe the performance and compare to the current industry CO_2 injection and WAG strategy.
- Verifying the fast path volume using field fiber optic and tracer studies.
- Simulating the foam behavior in the reservoir "fast path" and estimating the foam volume required to block the short circuits to release more oil and open new pore space.

BENEFITS TO ALBERTA

- Increased royalties from additional EOR barrels produced with a secondary benefit of additional CO_2 storage.
- The commercial employment benefit will be staff for operating the well injection equipment during the ArmorFoam™ injection and manufacturing the ArmorFoam™ locally.
- The project benefit will be hiring lab staff at the University of Calgary to conduct the lab experiments and the field staff for the field studies at Enhance Energy's Clive facility.

4 Publications

3 Project Jobs

CURRENT STATUS

APR 2022

Identified 6 horizontal injection and 4 horizontal production wells with appropriate infrastructure facilities to pilot tracer study. Field implemented water and gas soluble tracers and monitored tracer profiles to determine reservoir injectivity conformance patterns. Using tracer data, constructed a regional reservoir volume proxy map and acquired DTS data to further illustrate reservoir injection performance along the well lateral. This data will be used to estimate ArmorFoam™ volumes required to address "fast paths" streaks.