



DIRECT CONTACT STEAM GENERATION (DCSG)

Corporate and DCSG Technology Overview

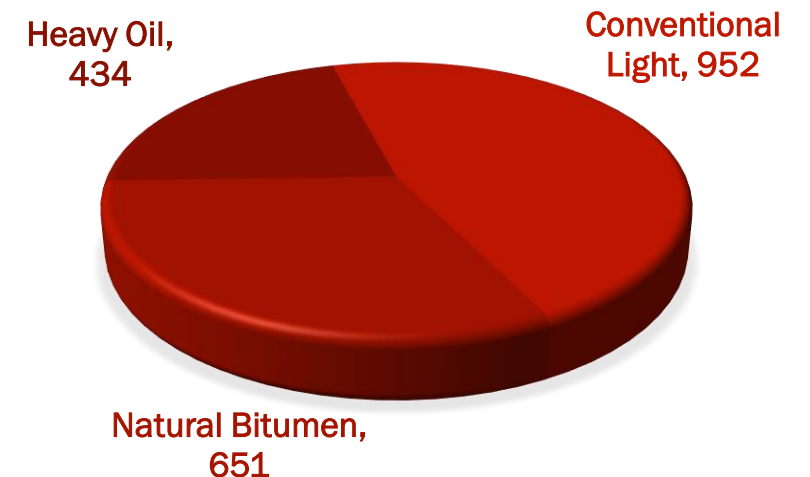
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CONVENTIONAL THERMAL OIL RECOVERY CHALLENGES

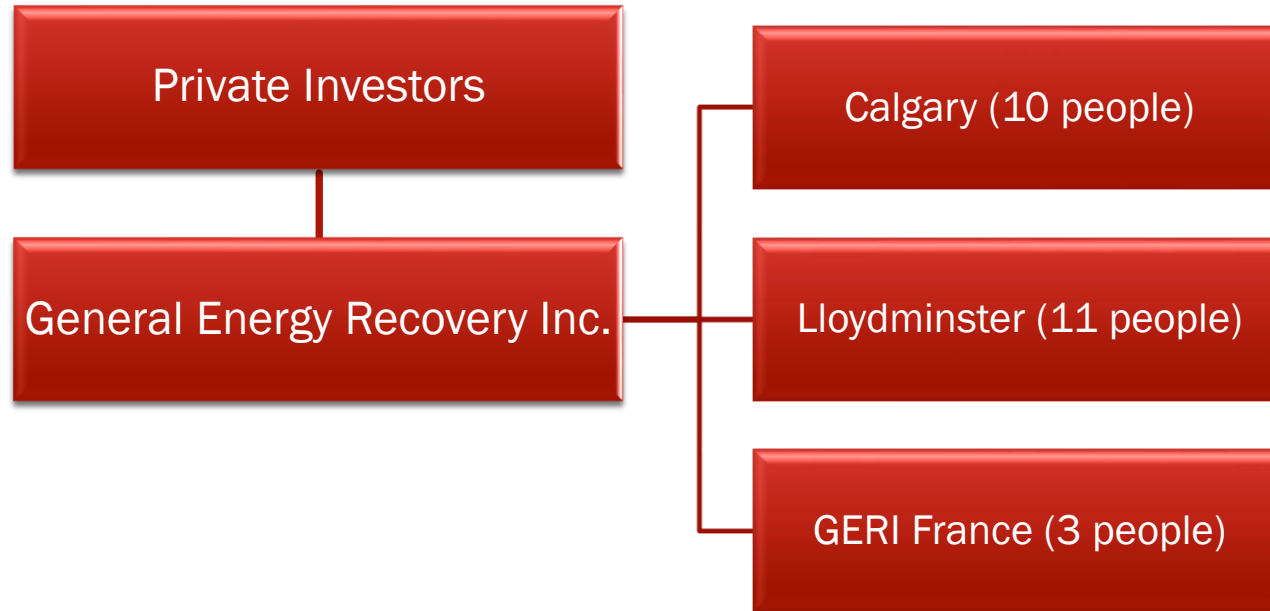
- Larger heavy oil pool size (> 50 MM barrels OOIP) required to meet economics
- 5-10 years pre-planning in order to optimize steam plant & production
- Pressure on producers to reduce GHG's and SOR's to meet stakeholder and legislative expectations
- Need to use less fresh water and more recycled water
- Significant up-front capital investment in large permanent facilities
- Large energy losses at steam plant, pipeline transmission, & wellbore

Small pools not developed and significant oil not recovered

OIL RESERVES (BBO)



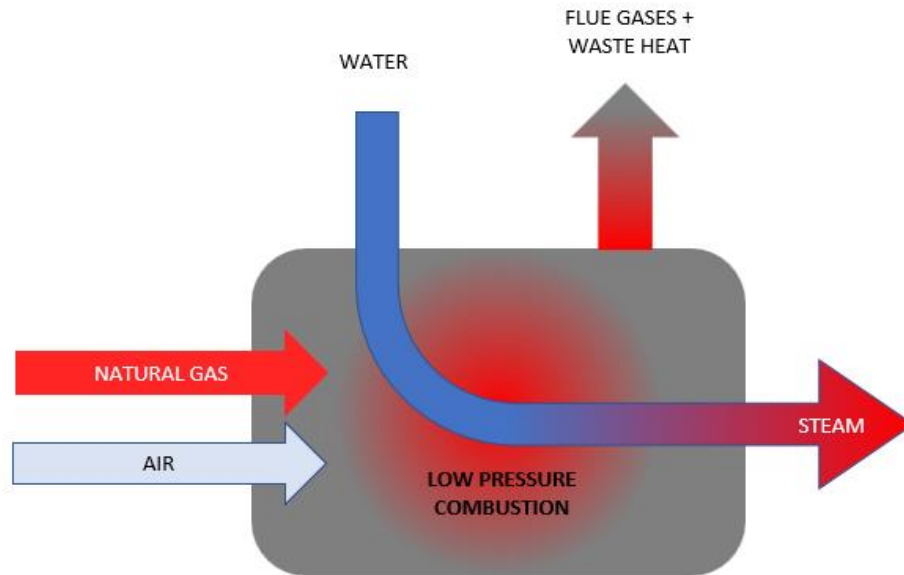
GERI - WHO WE ARE



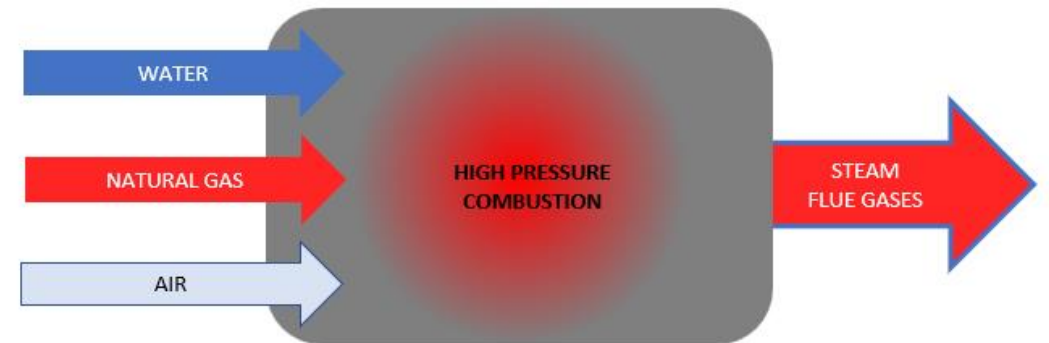
GERI IS A SERVICE COMPANY THAT HAS DEVELOPED A NOVEL MEANS OF EFFICIENTLY DELIVERING PORTABLE STEAM TO THE OILFIELD USING DIRECT CONTACT STEAM GENERATION

DIRECT CONTACT STEAM GENERATION

Conventional Steam Generation
Two Closed Loops



Direct Contact Steam Generation
Single Closed Loop



GERI GENERATOR ADVANTAGES

Capital Efficient

- Lower steam generator cost (< 10% of OTSG equivalent cost)
- No need for expensive Steam Plant, reduction in CPF size and surface steam pipelines
- No need for standard thermal wellbore design

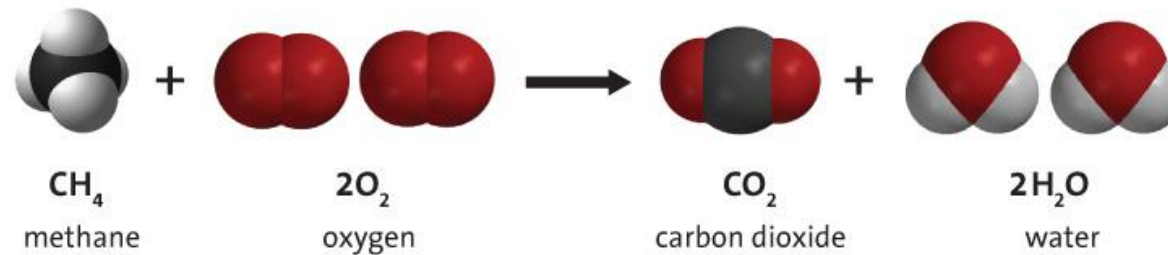
Portability

- Generator and surface equipment are compact and mobile. Currently only 4-5 days required to mobilize and setup on site. Minimal surface impact (fits on standard-size lease)
- After steaming, no stranded assets left on site

Greater Energy Efficiency (Better Targeted Steam)

- 100% of the steam/effluent energy is directed into the reservoir
- Steam Oil Ratio (SOR) is 75% lower than that of conventional OTSG, with values of 0.58 observed from the Dulwich pilot

GERI SOLUTION: DIRECT CONTACT STEAM GENERATOR



How DCSG Works

- Regulated amounts of air, water and natural gas are injected into a high pressure environment and the heat generated from combustion is turned to Steam, Carbon Dioxide, with Nitrogen passing through with the entirety directed at the wellbore.
- The benefits are:
 - Reduction in oil viscosity through thermal heating (steam)
 - Re-pressurization of reservoirs through Nitrogen and Carbon Dioxide Injection
 - Carbon Dioxide sequestering within the reservoir (lower GHG emissions, oil swelling, viscosity reduction)
 - Water is a byproduct of the combustion process, therefore 13% less water is required as compared to a conventional steam generator
 - The system has been successfully tested with 300+ ppm TDS water

GERI GENERATOR CHARACTERISTICS

Power Range

- Successfully Injected from 4 – 8.6 GJ/hr @ up to 7600 kPa (1100 psi)
 - System is designed to operate between 5-16 GJ/hr targeting between 5000-7000 kPa Injection Pressure

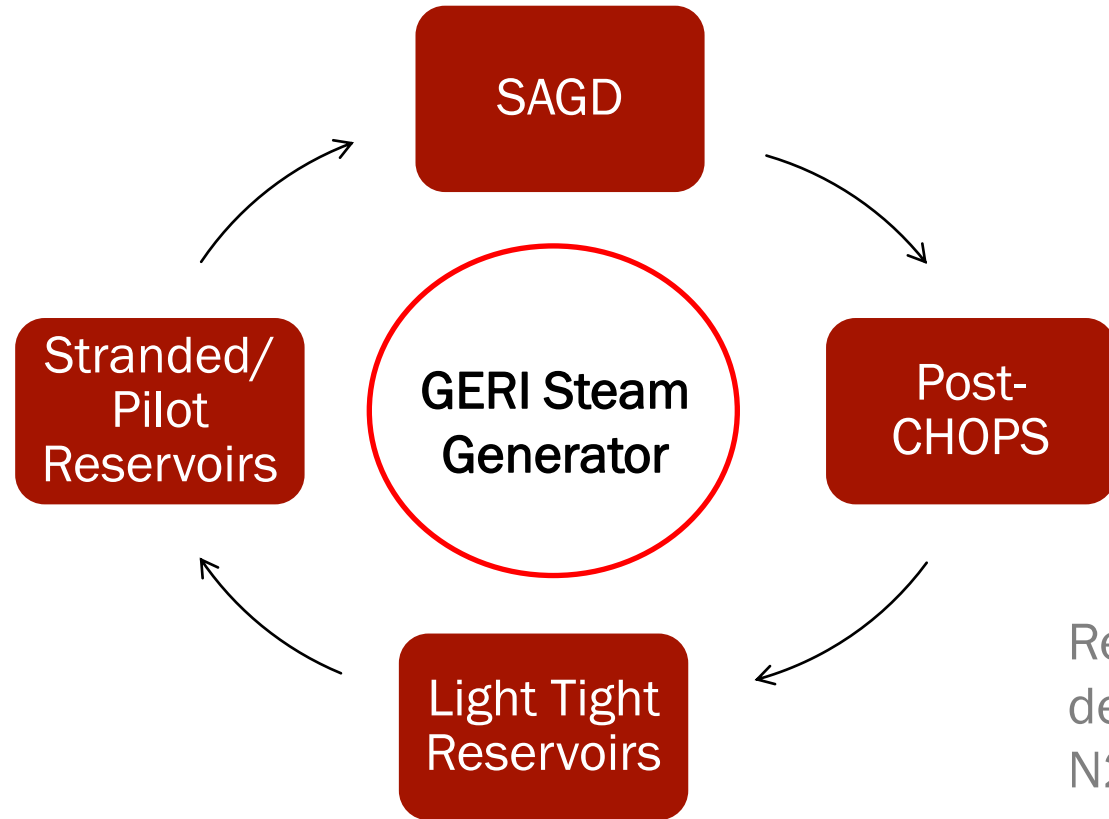
Output

- Steam, CO₂, N₂, and heat output equivalent up to 75 CWE m³/day at 80% steam quality (472 bbls/day)

High combustion efficiency & operational stability

- DCSG has high combustion efficiency and low CO levels.
- DCSG is remarkably tolerant to fluctuating inlet flow conditions.
- Steam Generation process is not sensitive to source inlet temperatures (air, fuel, water)

GERI STEAM GENERATOR APPLICATIONS



Opportunity to extend to other oil applications

GERI's Annular Cooling Technology* allows injection into non-thermal wells

Re-pressurization of depleted reservoirs through N2 and CO2, combustion product injection

*Patent Pending

GERI HISTORY AND DCSG DEVELOPMENT



*Robust design,
validated in the field*

2014
Initial DCSG and
System Design

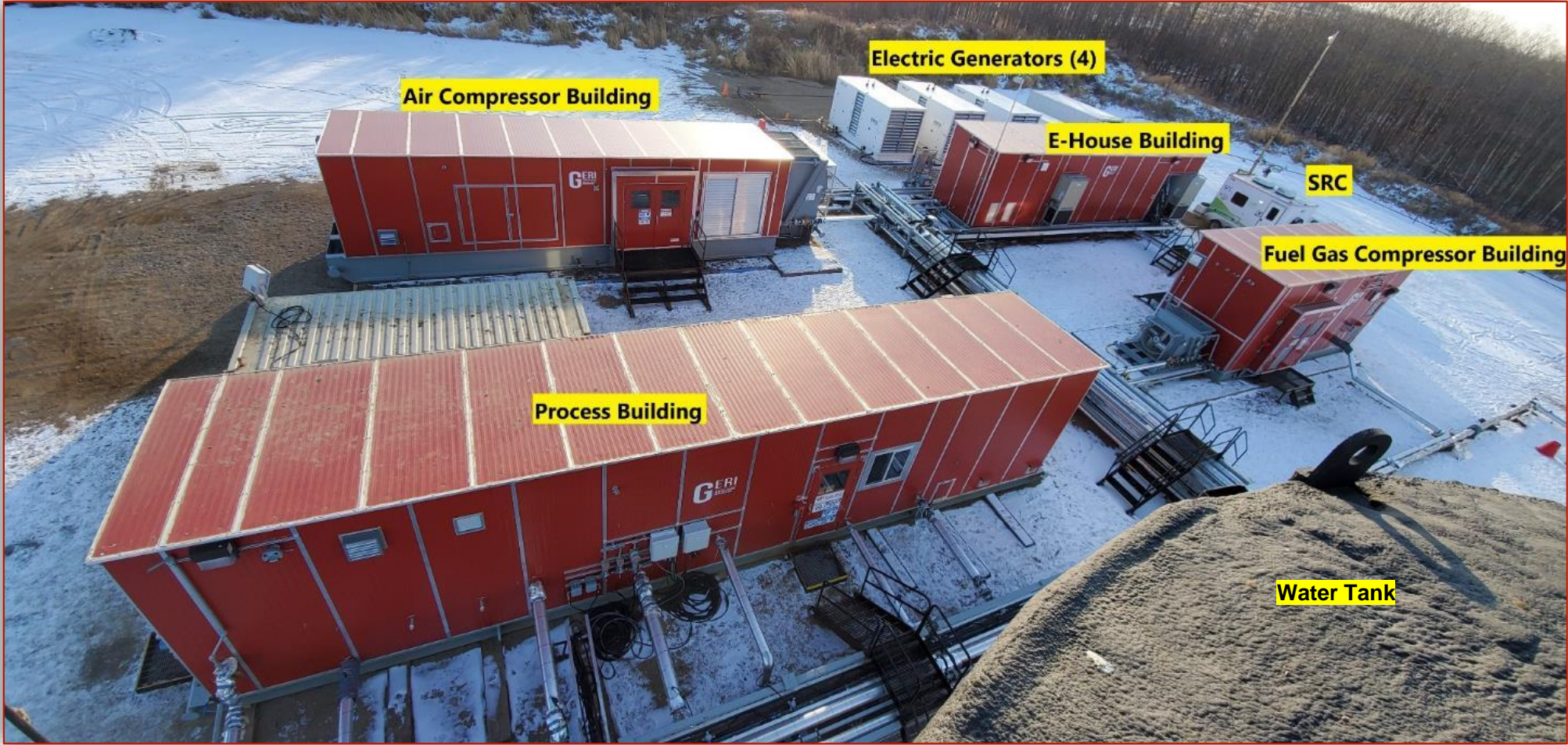
2015
Lab Testing
Early Field Tests

2016 - 2019
Field Testing

2020 - Commercial
Deployment



TYPICAL LEASE LAYOUT



TYPICAL LEASE LAYOUT



GERI's DCSG fits within an existing lease

APPLICATIONS – RESERVOIR/FLUID CHARACTERISTICS

Heavy Oil

- Field tested in Sparky, Waseca, and Lloydminster formations (API range 11 – 16, and oil viscosity range 2000 cp – 25,600 cp)

Intermediate Oil

- Very tight rock with low permeability (<50 md)
- Horizontal wells with hydraulic fracture completions
- Oil API of 20, viscosity < 250 cp
- Numerical simulation confirmed

GERI – PERFORMANCE TO DATE

GERI owned Dulwich 5-20-49-27W3 well

- 2 cycles @ 4.5 GJ/hr for 20 days/cycle
 - Average injection pressure ~ 5600 kPa
 - Steam Quality 65%

Client One test (Mervin area, Sask)

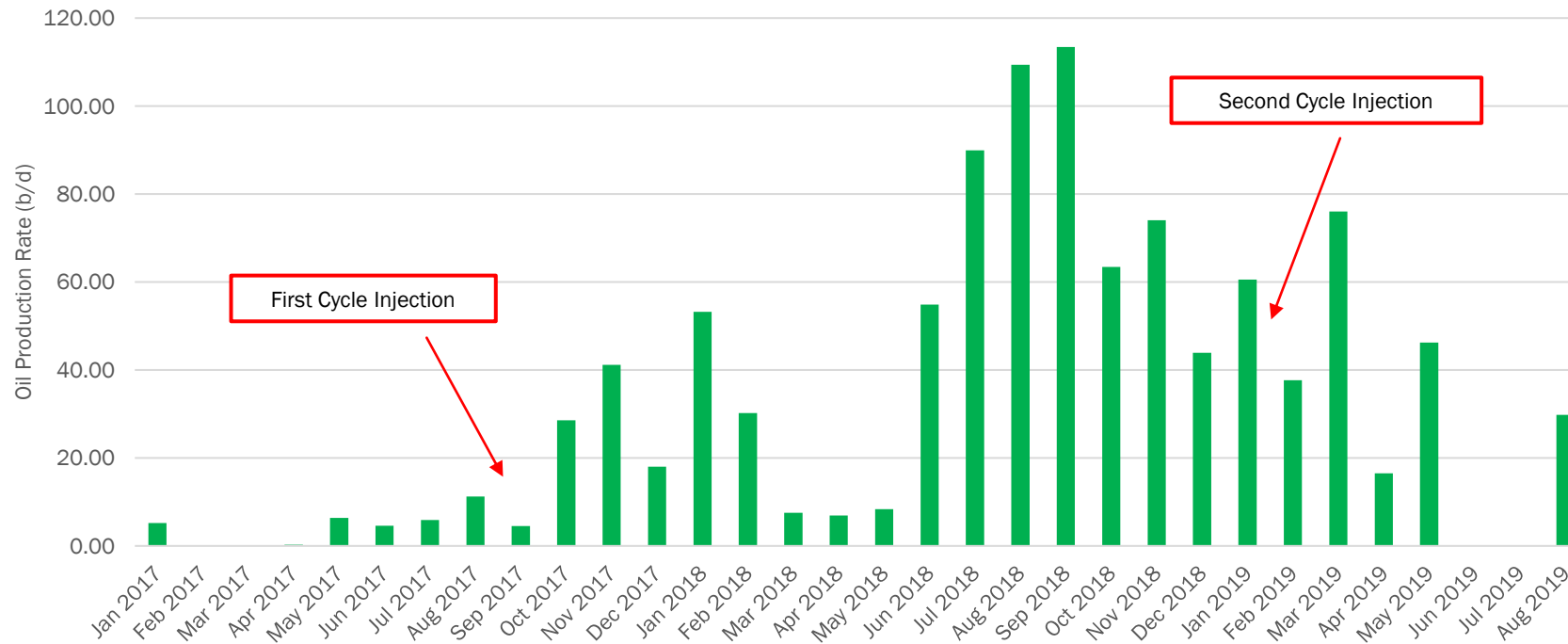
- 1 cycle @ 6.5 GJ/hr for 20 days
 - Average injection pressure ~ 5600 kPa
 - Steam Quality 65%

Client Two test (Morgan area, Alberta)

- 1 cycle @ 8.6 GJ/hr for 18 days
 - Average injection pressure ~ 5000 kPa
 - Steam Quality 72-84%

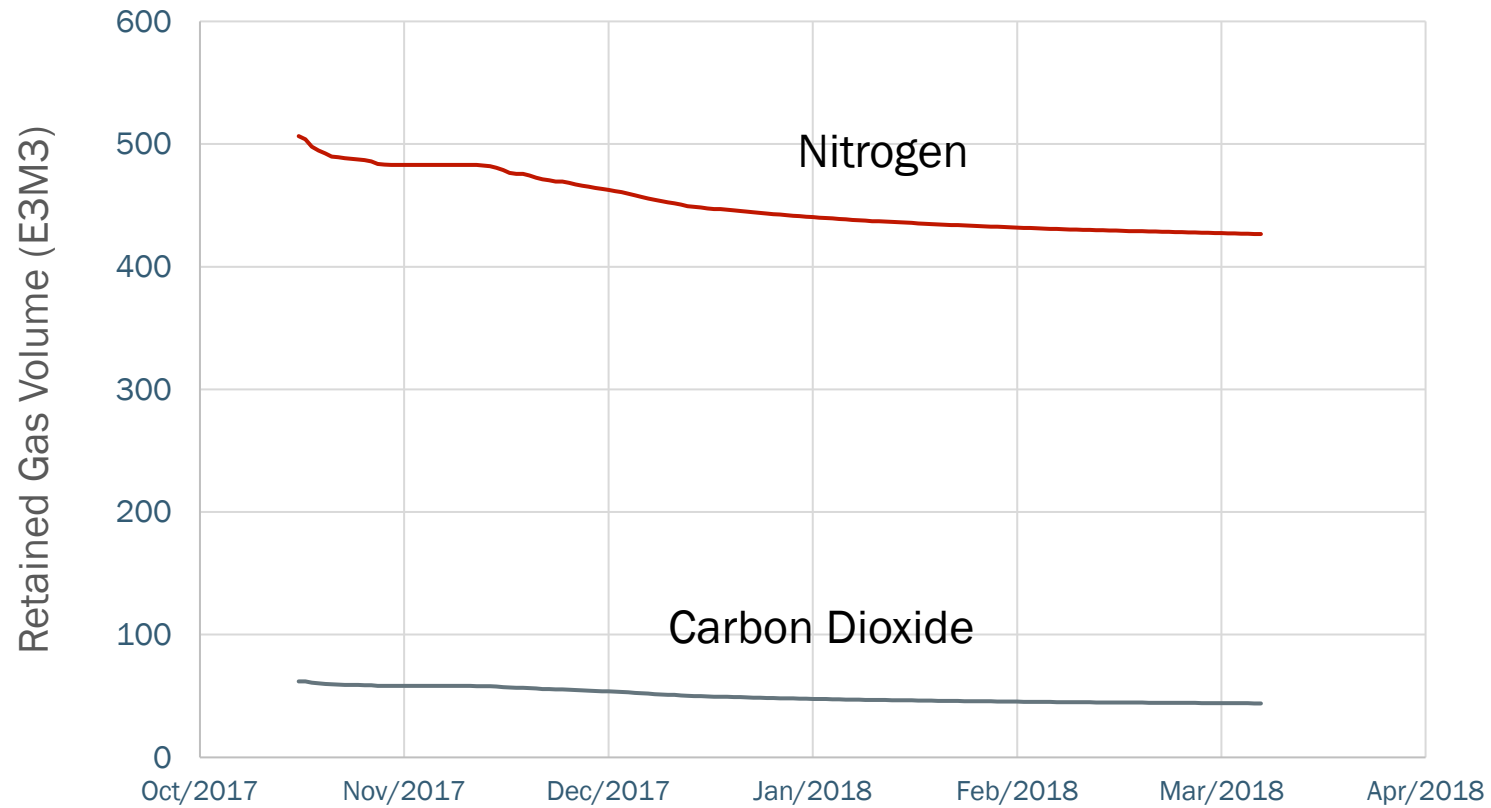
DULWICH WELL PRODUCTION RESULTS

Test Well & Offset Wells Performance



- Total of 18,000 bbls of incremental oil production from two cycles
- Cum SOR of 0.5 for the project (0.58 as independently verified by SRC)

DULWICH WELL – FIRST CYCLE GAS RETENTION / SEQUESTERING



70% of the CO₂ has been sequestered

VALUE PROPOSITION

Increasing Reserves and Profitability

- Portability, cost and efficiencies allow deployment in oil fields previously considered uneconomic to develop using conventional steaming; allows field trials in unconventional applications
- More applications means higher recovery of OOIP, increased reserves
- Process is capable of wide range of injection pressures (3000 – 7600 kPa)

Emissions Reduction

- Reduced carbon footprint and emissions - Partial greenhouse gas (CO₂) sequestration (up to 70%)
- No NO_x emissions
- Less thermal energy used per barrel of oil produced
- No additional surface footprint required

Reducing Water Consumption

- Tolerates some TDS water (300+ ppm TDS tested)
- Uses less water because of lower steam/oil ratio (0.58 vs 2-3)
- Combustion process adds 13% “free” steam (water of combustion)

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