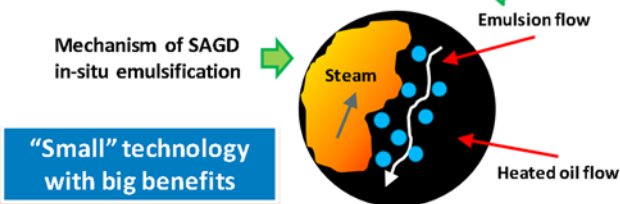
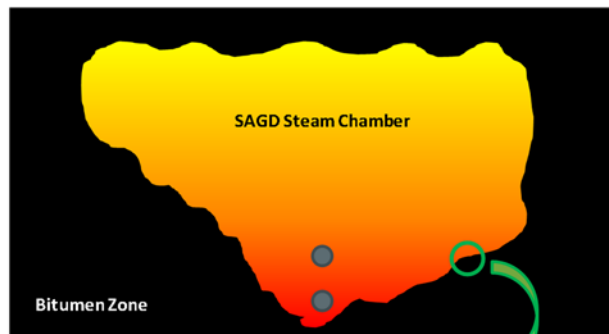


Surmont Steam Additives Pilot

Steam additives, specifically surfactants, have the potential to improve the performance of SAGD operations by increasing oil drainage rates while reducing energy losses. This results in improved thermal efficiency, reduced GHG emissions intensity, and incremental oil production.

Through STEADi, ConocoPhillips identified a commercially available, low cost, chemical surfactant additive ready for ‘first of kind’ field demonstration, which will be piloted in four SAGD well pairs tied to existing facilities at the Surmont SAGD facility. The proposed pilot will seek to quantify the operational benefits and performance of steam additives and determine commercial operating requirements. Pilot success in addressing remaining uncertainties is expected to advance the technology to Readiness Level 9 by 2023. A commercial path forward for both brown- and green-field applications is expected to result in GHG intensity reductions of at least 10% and 20%+, respectively.



RECIPIENT:
**ConocoPhillips
 Canada**



PARTNERS:
Total E&P Canada



TOTAL BUDGET:
\$18,300,000



AI FUNDING:
**\$2,500,000
 (TIER ERP)**



PROJECT DATES:
**MAR 2021 –
 MAR 2022**



PROJECT TRL:
**Start: 7
 End: 9**

APPLICATION

Pilot success would lead to broader Surmont deployment. This technology could be utilized by all Alberta SAGD projects, existing and proposed for operations, impacting 1.7 to 2.5 trillion barrels of heavy oil resource resulting in environmentally competitive oil production and technical and economic improvement of SAGD operations. In addition, the fundamental physics could allow for testing and potential GHG reductions in other thermal oil extraction operations such as cyclic steam stimulation and steam flooding.



CLEAN RESOURCES

ADVANCED HYDROCARBONS

CLEANER HYDROCARBON PRODUCTION – RECOVERY TECHNOLOGIES

PROJECT GOALS

- Advance the technology to TRL 9
- Confirm operationally the expected GHG intensity reductions (at least 10% brownfield)
 - Confirm laboratory results of reduced viscosity of emulsions formed during SAGD
 - Validate the hypothesis that higher drainage rates result in improved thermal efficiency
 - Confirm the Steam Additives are efficiently transported in the reservoir to the condensation interface
 - Observe and record any unanticipated negative impact to surface facilities and/or additional costs
- Determine the commercial viability of surfactant co-injection in SAGD for both brownfield and greenfield applications
- Identify commercial operating requirements for broader application of the technology

BENEFITS TO ALBERTA

- Reducing GHG intensity by 10% in a brownfield SAGD context, and 20%+ greenfield in a greenfield SAGD context; assuming market adoption rate of 15% by 2030, projected reductions could be 1.5 Mt-CO₂e/year
- Commercializing a solution to enhance standard SAGD operations which has the potential to be combined with other developing high TRL and newly commercial technologies for cumulative GHG intensity reductions of 30-50%
- Improving SAGD efficiency, lowering steam-oil ratio (SOR), reducing produced water, and related water treatment
- Enhancing the market competitiveness of Alberta heavy oil production
- Increasing annual oil revenues contributing to Alberta GDP, corporate taxes, and royalties if deployed on a field level



1 Patent



10 Project Jobs



~650 Future Jobs
5 Years After Project
Completion*



1 New
Product/Service



0 kT/yr Project GHGs
Reduced



3,260 kT/yr Future
GHGs Reduced

CURRENT STATUS

MAY 2021

ConocoPhillips completed facilities construction and commissioning in early March 2021, and all the pilot well pairs began steam additives co-injection in April 2021.