ALBERTA INNOVATES

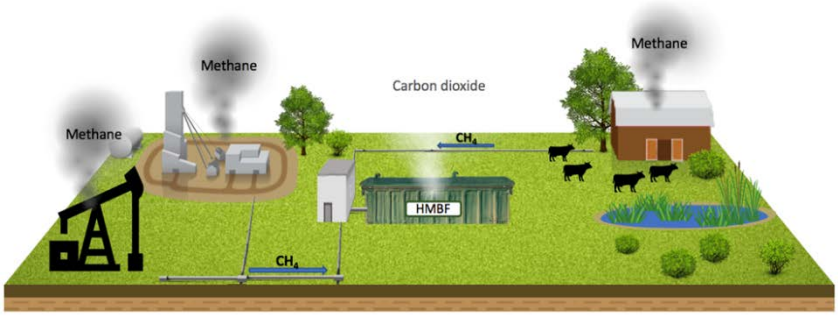
CLEAN RESOURCES

ADVANCED HYDROCARBONS

CLEANER HYDROCARBON PRODUCTION – METHANE EMISSIONS REDUCTION

Deployment of High Rate Methane Biofilters With A Multi Inlet Air Gas Feed System To Control Methane Emissions From Oil industry and Agriculture Sites

This project involves the deployment of high-rate methane-biofilter (MBF) technology to mitigate methane (CH_4) emissions from oil/gas and livestock industry operations in Alberta. The MBF technology involves operation of a granular media filter that supports the optimal growth of methanotrophs, aerobic bacteria capable of oxidizing CH_4 without generating toxic by-products. Over the last two decades we have conducted considerable research to understand the fundamental behaviour of methanotrophs and successfully implemented passively aerated MBFs at several locations in Alberta and British Columbia. The current project involves operation of methane biofilters in actively aerated mode that could achieve much higher CH_4 oxidation efficiencies.



FUNDING DETAILS

RECIPIENT:

University of Calgary – Dr. J.P.A. Hettiaratchi

PARTNERS:

AB Agriculture, Steelhead Petroleum, NAL Resources, Bering Resources

TOTAL BUDGET:

$747,000

AI FUNDING:

$373,000

PROJECT DATES:

Apr 2019 – Mar 2022

PROJECT TRL:

Start: 5
End: 7

APPLICATION

The successful implementation of project activities will result in a commercial-ready product to control Alberta's CH_4-rich waste gas emissions. For example, CH_4 emissions from Alberta's petroleum sector were 31.4 megatonnes of CO_2-eq in 2014. Although some of the gas is currently treated by methods that may produce toxic by-products, the industry is seeking to leverage new environmentally-friendly and cost-effective technologies. HMBFs do not produce harmful by-products, are cost-effective, simple to construct and operate/maintain.

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PROJECT GOALS

- Develop and deploy HMBFs as a cost-effective technology to treat CH_4-rich waste gas (or gas that cannot be recovered economically) associated with the petroleum and livestock sectors.
- The primary objectives are:
  - Conduct experimental studies to identify the most suitable solution gas/air feeding system.
  - Install several field-scale HMBFs at selected oil well and battery sites and agricultural sites in partnership with field operators to oxidize non-conserved volumes of CH_4-rich waste gas (including solution gas from crude oil production and waste gas from livestock operations) that are insufficient to support stable combustion and energy recovery.
  - Demonstrate the viability of using HMBFs to control CH_4 emissions associated with petroleum and agriculture operations.

BENEFITS TO ALBERTA

- The HMBF technology is expected to be an attractive low-cost and environmentally friendly solution to the GHG reduction problem facing Alberta oil and gas sector and agricultural sector operators.
- Provides climate change benefits by reducing overall provincial GHG emissions
- Large-scale deployment of HMBFs will create an additional revenue stream for these companies, in the form of carbon credits.
- For example, if an HMBF eliminating 200 m^3/day of CH_4-rich waste gas operates for one year, it will reduce GHG emissions by about 730 tonnes of CO_2-equivalents.
- By applying HMBF technology at only 15% of the 6000 battery sites in Alberta, that emit an average amount of 200 m^3/day, the potential annual GHG reduction will be about 650,000 tonnes of CO_2-eq.

8 Publications

9 Students Trained

1 - 10 Project Jobs

11 -100 Future Jobs

1 New Products/Services

2.9 kT/yr Project GHGs Reduced

1,300 kT/yr Future GHGs Reduced

CURRENT STATUS

APR 2020

The project started in April 2019 and has met and exceeded most of the short-term objectives and related milestones set out at the beginning of the project, notwithstanding the disruptions being created by the Covid-19 pandemic. As planned, we managed to start the process of optimizing air/gas delivery system, installing the full-scale HMBF systems at oil/gas sites and agricultural operations and develop a real-time data gathering system to monitor the performance of field HMBFs.