

## Project Profile

<b>Project Name:</b>	Comparison of Top Down and Bottom Up Methane Emissions Detection and Quantification Methods
<b>Project Number:</b>	ER-Meth-2020-02
<b>Proponent:</b>	Bridger Photonics / Carleton University
<b>Funding Envelope:</b>	Environmental Research—Methane and Greenhouse Gases
<b>Timeframe:</b>	September 16, 2019, to April 30, 2020

### Project objectives

The objective of this project is to scientifically evaluate the difference between top down and bottom up measurement approaches in a B.C. context and provide a baseline data set that may be used in the future to assess trends.

### Project description

This project will compare the measurement of methane emissions using top down and bottom up approaches to determine whether consistent results are obtained using these two inventory approaches in a B.C. context. “Top down” approaches involve the measurement of methane emissions at a regional scale (e.g., using aircraft-based or mobile ground laboratory-based platforms to detect and measure methane emissions). “Bottom up” approaches involve the quantification of methane emissions at the device/component level (e.g., using optical gas imaging cameras to detect, and meters to measure, methane emissions and/or using emission factors in place of measurement).

The reporting of methane emissions in B.C. is required under the Greenhouse Gas Emissions Reporting Regulation using a bottom up approach. Recent literature based on top-down studies has suggested that actual methane emissions in the upstream oil and gas sector in B.C. may be higher than what is currently being reported.

In addition to providing a basis to inform measurement approaches, the results from the field program will provide baseline data to assess emission trends over time.

### Project approach

Phase 1 of the project (September, 2019 to October, 2020) will involve the following activities:

1. Identify areas to conduct an aerial methane emissions survey using gas mapping LiDAR™ (e.g., production facilities in Northeast B.C.).

2. Conduct an aerial methane emissions survey to develop a top down inventory of oil and gas sector methane sources.
3. Compare the top down inventory to available bottom up inventories and ground-based leak survey data and provide insight into why they do or do not line up well.
4. Collect wind data from near ground level sensors for use in log profile boundary layer wind profile interpolations.
5. Conduct single-blind, controlled small-volume methane releases to test real-world detection limits and emission rate uncertainties.

Phase 2 of the project (November, 2020 to March, 2021) builds on the initial phase, and investigates and analyzes potential reasons for differences in emissions from phase 1 (e.g., aerial measurements and ground-based camera survey data):

- Investigate emissions from major identifiable equipment.
- Research the make-up of emissions sources from major equipment and buildings.
- Study the relative frequency of major emission sources.

### **Project deliverables**

The deliverables from this project include the following:

1. Estimated real-world ability of survey method to detect and measure methane emissions.
2. Estimate of methane leak occurrence probabilities.
3. Comparison of aerial survey results with previous ground-based survey data using site level production-accounting data.
4. Comparison between the top down inventory to available bottom up inventories and ground-based leak survey data and providing insight into why they do or do not line up well