

## UBC Sustainability Scholars Program 2019

The UBC Sustainability Initiative (USI) is pleased to offer current UBC graduate students the opportunity to work on funded sustainability internship projects. Successful candidates work under the mentorship of a partner organization, and are immersed in real world learning where they can apply their research skills and contribute to advancing organizational sustainability goals.

For more information about the Sustainability Scholars Program and to apply to work on this project, please visit the [Student Opportunities](#) page.

Please review the application guide (PDF) before applying.

Applications close **midnight Monday February 25, 2019.**

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**Title of Research Project:** [Investigating Potential Sources of Fugitive Nitrous Oxide \(N<sub>2</sub>O\) Emissions from Metro Vancouver Wastewater Treatment Plants](#)

### 1. The purpose of the project is:

- to identify potential sources of fugitive nitrous oxide emissions at Metro Vancouver's wastewater treatment plants;
- to estimate specific process-related fugitive nitrous oxide emissions at one of Metro Vancouver's wastewater treatment plants; and
- to conduct a literature search of measurement and mitigation methods relevant to Metro Vancouver wastewater treatment infrastructure and processes.

Research suggests that a significant amount of nitrous oxide, which is a potent greenhouse gas, may be released from wastewater treatment processes. In general, plants that achieve low levels of nitrogen removal emit more nitrous oxide (see, for example, [Philos Trans R Soc Lond B Biol Sci. 2012 May 5; 367\(1593\): 1265–1277](#)). Current greenhouse gas inventory protocols do not yet incorporate fugitive nitrous oxide releases, although estimates of releases are already incorporated in consulting analyses, and are emerging in literature. Metro Vancouver would like to determine if any of our wastewater treatment plants have significant fugitive nitrous oxide emissions, and this project will help quantify any potential emissions. Once sources are identified and emissions are estimated, the scholar will investigate possible ways to mitigate these emissions.

### 2. How will this project make a contribution to regional sustainability?

This project will lead to better quantification of wastewater treatment-based greenhouse gas emissions – specifically, from fugitive nitrous oxide (N<sub>2</sub>O) releases - and identification of actions that could reduce those emissions. It will contribute to several Board-approved plans and initiatives.

### 3. Outline the scope of project including how the scholar's work will be used by Metro Vancouver:

The scholar will conduct a literature review on potential sources of fugitive nitrous oxide emissions from specific processes relevant to Metro Vancouver's wastewater treatment plants, and will identify process-

specific fugitive nitrous oxide emissions factors relevant to Metro Vancouver's facilities, if available. This review will include an overview of the uncertainty associated with each parameter. The scholar will visit one of Metro Vancouver's wastewater treatment plants to familiarize themselves with plant processes and infrastructure, focusing on infrastructure relevant to potential fugitive nitrous oxide emissions. With the assistance of plant staff, the scholar will gather technical specifications and/or process operating conditions at the plant that could be associated with nitrous oxide emissions and use them to complete preliminary estimates of process-specific fugitive nitrous oxide emissions.

The scholar will also conduct a literature review of existing measurement and mitigation methods, focusing on methods that are relevant to processes and infrastructure present at Metro Vancouver wastewater treatment facilities.

Metro Vancouver will use the scholar's work to determine whether to measure actual emissions at targeted process locations to confirm estimates, whether to expand the effort to other Metro Vancouver wastewater treatment plants, and whether to prioritize further investigation and implementation of mitigation methods.

The project should be undertaken in parallel with the similar Sustainability Scholar project titled 'Investigating Potential Sources of Fugitive Methane Emissions from Metro Vancouver Wastewater Treatment Plants', as the methodologies are very similar, and visits to the WWTP should be combined.

#### 4. Project Deliverables:

- Literature review of specific processes that may be potential sources of fugitive nitrous oxide from wastewater treatment plants and quantification methods for those processes
- Estimates of process-specific fugitive nitrous oxide emissions at a selected Metro Vancouver wastewater treatment plant
- Literature review of Metro Vancouver plant-relevant fugitive nitrous oxide release mitigation methods
- Create PowerPoint summary presentation (and present to MV if time allows)

#### 5. Identify the required/preferred skill set and knowledge base for the ideal Scholar.

- Excellent research and writing skills
- Ability to work independently
- Demonstrated time management skills
- Deadline oriented
- Demonstrated interest in sustainability
- Familiarity with research methodologies and survey techniques
- A good understanding of greenhouse gas emissions
- Educational background in environmental science, environmental engineering, chemical engineering

#### 6. Should the potential Scholar submit a writing sample?

- Yes
- No

#### 7. Identify specific requirements required for completing this project (if any)

- Familiarity with greenhouse gas emissions and climate change
- Familiarity with wastewater treatment processes
- Must be able to travel to a selected Metro Vancouver wastewater treatment plant, perhaps several times
- Access to a computer and internet or a library to complete the literature review

Applications close **midnight Monday February 25.**

Apply here:

<https://sustain.ubc.ca/student-opportunities>

To learn more about the program here:

<https://sustain.ubc.ca/ubc-sustainability-scholars-program>

Read the application guidelines to confirm your eligibility to participate in the program here:

<https://sustain.ubc.ca/student-opportunities>

Contact Karen Taylor at [sustainability.scholars@ubc.ca](mailto:sustainability.scholars@ubc.ca) if you have questions.