

Summer 2023 Sustainability Scholars Program Internship Opportunity

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 sustainability across the region.

- Visit the [Sustainability Scholars Program website](#) to learn [how the program works](#) and to [apply](#).
- Be sure to review the application guide on the Apply page to confirm your eligibility before applying.

Applications close at midnight on Sunday January 29, 2023.

Project title: Lifecycle cost analysis of new single-family building construction and electrification on Musqueam

Project Background & Overview:

As part of their plan to move towards a sustainable emission-free community, Musqueam First Nation is looking for ways to reduce GHG emissions from on-reserve homes. Although most of the existing homes use natural gas for space and water heating, there is an opportunity to electrify the new buildings being constructed in Musqueam.

Project description

In this project, the Musqueam housing department is looking to assess the cost-effectiveness and environmental impacts of energy-efficient new build electrification on Musqueam reserve. The cost-effectiveness will be determined based on the upfront cost, maintenance cost, and utility bill cost of using heat pumps to provide space heating and cooling, and water heating. The electrification scenarios will be compared to a baseline where natural gas is used in new homes in high-efficiency space and water heating equipment. The baseline case will be the current new construction in Musqueam reserve that meets Step 2 of the BC building code. It is assumed that new Musqueam homes will be built to higher Steps of the BC building code (particularly Step 4 and Step 5) if being electrified. The potential building envelope improvements compared to current plans include higher attic, wall and foundation insulation, more energy-efficient doors and windows, and improved air tightness.

In addition to cost-effectiveness, the GHG emissions reduction from building electrification will be assessed over the lifetime of the house. Time permitting the feasibility of installing rooftop solar PV systems may also be investigated in the study. The case study for this work will be a 2,200 sq ft, 2-level single-family home located on Musqueam reserve.

Project scope

The project work will involve the following:

1. Assessment of the cost-effectiveness of electrifying new construction in Musqueam considering upfront costs (including equipment cost and installation), maintenance costs, utility costs, and available rebates. This will include:

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- Review of existing building documentation and other relevant literature to gather the necessary information to estimate the (additional) cost of a more energy efficient building envelope and mechanical systems and input in the building modelling software.
 - Building energy modelling using HOT2000 (preferred), eQuest, EnergyPlus, or whatever modelling program the Scholar is familiar with and is suitable for the analysis
 - Online research and phone calls with contractors to collect information on up front and maintenance costs of mechanical equipment
2. Calculation of the GHG emission reduction potential from improved building envelope and electrifying new construction on Musqueam reserve. The GHG emissions will include Scope 1 and Scope 2 ¹ emissions from natural gas and electricity consumption in the house. The analysis will not consider the embodied carbon in building material.
 3. Based on the research prepare a lifecycle cost analysis of building materials to understand the carbon emission reductions and cost benefits of construction and electrification of a single-family home.
 4. Time permitting: Assess the feasibility of rooftop solar PV systems for new single-family homes in Musqueam. The feasibility will be assessed based on upfront cost, operation and maintenance cost, renewable energy generation potential, estimated electricity consumption in the house, and utility cost.

Deliverables

- A final report containing a summary of the work completed
- A final report for the online public-facing [Scholars Project Library](#).

Time Commitment

- This project will take 250 hours to complete
- This project must be completed between May 1 to August 15, 2023
- The Scholar is to complete hours between 9 am and 5 pm, Monday to Friday, approximately 17 to 20 hours per week.

Required/preferred Skills and Background

- Excellent research and writing skills
- Demonstrated interest in sustainability
- Strong analytical skills
- Ability to work independently
- Deadline oriented
- Familiarity preparing feasibility studies
- Experience with financial modelling and analysis
- Demonstrated experience in building energy systems
- Familiarity with building science including building envelope components
- Familiarity with building energy modelling and energy modelling software an asset
- Background in mechanical/civil/architectural engineering desirable

¹ Refer to the following link for Scope 1 and Scope 2 emissions: <https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance>

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This project may be completed remotely, but the Scholar is encouraged to visit the community. All the required data for the project will be provided by the project mentor.

About Musqueam:

Musqueam is an urban First Nation community in British Columbia. Musqueam's ancestors have lived in the Fraser River estuary for thousands of years. Today, portions of Musqueam's traditional territory are called Vancouver, North Vancouver, South Vancouver, Burrard Inlet, New Westminster, Burnaby, and Richmond. Today, Musqueam reserve lies within the boundaries of the City of Vancouver.

Musqueam is a self-governing nation with a vision to ensure enhanced quality of life for all generations of Musqueam people to develop a sustainable, self-reliant, vibrant community that is built upon the historical and traditional values of the Musqueam community.

Applications close **midnight Sunday January 29, 2023**

Apply here: [Click here to apply](#)

Contact Karen Taylor at sustainability.scholars@ubc.ca if you have questions

Useful Resources

We are holding a special **resume preparation workshop for prospective Scholars** on January 23, 2023. [Click here for details and to register.](#)

Below are some links to useful resources to help you with your resume and cover letter (there are many more online). Some of these resources also provide information on preparing for your interview.

<https://students.ubc.ca/career/career-resources/resumes-cover-letters-curricula-vitae>

<https://www.grad.ubc.ca/current-students/graduate-pathways-success>

<https://www.grad.ubc.ca/cover-letter-cv-resume-templates-ubc-career-services>