Fall 2022 Sustainability Scholars Program Internship Opportunity

The UBC Sustainability Hub 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 to confirm your eligibility before applying.

Applications close at midnight on Sunday September 18, 2022.

Project title: Life-cycle costing analysis of a deep building energy retrofit of a mid-rise building to understand the impact of energy conservation measures on emissions savings

Project Background & Overview:
In response to climate change, the City of Richmond has developed several policies and plans to achieve resiliency and emissions reduction targets. However, retrofitting existing buildings for net zero or near net zero emissions remains one of the most challenging parts of reaching the climate action targets due to the diverse portfolio, early adopter disadvantage, and economic barriers. Multi-unit residential buildings (MURBs) represent a large and growing share of the building stock in cities across Canada. Most of these aging buildings are in need of renewal.

Deep energy retrofits are a great path to simultaneously:

- renew our housing stock
- reduce carbon emissions
- reduce energy costs and enhance property values for owners
- improve health and comfort for residents
- create green jobs in the growing energy industry
- provide green investment opportunities to lenders

The City of Richmond intends to undertake a deep energy building retrofit of a mid-rise building to identify and verify the potential impacts of a series of Energy Conservation Measures (ECMs) on energy consumption and Green House Gas (GHG) emission savings. By the end of this project, we hope to understand the required capital investment, approximate energy savings, corresponding energy cost savings, and carbon footprint for a mid-rise residential building deep energy retrofit. These findings will be used to provide guidelines/a roadmap for those interested in renovating other mid-rise buildings.

Project description
This study aims to provide a roadmap for existing mid-rise building retrofits in order to inform how innovative solutions could be implemented to attain CO_2 reduction targets while also considering implementation logistics, carbon costs, extreme climate events, utility costs and uncertainty of grid electricity emission factor.

We are interested in understanding a range of factors from low-hanging-fruit measures such as improvement of lighting and temperature control adjustment to more aggressive measures such as heating system electrification, using Variable Frequency Drive (VFD), and applying high-efficient windows, etc. to mitigate building GHG emissions to near zero level. We also want to understand and be able to provide guidance on the impact of retrofit measures, individually and cumulatively, on baseline energy consumption and GHG emission, show how they are evaluated, and illustrate them using waterfall charts.

Project scope

This project involves:

- a jurisdictional scan to understand best practices where deep energy retrofit models have been applied to retrofit projects to facilitate existing building renovation considering energy and carbon footprint mitigation.
- Life-Cycle Cost Analysis (LCCA) of various measures to demonstrate the capital investment and other financial factors affecting an owner's decisions.
    - The LCCA will include the life span of the equipment, maintenance, operational costs, future carbon costs and emission factors. Economic parameters, including cash flow, Internal Rate of Return (IRR), Net present Value (NPV) of 50-years will be provided for the pathway.
- Using whole-building energy modeling software (EnergyPlus, eQuest, IESVE) evaluate the annual performance of the selected building on an hourly basis
    - Note that the reference house energy model can be validated and regulated against electricity and gas bills if those bills are available; otherwise, we can rely on the energy software results since this is a retrofit study and we are looking for changes in energy and GHG emission resulting from retrofit measures compared to basic model.
- Develop the baseline model for the proposed building and validate the baseline model
- List the feasible retrofit measures and assess the energy and environmental impact on the proposed building
- Provide a cost analysis for the retrofit measures presenting payback period and other important economic indicators
- Conduct an embodied carbon analysis, if applicable

Deliverables

- A final report containing a summary of the work completed
- A final report for the online public-facing Scholars Project Library.
- Literature review of relevant building retrofits
- A graphical abstract of list of the most efficient measures for building retrofit
- A presentation of key findings and report recommendations to key stakeholders

Time Commitment

- This project will take 250 hours to complete
- This project must be completed between October 17, 2022 and March 15, 2023
- The scholars are to complete hours between 9 am and 5 pm, Monday to Friday, approximately 10 to 12 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 with benchmarking methods and tools
- Demonstrated understanding of building science and residential construction (e.g., barrier systems, insulation, renewable energy, fenestration, HVAC systems, etc.)
- Familiarity with performing Life-Cycle Cost Analysis (LCCA)
- Familiarity with economic modelling for Net Present Value (NPV), IRR, LCOE
- Previous experience with at least one of these energy modeling programs: EnergyPlus, eQuest, and IESVE
- Working knowledge of the National Energy Building Code, ASHRAE 90.1 & 62.1 and similar energy code
- Understanding of building drawings and schedules
- Demonstrated attention to detail

Applications close **midnight Sunday September 18, 2022**
Apply here: Click here to apply
Contact Karen Taylor at sustainability.scholars@ubc.ca if you have questions

Useful Resources

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