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: Developing a GIS-based urban building energy assessment model to support decision making in Richmond

Project Background & Overview:
Urban planners, local authorities, and energy policy-makers often develop strategic sustainable energy plans for urban building stock in order to mitigate overall energy use consumption and GHG emissions. Due to rapid growth in building data availability, there are opportunities to analyze existing building data and develop strategic and efficient energy planning. However, systematic approaches are required for integrating available energy and planning data. One possible solution for large scale building energy analysis is through a spatial analysis of energy data by using Geographic Information System (GIS) modeling to develop urban building energy models (UBEM). GIS provides a framework for gathering, managing, and analyzing large scale data in a geographic context. Visual representation of data in a GIS system can help planners and developers perform qualitative and quantitative analysis to support decision making.

GIS-based energy planning requires extensive data to make an energy policy decision. Individual building analysis is often difficult on a large scale due to the limited availability of data and users' privacy issues. One of the most promising solutions is through building stock modeling. UBEM is a great tool allowing decision-makers to explore a wide range of city sustainability subjects, for example:

- predicting operational energy use and indoor/outdoor environmental conditions for categories of buildings in the urban context;
- opportunities for energy conservation measures (ECMs) when applying to a large group of buildings;
- finding the best scenarios for distribution of a district energy utility for a large groups of buildings;
- using community-scale photovoltaic (PV) systems;
- prioritizing building stock for renovation; and more.

Project description
This study aims to develop a GIS-based urban building stock model to be deployed for city-scale sustainability assessment.

The first part of the project involves refinement of a database that will then be used to classify the building stock according to building function, construction year, number of storeys, building footprint,

etc. Using georeferenced data and incorporating missing building stock data (which will be provided to the Scholar), the Scholar will develop an urban building model map for a region or all of Richmond (depending on the available data and time).

The second part of the project involves mapping building energy consumption and GHG emission intensity onto the urban building model created in the first part of the project. Drawing on BC Assessment data and using a bottom-up engineering method the Scholar will aggregate the energy-related features of the building stock to produce the final energy assessment model.

Note that a bottom-up engineering approach focuses on building archetypes to represent the whole building stock and will be used to inform the high-level energy modeling for those prototype cases and eventually link them to the energy modeling results to urban building stock.

Project scope

This project involves:

- A jurisdictional scan to understand best practices where urban building energy models have been applied to provide a sustainability assessment platform and policy decision-making tool.
- Working with provided georeferenced data on Richmond building stock from various sources (e.g., BC Assessment data and data provide by the City of Richmond), followed by database cleanup and integration in order to characterize the building stock and prepare a new database required for a 2D/3D urban building modelling generation.
- Using the data collected above and deploying the bottom-up engineering method and available statistical energy consumption data, determine the energy use and GHG emission intensity for the building stock.
- Integrate the energy database into the GIS-based urban building stock model to visualize the distribution of energy and GHG intensity throughout the Richmond.
- Time permitting, pilot the model by conducting a feasibility assessment of various energy efficient measures such as:
    - Regional energy generation by PV panels considering available installation surface;
    - Extension of District Energy Utility to regions out of the existing DEU plan;
    - Prioritizing of rezoning applications to meet the GHG emission reduction plan; and etc.

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 urban building stock/energy models for different cities
- A GIS map/graphical abstract of urban building energy model for Richmond
- 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 May 1, and August 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

- Experience working with software packages for GIS applications such as Esri ArcGIS products (ArcGIS Spatial Analyst, ARcGIS 3D Analyst, ArcGIS Geostatistial Analyst, ArcToolbox and model building), QGIS, etc.
- Ability to create/prepare geospatial data to integrate within GIS-based software
- Familiarity with data analysis and various database integration within Python or R
- Comfortable working with large data sets
- Strong statistical analysis
- Familiarity with energy benchmarking methods
- Design and layout skills, an asset
- Ability to work independently
- A high level of skill in research, problem solving
- Demonstrated interest in sustainability
- Demonstrated attention to detail
- Background or experience in urban design or geomatics, an asset
- Background in building energy modelling, an asset

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