Funded M.A.Sc. Project: Zero Carbon Off-Grid Solar Utilization and Optimization
Graduate Supervisor: Dr. Cynthia Cruickshank (cynthia.cruickshank@carleton.ca)
Project Start Date: May 2023
Research Website: https://carleton.ca/caber/

Dr. Cruickshank is currently hiring for a Master's of Applied Science graduate student with research interest in building energy systems and energy efficiency.

Project Description: In partnership with a homeowner based in North-Western Ontario, the potential for creating a zero-carbon, passive house certified, off-grid home will be studied. In 2018, an off-grid passive house was constructed with a 16 kW PV array and 55kWh battery storage bank. Currently, 92% of the buildings' electrical load is met with this system. The remaining 8% of electrical demand and 100% of the house's heating load are met using a propane boiler and generator. In-line with Canada's objectives of achieving net-zero carbon by 2050, the goal of this research project is to develop and optimize solar utilization to meet 100% of this passive house's energy requirements.

To achieve this, a variety of technologies will be explored, such as coupling photovoltaic panels, battery storage, solar thermal panels, heat pumps and thermal storage systems. Dr. Cruickshank is looking to hire a M.A.Sc. student to develop and calibrate a model of the passive house under study, develop conceptual designs and layouts of three separate technology solutions, create energy models within TRNSYS to optimize for zero carbon emission operations and complete an economic analysis of these solutions.

If interested, please contact Cynthia Cruickshank for more information on this graduate project (Cynthia.Cruickshank@carleton.ca). Additional M.A.Sc. and Ph.D. projects are also available and described here: https://carleton.ca/caber/graduate-student-opportunities/

Passive House to be modelled and optimized