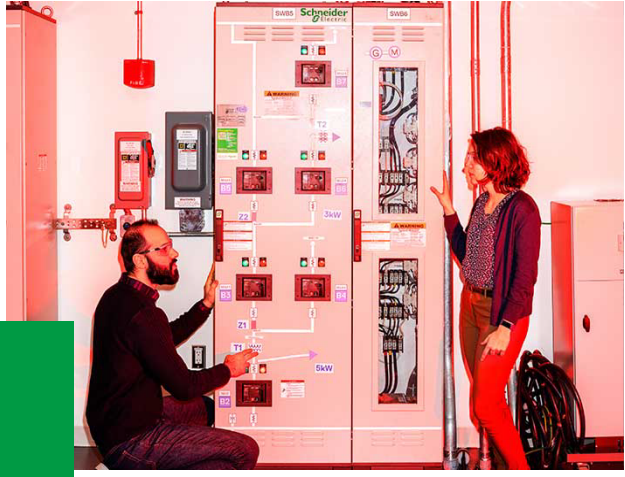
Ryerson University

Centre for Urban Energy



Research case study

Advancing energy storage capability

Version 1: Oct. 14, 2020
Sponsor: City of Toronto

Microgrid with solar generation and energy storage – analysis and planning

Toronto Island Water Treatment Plant (TIWTP) is considering augmenting its electric system by adding a solar generation facility. They retained CUE to design a microgrid and an energy storage system in an effort to assess opportunities to support the solar project.

Problem: It was important to understand the technical feasibility of solar generation and additional demand, along with determining the optimal size of energy storage units utilized by TIWTP. The proposed project aligns with the City of Toronto's TransformTO goal to continue greening City Operations, while helping to meet greenhouse gas emission reduction target of 80 per cent by 2050.

Solution: Optimize sizes of energy storage for different scenarios of load and solar generation with short payback periods.

Impact: The annual expense towards energy will be approximately halved by purchasing and installing energy storage units of the optimal size. Installation of solar generation will further reduce the energy cost.

CUE's role: CUE's researchers performed a steady-state power flow analysis to ensure that the additional solar generation and load were technically feasible. CUE also determined optimal energy storage sizes for eight different scenarios of load and solar generation. Upon review, the project was deemed successful and the City will include CUE's recommendation as it proceeds with conceptual design

✓ Completed

"CUE's capacity to assess and project the technical possibilities of our proposed solar system is essential to our preliminary analysis. This kind of innovation supports us to move toward our long-term greenhouse gas emission target."

Jessie Cheng, Senior Engineer, Energy Management, Toronto Water, City of Toronto

Key stats

13.8 kV, 4.16 kV	Voltage
4,000 kW	Proposed solar generation
3,500 kW	Proposed load