On-site Hydrogen Production and Consumption of Hydrogen in Existing Prime Movers

Hydrogen Innovation Fund Project Details

Proponent: York University

Partner: Enbridge Gas, and CEM Engineering Inc.

Project Type: Feasibility study
Project Total Cost: $106,000
Year Contracted: 2023
Location: Toronto
Status: Open

Project Objectives

The objective of this study is to investigate the feasibility of retrofitting two existing behind-the-meter (BTM) 5.5 MW gas turbine generators located at York University to run on blended fuel (natural gas with hydrogen) with hydrogen that would be produced on-site using off-peak electricity. The study aims to investigate how York University can use the BTM generators burning hydrogen to generate electricity during on-peak hours to reduce peak demand emissions and provide grid services such as Operating Reserve and peak shifting. The study will further investigate if the existing piping and area classification on campus needs to be updated or altered to accommodate the hydrogen production, transportation, and consumption.

Outcomes

If successful, the study will establish a foundation for retrofitting existing BTM distributed energy resources to take advantage of low-carbon hydrogen and provide grid services such peak shifting and operating reserves. Expected learnings include:

- High-level capital cost values, with appropriate contingency, for new electrical devices, piping, and electrolyzer for an existing gas turbine generators (GTGs) to burn a blended of hydrogen and natural gas.

- Implementation "roadmap" with phases detailing discreet steps to move towards burning hydrogen in existing infrastructure/equipment.
- Estimate of the levelized cost of carbon abatement (LCCA) and levelized cost of electricity (LCOE) for this grid enhancement option (specifically retrofitting existing assets to burn hydrogen).
- Potential area classification or piping changes required to existing buildings/powerhouses to allow for hydrogen and natural gas blending.
- Analysis of peak reduction/shifting abilities available for small-medium sized generators using hydrogen and natural gas at various blending levels.
- Preliminary emission compliance analysis for existing GTGs when burning hydrogen and natural gas at various blending levels