

Performance of CHP System Using Blended Hydrogen

Hydrogen Innovation Fund Project Details

Proponent: Enbridge Gas Inc.

Partner: None

Project Type: New facility

Project Total Cost: \$3,574,960

Year Contracted: 2023

Location: Markham

Status: Open

Project Objectives

The objective of this project is to design and construct a 115 kW combined heat and power (CHP) system to generate electricity and heat for Enbridge's Markham office buildings and demonstrate the capability to provide grid services. The behind-the-meter (BTM) CHP system will offset the buildings' electrical load and natural gas consumption, fuelled by a range of hydrogen and natural gas blends (up to 100% hydrogen) using the hydrogen produced by an existing on-site electrolyzer. In addition to providing benefits such as emissions reductions and reduced local peak electricity demand, the CHP system will be tested for its capabilities to provide wholesale grid services such as demand response, energy, and operating reserve at various blending ratios.

Outcomes

If successful, this project will demonstrate a use case for hydrogen as an alternative fuel to natural gas for heating loads and electricity generation, as well as demonstrate the reliability of CHP system performance at blending levels of up to 100% hydrogen.

Expected learnings include:

- Test CHP accuracy, ramping ability and response time, demonstrating its potential to provide wholesale grid services such as energy, operating reserve, and demand response
- Analysis of 0% to 100% hydrogen blending with natural gas impacts on equipment performance and operating characteristics such as heat rates, ramp rates, cost, minimum loading point, emissions reductions, etc.
- Knowledgeable and skilled work force to support the development of the hydrogen economy.

- Development of M&V plan to assess the performance and GHG reduction capabilities of hydrogen CHP system
- Analysis of the load reduction impact on the grid.
- Dissemination to raise awareness of the capabilities of the CHP facility, its potential contribution to grid services and the broader future hydrogen landscape. Inform future hydrogen project decision-making.
- Outcomes of the prescribed IESO test cases (Hydrogen Testing Framework) including but not limited to:
 - Data Collection, Performance Analysis and Results,
 - CHP operating characteristics, efficiency, ramp rates, heating and electrical load displacement capability, hydrogen life cycle analysis