Distribution-Connected Electrolytic Hydrogen Production

Hydrogen Innovation Fund Project Details

Proponent: Carlsun Energy Solutions Inc.

Partner: None

Project Type: New Facility

Project Total Cost: $4,212,800

Year Contracted: 2023

Location: Port Elgin

Status: Open

Project Objectives

The objective of this project is to install and operate a 500kW electrolytic hydrogen production, compression, and storage facility at Carlsun's headquarters in Port Elgin, Ontario to demonstrate the grid benefits of Anion Exchange Membrane (AEM) electrolysis while producing hydrogen fuel for Ontario's first publicly accessible hydrogen fueling station to be located at Toronto Pearson International Airport. The dominant technology in industry today is the Proton Exchange Membrane (PEM) electrolyzer, given its fast ramp rates and rapid start-up/shut-down times. The AEM electrolyzer is purported to provide PEM-like ramp rates at a much lower cost. The project aims to provide key insights on the operational characteristics of an AEM electrolyzer's ability to provide grid services such as frequency regulation and operating reserve, while at the same time producing clean fuel to support decarbonization of the transportation sector.

Outcomes

If successful, this project will demonstrate how hydrogen can be produced via AEM electrolysis, compressed, and stored to supply the transportation sector while simultaneously enhancing the reliability of the bulk power system by providing grid services such as frequency regulation.

Expected learnings include:

- Test electrolyzer accuracy, ramping ability and response time, demonstrating its potential to provide existing or new ancillary services such as renewable smoothing
- Assess electrolyzer performance for grid services such as operating reserve and energy
- Real-life case study for the operation of an AEM electrolyser on the Ontario grid.
- Practical demonstration of performance and technical capabilities of an AEM electrolyzer such

as operating characteristics, efficiency, ramp rates, amount of hydrogen produced to inform its potential as a future grid resource.

- Construction and operation of a 350/700bar hydrogen fueling station