

Hydrogen Innovation Fund – Projects Background

Overview

Projects funded under the Hydrogen Innovation Fund are taking various approaches to researching, developing and testing the capability of hydrogen technologies and how to integrate them into Ontario's electricity system. Four of the projects are new facilities that will provide real-world demonstrations of hydrogen production and consumption. The remainder are divided between research and feasibility studies investigating the potential of hydrogen to be an important part of Ontario's energy future.

Projects Announced on October 12, 2023

Carlsun Energy Solutions Inc. – Distribution-Connected Electrolytic Hydrogen Production

Funding: \$1,891,400

Location: Port Elgin

Project Type: New Facility – Hydrogen Production from Electricity

Project Summary: This project will construct and operate a 500 kW hydrogen production, compression and storage facility to produce hydrogen fuel for Ontario's first publicly accessible hydrogen fueling station. The electrolyser will provide grid benefits by operating during off-peak hours. It will be tested to better understand its capabilities to provide grid services such as energy, operating reserve, capacity and ancillary services.

Carlsun Energy Solutions Inc. – Power to Agriculture Feasibility Design Study

Funding: \$500,000

Location: Goderich and Seaforth

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This project will assess the feasibility of using off-peak electricity to produce hydrogen and ammonia for fertilizer production. This includes feasibility studies for a hydrogen production plant, a hydrogen pipeline, an ammonia production plant, an ammonia storage facility and a nitric acid plant. If deemed feasible, the facility could result in 260 MW of hydrogen production and 400 tonnes of ammonia production per day.

Emerald Energy from Waste Inc. – Hydrogen Commercialization Project

Funding: \$2,990,000

Location: Brampton

Project Type: New Facility – Hydrogen Production from Electricity

Project Summary: This project will demonstrate the technical capabilities of a 1 MW electrolyzer to produce hydrogen from waste. The pilot will test the electrolyzer's ability to provide real-time grid services such as operating reserve, frequency regulation and the smoothing of renewable generation. The project will also develop an on-site hydrogen hub to store and dispense hydrogen to near market ready customers (heavy trucks and off-road construction equipment), as well as developing a relationship with CN Rail to supply hydrogen to their rail yard on Bramalea Road.

Enbridge Gas Inc. – Installation and Performance Evaluation of a Combined Heat and Power System Using a Blend of Hydrogen and Natural Gas

Funding: \$1,787,480

Location: Markham

Project Type: New Facility – Electricity Generation from Hydrogen

Project Summary: This project will demonstrate the fueling of a 115 kW combined heat and power (CHP) unit with a range of hydrogen and natural gas blends (up to 100% hydrogen). The blended hydrogen will be sourced from an existing electrolyzer on-site. The CHP system will be connected to the building's electric and hot water system to reduce electricity demand and natural gas consumption of the boilers.

Kinectrics Inc. – Feasibility Study for an Urban Hydrogen Hub for Grid Flexibility, Resilience and Carbon Reduction Scalable to Nuclear Power Plant Co-Location

Funding: \$250,000

Location: Toronto

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This study will assess the potential of producing hydrogen through electrolysis and explore the use of fuel cells for power generation and as a clean fuel source for heavy-duty vehicles. It will evaluate the economic feasibility, including installation, maintenance and operating costs of the hydrogen production, storage, distribution and power generation infrastructure.

University of Windsor – Hydrogen Integrated Greenhouse Horticultural Energy

Funding: \$130,000

Location: Windsor

Project Type: Research Study – Supporting the Broader Hydrogen Economy

Project Summary: This research project will economically model the production, storage, delivery and consumption of hydrogen for use in Ontario’s agricultural greenhouse sector. It will identify the potential grid services that a wind-powered hydrogen production facility can offer in Southwestern Ontario and estimate the range of costs for hydrogen integration into a greenhouse operation.

Projects Announced on November 23, 2023

Atura Power – Halton Hills Natural Gas and Hydrogen Blending

Funding: \$4,200,000

Location: Halton Hills

Project Type: Electricity Generation from Hydrogen

Project Summary: This project will demonstrate the performance of an existing large natural gas turbine when co-firing a blend of natural gas and hydrogen (up to 15% hydrogen). The project will source its hydrogen from the Niagara Hydrogen Centre (NHC) at the Sir Adam Beck II hydro generating station, which is scheduled to come online in 2024.

Capital Power – Hydrogen Blending: Goreway Power Station, East Windsor Cogeneration Centre and York Energy Centre

Funding: \$206,300

Location: Brampton, Windsor and Newmarket

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This study will assess the financial and technical viability of blending and co-firing hydrogen and natural gas at Capital Power’s East Windsor, Goreway and York Energy Centre facilities using various mixes of hydrogen (from 5% to 15%). Engineering studies will be conducted at each site to evaluate the impacts on the natural gas turbine’s performance, maintenance, operability, emissions and safety considerations, as well as how hydrogen could be procured, transported and stored.

Capital Power – Kingsbridge Green Hydrogen and Storage Assessment

Funding: \$150,000

Location: Goderich

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This project will explore the economic and technical feasibility of creating green hydrogen from wind and storing it in underground storage units located in depleted gas reservoirs. Use cases to be assessed include fueling a hydrogen-methane turbine and using hydrogen for natural gas blending and transportation fuel.

HydroMéga Services Inc. – Coupling Green Electricity and Hydrogen

Funding: \$100,000

Location: Cochrane

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This study will assess the feasibility of installing renewables (solar panels and/or wind turbines) at an existing natural gas facility in order to expand the facility's capacity and operations. The main objective of the renewables would be to power a hydrogen electrolyzer to produce hydrogen that would then be blended with natural gas to produce electricity.

The Transition Accelerator – The Role of Hydrogen Hubs in Strengthening the Affordability and Reliability of Ontario's Electricity System

Funding: \$101,205

Location: Hamilton

Project Type: Research Study – Supporting the Broader Hydrogen Economy

Project Summary: This study will model the potential for hydrogen hubs to enable the decarbonization of Ontario's economy and the resulting impact this could have on the province's electricity system. It will assess the ability to cluster hydrogen production, transportation, storage, and demand to facilitate cost-effective net-zero solutions across multiple sectors in the Hamilton region.

Volta Energy Inc. – Feasibility Evaluation of Sustainable, Green and Rapid-Response Metal-Supported Solid Oxide Cell Technology

Funding: \$491,352

Location: Toronto

Project Type: Research Study – Academic Hydrogen Technology Research

Project Summary: This project will assess how reversible solid oxide hydrogen fuel cells can help provide a pathway for hydrogen integration into the electricity grid. This study includes research on market-entry barriers for reversible solid oxide hydrogen fuel cells alongside the responsiveness of the technology to control room signals.

Western University – Negative Emissions Technology for Pale Blue Hydrogen Production

Funding: \$498,000

Location: London

Project Type: Research Study – Academic Hydrogen Technology Research

Project Summary: The study will investigate the production of hydrogen through electrolysis using two generation sources: wind (green hydrogen) and bio-gas (blue hydrogen), including the technical capabilities, carbon footprint and economics of "Pale Blue" hydrogen production.

York University – Optimal Deployment of Green Hydrogen Plants in Ontario’s Electricity System

Funding: \$90,000

Location: Toronto and Bruce County

Project Type: Feasibility Study – Supporting the Broader Hydrogen Economy

Project Summary: This study will analyze innovative approaches to integrating large-scale green hydrogen plants into Ontario’s electricity system. The study will assess the technological and economic challenges and opportunities associated with the wide adoption of green hydrogen plants.

York University – Preliminary Feasibility Study of Hydrogen Productions On-Site and Utilization of Hydrogen in Existing Prime Movers

Funding: \$38,000

Location: Toronto

Project Type: Feasibility Study – Site-Specific Hydrogen Development

Project Summary: This study will investigate the feasibility of retrofitting existing gas turbines to burn a blend of hydrogen and natural gas in small/medium sized generators. The study will also investigate how generating hydrogen on-site during off-peak periods can provide faster operating reserve and reduce electricity demand and emissions during hours when large gas plants would otherwise be operating.