



## Hydrogen Feasibility Study

Metrolinx, an agency of the Province of Ontario, is upgrading its commuter rail system into Regional Express Rail. The Greater Toronto and Hamilton Area (GTHA) is now home to nearly 7 million people and heading towards 10 million by 2041. To address the urgent transit needs of the GTHA, the Province of Ontario committed to implement Regional Express Rail and make other improvements to the GO system. By 2025, electrified trains will be running every 15 minutes or better, all day and in both directions, within the most heavily travelled sections of the GO network.

As part of the Regional Transportation Plan, Metrolinx is committed to running faster, more frequent GO service to keep GHTA residents moving on public transit. This includes offering all-day service every 15-minutes service in both directions on sections of the rail network owned by GO Transit.

Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network. That's why, in addition to studying the environmental impacts of traditional electrification, Metrolinx is also examining the feasibility of another form of electrification – hydrogen powered vehicles.

### **What is included in the feasibility study on hydrogen?**

As part of our work to deliver GO RER, the Ministry of Transportation is working with Metrolinx to study the feasibility of using hydrogen to power vehicles ('hydrail') on the GO rail network.

The study will explore all of the issues associated with implementing trains powered by hydrogen fuel cells. This will draw on lessons learned in Germany where hydrogen-powered trains are being introduced in late 2017/18 for passenger service. The study will need to explore everything from fuel supply and storage, to vehicle design and fleet planning, to statutory and regulatory requirements, to standards and operational rules, to testing economic viability and impact on RER's business case, and understanding the associated timescales should implementation go ahead.

As part of the study, this fall the province will bring together industry leaders in fuel cell technology for a symposium hosted by the University of Toronto to explore the potential application of hydrogen fuel cell technology to electrify the GO rail network.

### **Why hydrogen, why now?**

Metrolinx completed its Electrification Study in 2010. At that time, the conclusion was that hydrogen fuel cell technology was not suitable for use in Ontario. Since 2010, hydrogen fuel cell technology has advanced to the point that other jurisdictions are taking a much closer look. For example, Germany is poised to deploy trains powered by hydrogen fuel cells that are currently undergoing final testing. To make sure we get this right, Ontario is exercising its due diligence to ensure that we chose the appropriate technology to electrify the GO rail network.

### **What does this mean for electrification?**

If the feasibility study determines that hydrail is an option for our GO rail network and we ultimately decide to proceed with this technology, we would still be electrifying our network. It is a different technology, but it is still electrification.

Ontario is committed to running electrified trains on the GO rail network by 2025. Studying the feasibility of hydral technology is part of our due diligence to ensure that we choose the appropriate technology to electrify the GO rail network.

Metrolinx is currently undertaking a GO Rail Network Electrification TPAP to assess the environmental impacts of converting several GO rail corridors from diesel to electric service. We are moving forward on electrification. Our assessment of hydral will be happening in tandem with the Electrification TPAP – this will make sure that we stay on-track for 2025.

**Would choosing hydrogen result in another EA? How long would this take?**

Whether or not choosing hydrogen will require a new EA will be one of the outcomes of the feasibility study. One of our goals in moving the study of hydrogen in parallel with the TPAP is to ensure we look at the feasibility of a fuel cell based rail system and its environmental footprint vs a traditional overhead wires approach.

An environmental assessment would be required for the fuel production, storage and refueling facilities.

**Is hydrogen safe, both for riders and for those in the community?**

Yes. Hydrogen is routinely transported on roads and highways by truck throughout communities all over North America, both as a compressed gas and in liquid form.

Hydrogen is integral to production in various industries, including metals and automotive manufacturing, and its production, storage and distribution comprises a well-established infrastructure.

Hydrogen is also used safely as a transportation fuel. More than 215 hydrogen fueling stations for automobiles are in operation around the world. More than 50 of these are in the U.S. and about half of them are self-service stations for drivers, supporting more than 2,000 passenger fuel cell-electric vehicles, most built by Honda, Hyundai and Toyota. All these vehicles and fueling stations have had to comply with rigorous public safety standards. Many experts in the field believe hydrogen is safer than other conventional fuels, because it is non-toxic and dissipates so quickly when vented.

In Canada, there are a few hydrogen fueling facilities, and around 10 fuel cell-electric vehicles are currently registered to drivers in British Columbia and Ontario. Established codes and standards exist, as well as training materials for first responders, which ensure that hydrogen is managed safely in accordance with proper procedures.

**Why is hydrogen considered a form of electrification?**

Electricity is used to split water into hydrogen fuel which is then pumped into the vehicle's tank. The hydrogen is then used to generate electricity on the vehicles using fuel cells. Finally that electricity is used to drive electric traction motors to move the vehicle. There is no combustion in this process. Hydrogen acts an 'energy carrier' between electricity generated using renewable technologies and electricity driving electric motors.