ALBERTA INNOVATES

CLEAN ENERGY

CLEAN TECHNOLOGY

HYDROGEN CENTRE OF EXCELLENCE

FUNDING DETAILS

Liquid Organic Hydrogen Carrier (LOHC) for Secure, Efficient, and User-Friendly Hydrogen Storage and Transportation

Ayrton Energy is making hydrogen logistics easy, unlocking its potential as a scalable and sustainable energy source. Traditional methods of hydrogen storage and transportation face significant challenges, including hydrogen loss, pipeline corrosion, and costly specialized equipment. Ayrton Energy's breakthrough electrochemical Liquid Organic Hydrogen Carrier (e-LOHC™) technology provides a practical, efficient, and cost-effective solution that is fully compatible with existing liquid fuel infrastructure. Our proprietary e-LOHC technology comes at a pivotal time for the global hydrogen market, poised to eliminate these logistical limitations and foster widespread adoption.

This project is focused on a field pilot that safely tests Ayrton's LOHC system for up to 30kg-H_2/day of hydrogen storage and release. The data collected during this project will be used to optimize Ayrton's system such that it can be scaled to 300kg-H_2/day and then following that to 3T-H_2/day systems that are containerized for large scale hydrogen storage and transportation.

RECIPIENT:
Ayrton Energy Inc.

PARTNERS:
ATCO
Rocanda

TOTAL BUDGET:
$3,498,000

AI FUNDING:
$655,000

PROJECT DATES:
APR 2024 – FEB 2026

PROJECT TRL:
Start: 4
End: 6

APPLICATION

Hydrogen storage and transportation is a bottleneck to broader hydrogen adoption as the challenges of using high pressure or cryogenic liquid requires complex logistics, specialized equipment, and high costs. This drives hydrogen to be mainly used where it is produced. Storing hydrogen in an LOHC enables hydrogen to be stored as a room temperature and pressure liquid that can utilize existing low-cost infrastructure including tanks, trucks, railcars or pipelines.

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PROJECT GOALS

- Installation, commissioning and operating of the unit at demonstration site.
- Improve system designs to increase capacity and durability towards commercial targets.
- Run scaled unit for longer term testing and product validation in preparation for early commercialization.
- Complete market analysis and commercialization plan to implement following project completion.

BENEFITS TO ALBERTA

- Create new jobs opportunities in Alberta.
- Partnerships with local suppliers and vendors.
- Limit environmental footprint – facilitates the use of existing liquid fuel delivery infrastructure for hydrogen distribution.
- Enable emissions reduction - We aim to see 500M T of CO_2 per year abated using hydrogen energy, where Ayrton's LOHC system is managing >10M T of H_2 per year globally and displacing high-emission technologies such as diesel generators.
- Support Alberta hydrogen producers in getting their product to a wider market.
- Strengthen Alberta as a leader in hydrogen production.

4 Patents

2 Students Trained

500M T of CO_2/yr Future GHGs Reduced

20 Project Jobs

100+ Future Jobs

CURRENT STATUS

MAY 2025

Ayrton Energy has successfully completed the early phases of the project, designing and deploying a small-scale system at ATCO's Energy Discovery Centre. Next steps include leveraging the learnings from this first field pilot to engineer, build and deploy a 30kg/day system.