

# CLEAN RESOURCES

## CLEAN TECHNOLOGY

CARBON CAPTURE, UTILIZATION AND STORAGE & HYDROGEN - HYDROGEN

### FUNDING DETAILS

## Blue Hydrogen-Diesel Dual Fuel Engine Technology Development

Reducing the carbon intensity of freight vehicles is needed to help transition our economic systems towards a low carbon future. Hydrogen use in the freight transportation sector is a means to achieve this outcome, and the addition of hydrogen dual-fuel capabilities with existing freight vehicles is an inexpensive way to transition existing equipment to achieve lower carbon emissions. The ability to optimize the co-injection of hydrogen and diesel into an existing internal combustion engine is needed to ensure optimal engine performance.

In this project, a hydrogen delivery system and control software solution is being tested with a major engine original equipment manufacturer to demonstrate the co-injection of clean hydrogen and diesel into a Class 8 diesel internal combustion engine. The project aims to demonstrate this application on a full-sized engine in a laboratory environment prior to field testing. In addition, the project will develop techno-economic assessments, business models and commercialization plans.



**RECIPIENT:**  
University of Alberta



**PARTNERS:**  
Transition Accelerator



**TOTAL BUDGET:**  
\$1,659,560



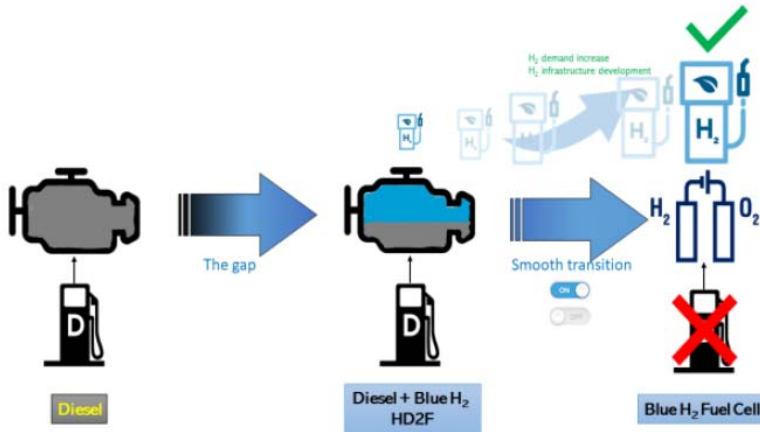
**AI FUNDING:**  
\$827,425  
TIER



**PROJECT DATES:**  
MAR 2021 –  
FEB 2023



**PROJECT TRL:**  
Start: 4  
End: 7



## APPLICATION

Hydrogen is useful as a replacement for diesel in commercial and heavy freight transportation, replacing diesel and gasoline as it releases no carbon dioxide when used, only water. This test unit will be tested at the University of Alberta in preparation for future field trials on Alberta roads. The technology can be deployed on any compatible diesel internal combustion engine.

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### PROJECT GOALS

- Develop and validate a mathematical model for equipment performance
- Optimize dual fuel engine performance under a broad range of anticipated operating conditions
- Design the hydrogen delivery unit
- Pilot demonstration of steady-state operation
- Apply artificial intelligence and machine learning processes to the engine control unit software
- Characterize emissions and tune performance to minimize emissions
- Test integrated system with engine, hydrogen storage and delivery system, and upgraded engine control unit
- Build business plans and commercialization strategies
- Prepare infrastructure for future scale-up deployment
- Launch large-scale demonstration / commercialization initiative for hydrogen-diesel dual fuel vehicles

### BENEFITS TO ALBERTA

- Development of technology that allows Alberta's heavy freight transportation sector to thrive in a low carbon economy
- Enable the reduction of carbon intensity of vehicles
- Establishment of a successful university spinoff company to commercialize the dual fuel product.
- Creation of new jobs to develop, demonstrate and commercialize the technology.
- Growth of Alberta's high tech, clean energy economy.
- Export opportunities globally for the dual fuel retrofit kit product



6 Publications



8 Students  
Trained



1 New Patent  
Anticipated



6 Project Jobs



1 New  
Product/Service



1 Spinoff  
Company



Project is an enabler  
of GHG Reduction



1,250 Future Jobs

### CURRENT STATUS

**JUN 2022**

Technology validation in laboratory and simulated environment completed. Test cell expansion, development and upgrade complete. Technology prototype testing underway, techno-economic and environmental assessment underway, commercialization strategy development underway.