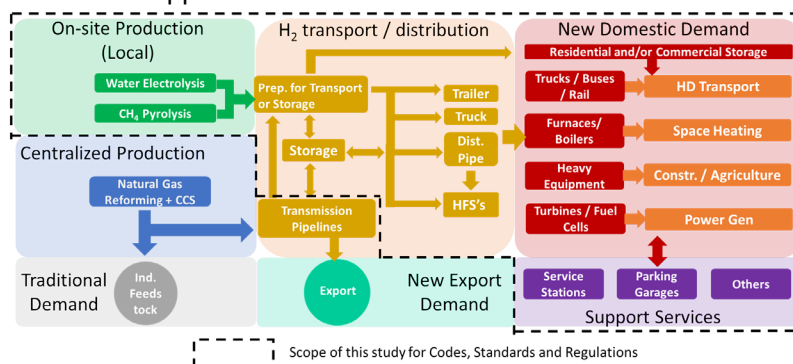


## Codes, Standards, Regulatory and Insurance Gap Analysis for Hydrogen value chain development in Alberta

This project aims to develop a risk-informed framework to assess the safety and feasibility of H<sub>2</sub>-Combined Heat and Power (CHP) systems. Using MCS alongside quantitative tools like HyRAM+ and SAFETI, this study aims to quantify leak sizes, ignition probabilities, and consequence event frequencies to determine appropriate separation distances. Additionally, a regulatory gap analysis identifies deficiencies in existing Canadian codes and compares them with international frameworks. Ultimately, the research aims to support Alberta's sustainable energy transition by providing data-driven insights to enhance safety standards, optimize risk mitigation strategies, and support informed decision-making for safely deploying hydrogen energy systems in residential and commercial applications.



#### RECIPIENTS:

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#### PARTNERS:

Strathcona County  
Sturgeon County  
ATCO Gas  
Transition Accelerator  
Alberta Infrastructure  
Alberta Energy & Mines  
AXAXL Insurance



#### TOTAL BUDGET:

\$501,700



#### AI HCOE FUNDING:

\$233,100



#### PROJECT DATES:

Aug 2023 – Feb  
2026



#### PROJECT TRL:

n.a.

## APPLICATION

This study identifies critical gaps in Canada's and specifically Alberta's regulatory frameworks that currently limit the safe and scalable adoption of hydrogen technologies across residential, commercial, industrial, and heavy equipment applications. Existing codes and standards are built mainly around natural gas systems and do not adequately reflect hydrogen's unique properties, operational hazards, or evolving end-use scenarios. The key findings from the regulatory gap analysis are summarized by application type and cross-cutting issues (references to other Alberta codes, alignment with international safety standards, and performance-based safety design criteria, informed by Quantitative Risk Assessments (QRAs).

# ALBERTA INNOVATES CLEAN RESOURCES

## CLEAN TECHNOLOGY

### HYDROGEN

## PROJECT GOALS

As Canada and the world accelerate the transition to low-carbon energy systems, hydrogen has emerged as a crucial enabler of decarbonization across sectors that are difficult to electrify. Alberta plays a key role in the hydrogen market due to its capacity to produce hydrogen for various end-user applications. The primary concerns surrounding the introduction of hydrogen into residential or commercial environments are whether people may face additional risks in the event of an accidental leak or damage. Therefore, in this study, the end-user sectors where hydrogen most likely aligns with the goals of the Alberta Hydrogen Roadmap are assessed to determine the risk levels associated with the fuel. A risk-based regulatory gap analysis identifies how codes, standards, and regulations can be revised to ensure safe infrastructure development.

## BENEFITS TO ALBERTA

- Provides data-driven recommendations for separation distances and risk mitigation, improving safety in hydrogen infrastructure development.
- Identifies gaps in existing codes and aligns Alberta's regulatory framework with international best practices, supporting safe hydrogen deployment.
- Facilitates the adoption of hydrogen-fueled CHP systems, promoting Alberta's leadership in clean energy and reducing reliance on natural gas.
- Supports Alberta's climate goals by enabling low-carbon hydrogen solutions in energy-intensive commercial buildings.
- Assists policymakers and industry stakeholders in making risk-informed decisions on hydrogen infrastructure planning, ensuring safe and efficient integration into Alberta's energy landscape.
- De-risks investment in Alberta's hydrogen infrastructure.



**11 Publications**



**3 Students  
Trained**



**0 Patents**



**0 Project Jobs**



**>500 Future Jobs**



**1 New  
Products/Services**



**1 Spinoff  
Companies**



**0 kt/yr Project GHGs  
Reduced**



**1.6 MtCO2/yr  
Future GHGs**

## CURRENT STATUS

### Sept 2025

Milestone 1: Assessment of H2 vehicle fueling and servicing, Milestone 2: Assessment of H2 distribution: Trucks and Pipes, Milestone 3: Assessment of H2 combined heat and power (CHP), and Milestone 4: End-user assessments have been completed and submitted on schedule. Milestone 5 assessments are underway: 5.1: LH<sub>2</sub> Storage at production sites; 5.2: Natural Gas-H<sub>2</sub> Blend Water Heaters, Furnaces & Burners, and Cooking Appliances; 5.3: CHP hospitals.