

## Full-scale Testing of Legacy Pipeline Materials for the Purpose of Retrofitting Existing Natural Gas Pipeline Networks for Hydrogen Service

Conducted by the PRCI Emerging Fuels Institute with C-FER Technologies, this project will lay the groundwork for understanding the impact of hydrogen on defects in existing pipelines. It includes several small-scale tests to characterize selected material types and vintage specimens extracted from legacy pipeline systems. A limited number of large-scale tests on these pipe specimens will be conducted to provide an initial assessment of the potential impacts that defects such as cracks, corrosion wall loss, dents, laminations, bends/buckles and local hard zones could have on pipelines operating with hydrogen.



**RECIPIENT:**

**Pipeline Research Council International**



**PARTNERS:**

**Alberta Innovates, Prairies Canada**



**TOTAL BUDGET:**

**\$5,487,054**



**AI HCOE FUNDING:**

**\$1,883,083**



**PROJECT DATES:**

**FEB 2024 –**

**JUN 2025**



**PROJECT TRL:**

**Start: 3**

**End: 6**



### APPLICATION

The results of this testing will provide experimentally backed technical evidence of the impact of hydrogen on vintage pipelines and its potential for pipe defects. These results will be disseminated to standards and guidelines as well as for organizations to incorporate in new and revised standards to guide Canadian, US, and European operators for the addition of hydrogen into a natural gas pipeline.



# CLEAN RESOURCES

## CLEAN TECHNOLOGY

### HYDROGEN CENTRE OF EXCELLENCE

### PROJECT GOALS

- Conducting small-scale validation tests to reduce uncertainty in full-scale tests.
- Testing a variety of pipe sizes and materials for a broader range of legacy pipeline systems.
- Streamlining, automating, and enhancing the testing systems to do more testing in less time, reduce testing costs, and accelerate testing schedules.
- Incorporating the test results in a quantitative reliability-based assessment framework to begin evaluating the impact of hydrogen on pipeline operating risk and guiding future testing programs to be able to concentrate on key uncertainties and high-risk areas.

### BENEFITS TO ALBERTA

- The current project is supported by 21 industry members, including three Canadian operators, which will incorporate the findings of the expanded project into their operations.
- Project members sit on various industry committees charged with updating international industry standards for pipeline design and operations considering hydrogen and hydrogen blends with natural gas.
- The results of this project will be widely disseminated and used to guide international standards and regulations for the safety and reliability of pipelines, including Alberta.
- At least 80% of the total project budget of CAN \$5.5M will remain in the province of Alberta. Most third-party equipment manufacturing and vendor services will be procured locally in the Edmonton or Alberta area.



**80% of funding stays within Alberta**



**3 Canadian Operators Participating**



**20 Industry Technical SMEs Participating**



**3 Collaborating Research Institutes**



**10 Highly Qualified Project Jobs (inc. 4 Trained Students)**



**7 Pipe Defect Types Evaluated**



**3 New Test Procedures Reduces Testing Time**



**5 Technical Presentations/Publications to Industry**



**4 Technical Presentations to Standards Committees**

## CURRENT STATUS

### APR 2024

Several candidate legacy pipes were identified through pre-screening, removed from service at various locations across the United States, and are currently undergoing rigorous examination for the presence of defects of interest. The high-volume, high-pressure hydrogen gas compression system required to conduct the full-scale tests has been procured and is in the process of manufacturing. Detailed design of the full-scale specimen end fixturing is underway as well as specialized fixturing for conducting the small-scale material evaluations in high-pressure hydrogen. Preparation of the full-scale test site within C-FER's Special Environment Chamber is also in progress.