Pipeline Research Council International

Greenhouse Gas Emissions Reduction SRP Update

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Research Steering Committee Meeting
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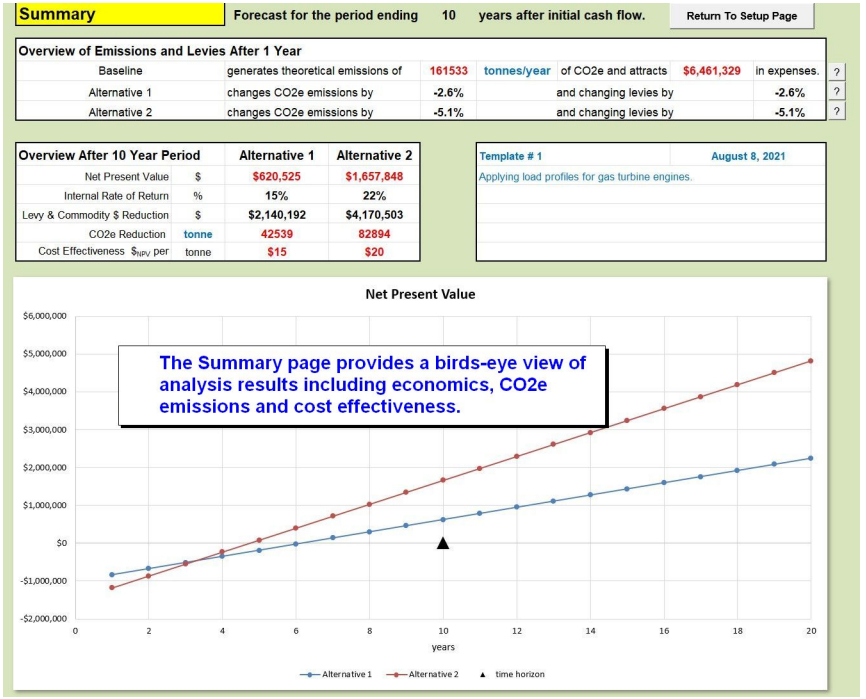
LEADING PIPELINE RESEARCH

Agenda

- Greenhouse Gas Emissions Reduction SRP Overview
- Closing the Research Gaps
- Next Steps



Above: CO2e Economic Tool Example
Left: Colorado State University's GMV engine used for lab testing in support of methane slip reduction research

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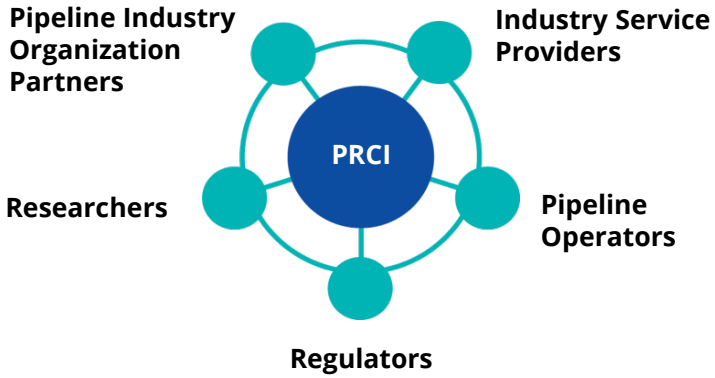
Greenhouse Gases Emissions Reduction

This Strategic Research Priority will provide greenhouse gas reduction technology in the combustion process for both fugitive and vented natural gas.

Outcomes and Value to Industry

- Understanding the carbon footprint of an operating company for the purposes of permitting new facilities.
- Improving standards for assessing performance, technological advancement and tools to mitigate emissions, and providing a standardized approach for assessing alternatives.
- Technology advancement and standards development to encourage agencies to implement more efficient and lower cost GHG regulations or permit requirements.
- Evolving regulations at the state, federal, and international levels, including carbon trading/carbon tax approaches.

Stakeholders



Industry Improvement

Developing an economic prioritization model/tool to identify the GHG reduction efforts that provide the largest net reduction in GHG emissions per net present value of spend.	Developing alternatives to natural gas pneumatic control and actuation devices, and assessing the feasibility and optimization of current alternatives
Increasing the efficiency of both compression driver and driven equipment.	Reducing natural gas blowdowns associated with pipeline repair and equipment shutdowns.
Enhancing leak mitigation programs to efficiently implement alternatives to conventional regulatory leak detection and repair programs.	Developing enhanced natural gas leak detection/ quantification methods.
Reducing fugitive leaks through compressor rod packing, gas seals, and isolation/blowdown/dump valves.	Working to change regulations that inhibit economically viable methods to reduce greenhouse gas emissions.

Closing the Research Gaps (Key Outcomes)

- **Analytic tools and data analysis**
  - CPS-17-06 CO2e Economic Analysis Tool
- **Fugitive emissions/leak detection surveys and mitigation**
  - MEAS-5-29 Evaluate Gas Venting for Common Meter Station Operation and Maintenance Activities
  - MEAS-9-02 Low-Cost Instruments to Detect/Quantify Leaking Seals, Packing, or Dump Valves
  - MEAS-9-03 High Flow Sampler Replacement
  - CPS-14-06 Continuous Monitoring and Diagnostics for Facility Efficiency
  - CPS-17-09 Evaluate In Situ Valve Repair Techniques

- Completed Research
- Ongoing Research

Closing the Research Gaps

- **Leak detection and quantification**
  - PL-1-08 Methane Leak Detection and Quantification ➡ LD SRP
  - MEAS-5-28 Flow Sensors for Continuous Monitoring and Diagnostics for Equipment Efficiency Monitoring
- **Incomplete combustion from reciprocating engines (methane slip)**
  - CPS-17-08 Reciprocating Engine Exhaust Methane Slip Reduction
  - Idea 3791 Redesign Existing Components to Minimize Methane Emissions
    - New idea to support Texas A&M and Colorado State University proposal for potential DOE funding for Methane Emissions Reduction Program.

- Completed Research
- Ongoing Research

Closing the Research Gaps

- **Blowdown reduction through capture, recovery, and flaring**
  - MATR-3-15 Methods to reduce pipeline blowdowns to effectuate repairs/inspections
  - MATR-3-15A Assessment of Temp Repair Methods
  - MATR-3-15B Industry Best Practices for Making Temporary Repairs Permanent
- **Efficiency improvement**
  - CPS-17-07 Improvements in Facility Efficiency
  - CPS-17-10 Centrifugal Compressor Station Efficiency Optimization
  - CPS-17-11 Literature Review - Advances in Plasma Technology
  - CPS-17-12 Operating Flexibility - Improve part load operating efficiency and reduce GHG emissions

- Completed Research
- Ongoing Research

Closing the Research Gaps

- **Regulatory and permitting**
  - CPS-11-09 Regulatory Support for GHG Emission Reductions
- **Emerging Fuels**
  - CPS-14-07 Fuel Reforming and Segregation as an Alternative for Compressor Fuel

- Completed Research
- Ongoing Research

Next Steps

- **Complete ongoing research**
- **Knowledge transfer**
  - Research compendium
  - Track at REX 2026 or standalone event
- **Supporting the Leak Detection SRP**
- **Standard Research Initiatives, some examples include:**
  - CPS-14-09 PCC Roadmap Compilation Report
  - Idea 3725 Follow-on Project: Validation of Next Generation Predictive Emissions Monitoring System for Gas Turbines
  - Idea 3731 Fabrication and Testing of a Medium Pressure High Momentum Fuel Injector on a GMV4 Engine
  - Idea 3687 NOx Sensor Evaluation
  - Idea 3741 Field testing of devices for GHG venting measurement

thank you

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