

Pipeline Research Council International

PHMSA Public Meeting

Pipeline Leak Detection, Leak Repair and Methane Emission Reductions

May 5 - 6, 2021

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Program Manager



LEADING PIPELINE RESEARCH

Our Mission

To collaboratively deliver relevant and innovative applied research to continually improve the global energy pipeline systems.

Our Members

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- **33 Energy Pipeline Operating Companies**

- 15 Natural Gas Transmission; 10 Liquid
- 8 Liquid/Natural Gas

- **3 Pipeline Industry Organization (PIO) Members**

- American Petroleum Institute (API)
- Association of Oil Pipe Lines (AOPL)
- Operations Technology Development (OTD)

- **34 Associate Members & Technical Program Associate Members**

- Australia, Canada, China, Europe, Japan, U.S.

- **Worldwide Research Organization**

- 45 North American Companies (U.S. & Canada)
- 25 Non-NA (Australia, Brazil, China, Europe, India, Japan, & Saudi Arabia)



AUSTRALIA
AUSTRIA
BRAZIL
CANADA
CHINA
FRANCE
GERMANY
INDIA
IRELAND
JAPAN
NETHERLANDS
NORWAY
SAUDI ARABIA
UNITED KINGDOM
URUGUAY
USA

TECHNICAL COMMITTEES & FOCUS



CORROSION

Detection, assessment, prevention, and management of galvanic corrosion and SCC; coatings; quantitative risk assessment; improvement & enhancement of CP systems



DESIGN, MATERIALS & CONSTRUCTION

Assessment & repairs; construction; design; fracture; geohazard management; materials; welding & welding inspection; structural integrity assessment



INTEGRITY & INSPECTION

NDE technology development & inspection methods; mechanical damage; pipeline integrity



SUBSEA

Offshore pipeline design; inspection & repair; integrity management

TECHNICAL COMMITTEES & FOCUS



SURVEILLANCE, OPERATIONS & MONITORING

Threat analysis & damage prevention; ROW management - environmental & third party damage; ROW protection & monitoring; **leak detection**



COMPRESSOR & PUMP STATION

Cost-effective emissions reduction & emissions monitoring; equipment reliability, availability & life extension; improve fuel efficiency & greenhouse gas emissions mitigation & reporting



MEASUREMENT

Improve custody transfer accuracy & reduce metering errors; support technical underpinnings of measurement standards **reduce lost & unaccounted for gas;** expand the operating range of existing equipment



UNDERGROUND STORAGE

Storage reservoirs, bedded salt structures & caverns; wellbore & cavern integrity & inspection; field **deliverability & facility integrity & reliability**



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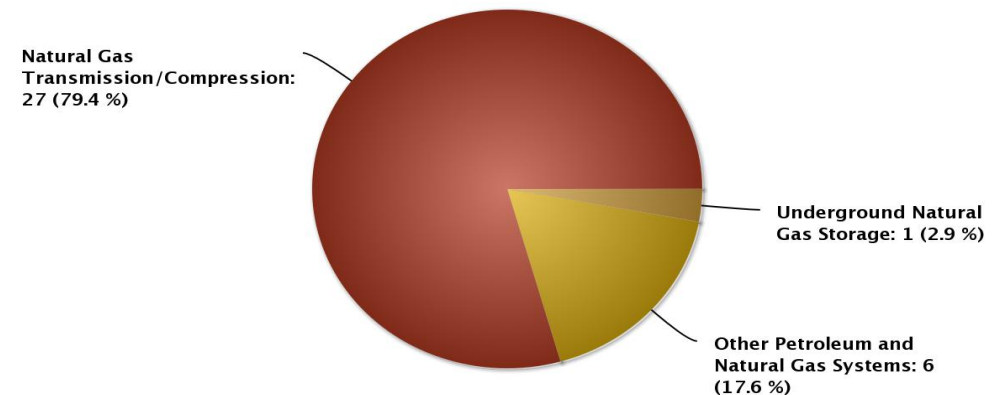
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GHG Emissions, Leak Detection & Repair Research Portfolio

Focus current and future research work on reducing in the areas of greatest impact first

2019 EPA Data Segmented for NG Transmission System Only

U.S. – Petroleum and Natural Gas Systems – Direct GHG Emissions of Selected Gases
Reported by Sector in Million Metric Tons of CO₂e



Recently Completed Projects - Emissions

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Project Title	Objective
Pump Station Efficiency Improvement Evaluation (CPS-15E)	Evaluate pump station equipment for practical opportunities to increase overall efficiency
GHG Database to Support Emission Factor Improvement (CPS-17-01A)	Data mining of subpart W data to find most effective areas to devote methane emission mitigation measures
Valve Leakage scoping study (CPS-17-04)	Evaluate options and feasibility of detecting leaking valves, quantifying leak rates, and in situ repairs
Pre-Combustion Chamber CFD (CPS-14-05)	Reduce methane engine exhaust emissions through enhanced pre-chamber design
Field Trial of Solar's Fugitive Methane Recompression System for DGS and Process Vents (CPS-17-05)	Assess the feasibility and viability of using a compressor as a capture and recovery method to reduce compressor (and other compressor station blowdown) emissions

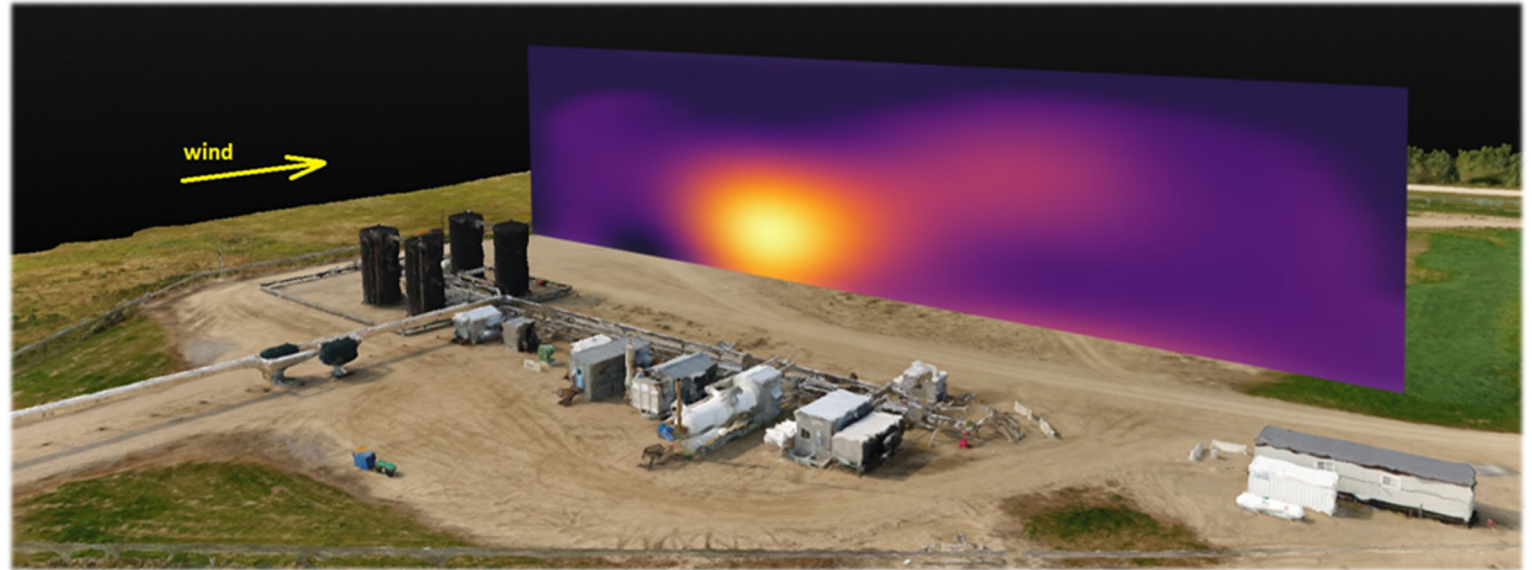
Recently Completed Projects – Gas Leak Detection

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Methane Detection from sUAV – Open Path Laser Spectrometer:

NASA JPL

Developed commercial sensor and system for handheld and small UAV for methane/ethane detection. Identifies *leak location & flux rate* based on technology from Mars Rover.



Integrated OPLS on UAS & flown successfully:

- SeekOps: Pasadena, CA
- Automated Aeronautics: Calgary, Canada
- Indro Robotics: Salt Spring Island, BC, Canada
- Swift Engineering: San Clemente, CA
- Trumbull Unmanned: Houston, TX

Licensed OPLS technology:

- RKI Instruments: Union City, CA
- SeekOps: Pasadena, CA
- Dynetics: Huntsville, AL

Recently Completed Projects – Underground Storage

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Underground Storage: Evaluating the Use of Optical Gas Imaging Cameras

- Performed field studies to examine real-world performance of OGI systems at METEC for application in natural gas underground storage
- Tested minimum detection limit camera systems across multiple days/weather conditions/imaging distances
- Tested quantification accuracy for technologies that include quantification as a feature



FLIR GF320 + Providence QL320

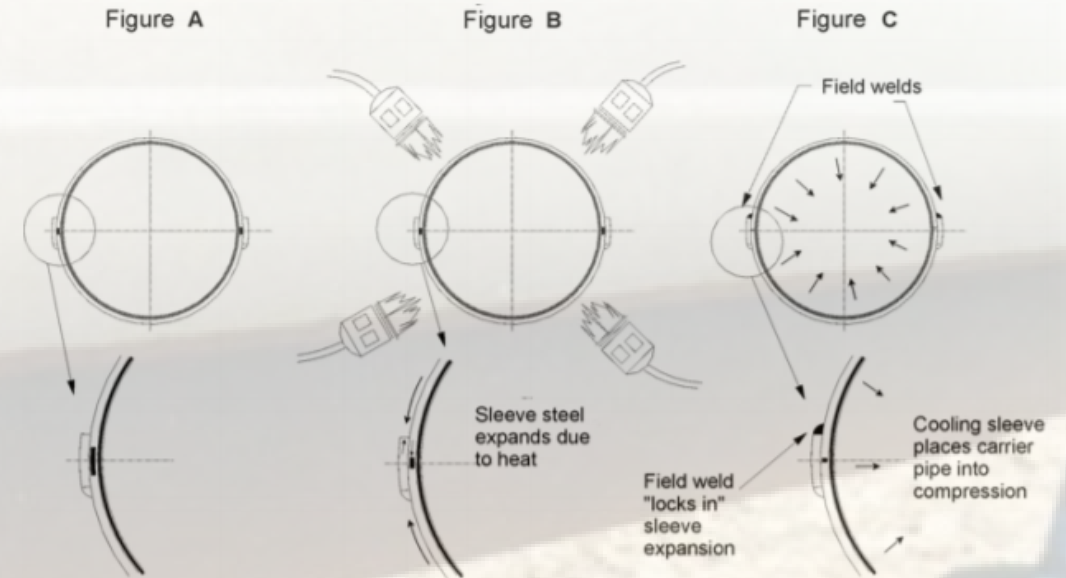


Rebellion Photonics miniGCI

Completed Projects – Repair

Pipeline Repair Manual 6th Edition

- **Widely used in the Industry**
 - Liquids and Natural Gas Pipe
- **Currently updating for a 7th edition**
 - Composite Repair Best Practices and Guidance for Transmission Pipe



PRCI Green House Gas – New Project Work

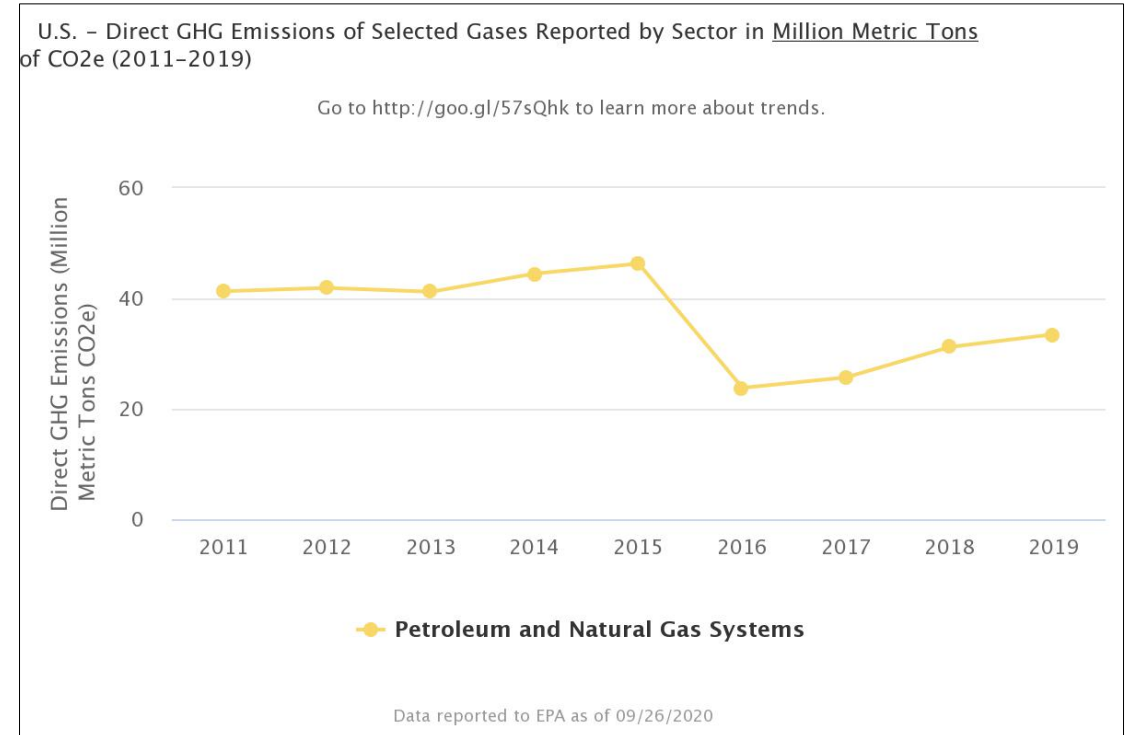
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Project Title	Objective
Carbon Economics – PHASE 1	Develop guidelines and tools for assessing the costs per annual ton of CO2e emissions reductions
CFD Modeling of Pre-combustion Chambers	Reduce methane engine exhaust emissions through enhanced pre-chamber design
Flow Sensors for Continuous Monitoring and Diagnostics for Equipment Efficiency Monitoring	Assessment of low cost retrofit technologies to install flow sensors mass to gas compressors (both reciprocating and centrifugal) and liquid pumps.
Improved GHG Fugitives Leak Detection	Developing, demonstrating and validating processes and technologies to detect, quantify, and mitigate GHG releases.
Methods to Reduce Pipeline Blowdowns to Effectuate Repairs/Inspections	Assess technologies that would facilitate pipeline repairs without requiring pipeline blowdowns

Focus Areas for GHG Leak & Emission Reductions

Additional research is needed to produce operational solutions:

- **Fugitive emissions/leak detection surveys and mitigation**
 - *Leak identification and quantification (ROW & Facility)*
 - *Rod Packing and Seals*
 - *Isolation valves*
- **Analytic tools and data analysis**
- **Incomplete combustion from reciprocating engines** (*methane slip*)
- **Blowdown Reduction** (*Capture, Recovery, and Flaring*)
- **Efficiency Improvement**
- **Regulatory and Permitting**



[GHG data for the Petroleum and Natural Gas Systems source category is not directly comparable between 2011-2015 and 2016 onwards. Facilities in the Onshore Oil & Gas Gathering & Boosting and Onshore Gas Transmission Pipelines industry segments began reporting in 2016.](#)

Areas that require additional support & resources:

- Standardized evaluation of detection quantification
- Field evaluation and validation data



Resources & Engagement Opportunities

Compendiums

- [Greenhouse Gas Emissions Reductions Compendium](#)
- [Leak Detection Compendium](#)
- [Gas Engine Emissions Compendium](#)
- [Pipeline Repair Compendium](#)

On Demand Webinars



Research Exchange: March 8-9, 2022 | Orlando, Florida

Public Research Roadmaps – Available Summer 2021

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- **2-Year Research Roadmaps per Technical Committee**
 - *Working to develop 5-year research roadmap by end of 2021*
- **Identifies Synergies and Removal of Duplication of Efforts**
- **Provides Outlook to Co-funding Opportunities**
- **Detailed Roadmaps Currently Available for PRCI Members**
 - *Public Versions Available Summer 2021*

***Connect with us to further discuss possible collaborations
and available PRCI research opportunities***



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Questions & Follow-up

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