



OTD Overview

November 30th, 2021

Mike Adamo, P.E.

Vice President of Operations

80 Year History of Turning Raw Technology into Practical Energy Solutions



400+



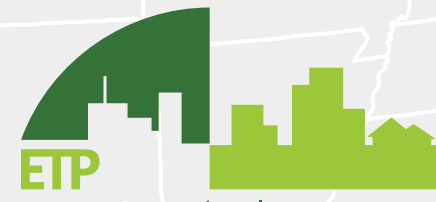

EMPLOYEES



World-class piloting facilities headquartered in Chicago area

Collaborative Organizations and Programs

Working with utilities to address critical challenges

 <p>OTD Operations Technology Development</p>	 <p>UTD Utilization Technology Development</p>	 <p>ETP Emerging Technology Program</p>	 <p>LCRI LOW-CARBON RESOURCES INITIATIVE</p>
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Operations Technology Development (OTD) Overview

Established 2003

Stand-alone, not-for-profit, member-controlled company where gas utilities work together to develop technology solutions to common issues

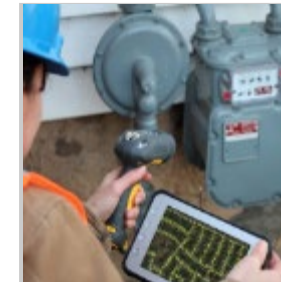
- Annual membership dues are calculated based on number of customer meters
- New projects selected by members based on needs
- Each member votes their own dollars to specific projects
- All members have access to all project information

28 Members

\$12M
annual dues

\$150-\$750k
member/yr

\$0.50
meter/yr



OTD Mission and Goals

MISSION

- > Identify, select, fund, and oversee research projects resulting in innovative solutions and the improved safety, reliability, and operational efficiency of natural gas systems





















GOALS

- > Enhance safety
- > Enable operational excellence
- > Minimize environmental impact
- > Practice good science



OTD Members

Serving 50 million gas consumers in the U.S., Canada, and France

Technology Focus Areas

OTD Working Groups

- Smart Utilities
- Risk & Integrity Management and Environmental Matters
- Infrastructure and Gas Operations



Crosscutting

- Safety & System Integrity
- Efficiency of Operations
- Renewable Energy and Alternative Fuels
- Smart Energy Future

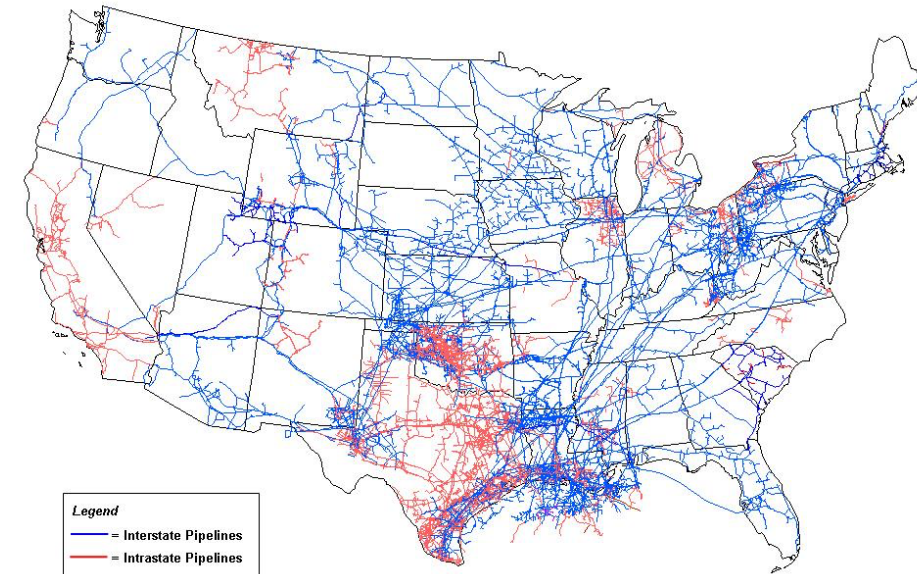
Enabling Gas Infrastructure for Hydrogen

Current OTD/SMP Projects

- OTD 7.19. h Hydrogen Working Group
- OTD 6.14.b Effects of Hydrogen Blending in Natural Gas on Material Properties and Operational Safety Ph1 and Ph 2
- OTD 7.21.d Accuracy of H2 Analyzers and Survey Instruments
- SMP Development of Hydrogen Embrittlement Model for Steel Piping – Phase 1
- SMP Hydrogen/Natural Gas Mixture Impacts on Legacy and Advanced Res/Com Combustion Equipment
- SMP Embedded Hydrogen Microsensor

Other Select GTI Projects

- CPUC Modeling of H2 Blending Impacts on Leak Rates and Pipeline Components
- NYSEARCH Hydrogen Blend Impacts on Elastomer Materials
- Technical Consulting on Company Specific H2 Blending Pilots
- Preliminary techno/econ analysis on converting natural gas transmission infrastructure to transport up to 100% hydrogen
- SoCal Gas Upstart Residential Solid Oxide Fuel Cell Laboratory Evaluation
- UTD 1.20.h High Hydrogen-Content Fuel in Residential/Commercial Combustion Equipment



New Hydrogen Projects

Recent Funding Awards to GTI from the Department of Energy

- DOE EERE - HyBlend Collaborative Research Partnership: NREL is the National Lab Lead, GTI is the Industry Lead
- DOE EERE – Hydrogen Education for a Decarbonized Economy
 - EPRI is the lead, GTI is a project partner
- DOE Fossil – Energy Storage
 - Hydrogen Storage for Load-Following and Clean Power
 - Hydrogen Storage for Flexible Fossil Fuel Power Generation
 - Hydrogen Pipeline Storage for Power Generation on Texas Gulf Coast
- DOE Fossil – Net Zero Carbon Electricity and Hydrogen Plants
 - Wabash Valley Resources is the lead, GTI is a project partner – Terra Haute gasification facility
 - EPRI is the lead, GTI is a project partner – Nebraska Public Power District Host Site

HyBlend Project To Accelerate Potential for Blending Hydrogen in Natural Gas Pipelines

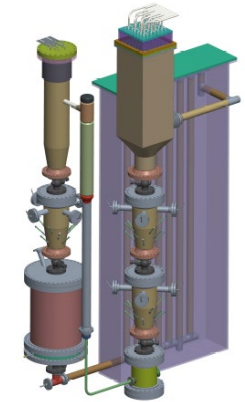
NREL Will Lead Multi-Lab, Multi-Industry R&D Effort To Overcome Technical Challenges

Nov. 18, 2020



Photo from iStock

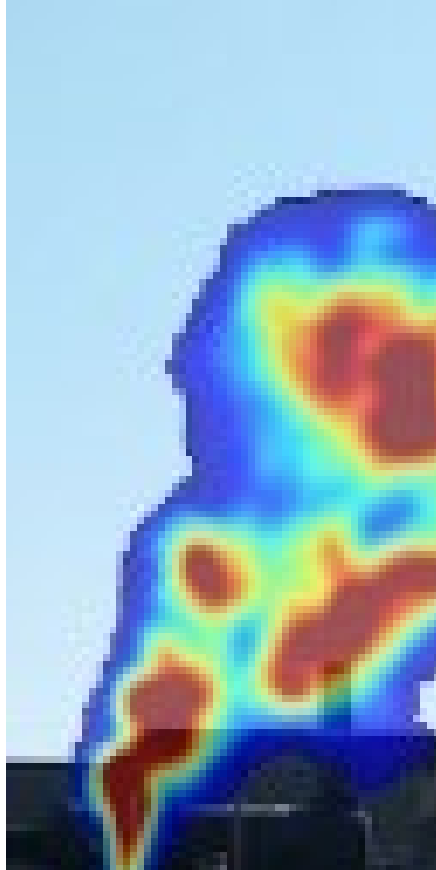
GTI Hydrogen Generator



Methane Detection and Remote Sensing

Flexibility to deploy multiple technology SOLUTIONS

- Technology Development
- Technology Evaluation
- Modeling
- Methodologies
- Measurement Studies



Technology

- Sensor Type
- Detection
- Quantification
- Measurement



Platform

- Hand-held
- Vehicle
- UAVs
- Drones
- Aircraft



Asset

- Pipelines
- M&R Stations
- Compressor Stations
- Meters



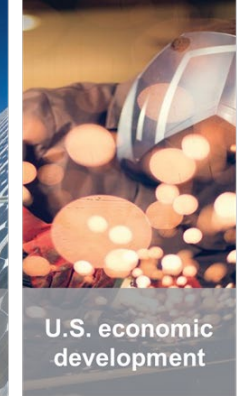
Use Case

- Leak survey
- Leak Investigation
- Stationary Monitoring
- First Responder

ARPA-E REPAIR – Technical Specifications and Steering Panel

Program Goals

- Rehabilitate cast iron and bare steel natural gas distribution pipes to 50-year service life
 - Reduce costs compared to pipeline replacement by minimizing excavations and using advanced coating, robotics, and novel inspection techniques
 - Investigating multiple coating technologies
- Create 3-D maps of pipelines and adjacent underground infrastructure
 - Integrate rehabilitation/materials/inspection data into real-time visualization tools
 - Investigate in-pipe and surface-based technologies
- Facilitate commercialization by engaging key stakeholders (regulators and utilities) through the Technical and Test Specification Panel
 - Program will be successful only if technologies are used
 - TTSP input is critical to the success of REPAIR
- OTD is managing and coordinating the TTSP



Contact

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