



GTI ENERGY

solutions that transform

GTI Energy's Advancements in Leak Management in Distribution:

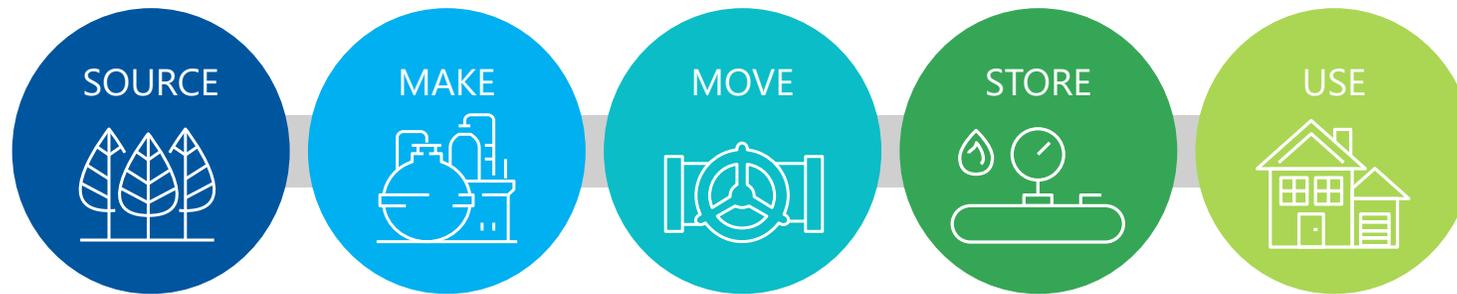
Leak Detection And Repair (LDAR), Veritas, and Renewable Natural Gas (RNG)

Srijana Rai – Principal Analyst, Zero Emissions Systems

WI PSC Pipeline Safety Seminar | February 4, 2026

GTI Energy “At-a-glance”

Our trusted team collaborates with the operators of energy systems to progress the performance of those systems by leveraging gases, liquids, infrastructure, efficiency and operational know-how.



Enterprise Employees

590+



Partners in Active Collaborations

175+

80+ years of experience and leadership in energy production, storage, delivery and use

Research & Development

\$1B+

In the past decade

Leading and convening collaborative R&D

Innovation & Commercialization

1,300+ Patents

500 Products

750+ Licensing Agreements

10+ Industry Collaboratives



Leak Detection Projects Portfolio

Purpose: Supporting pipeline safety, emissions reduction, and technology advancement through a diverse portfolio of DOE, utility, and industry funded projects.

- Projects Spanning Methane Detection, Pipeline Integrity, Hydrogen Blending, and Advanced Materials.
 - Broad coverage across technologies relevant to pipeline safety and regulatory modernization.

Funding Sources

- Federal
 - DOE
 - PHMSA
- Industry
 - Direct
 - Collaboratives
 - OTD
 - Veritas

Domains with Active Work

- Leak detection & quantification
- Pipeline defect characterization
- Hydrogen effects on pipelines
- Methane mitigation technologies

OTD Members

Serving more than 70 million gas consumers in the U.S., Canada & France



XX projects related to LDAR

Optical Gas Imaging (OGI) & Handheld Laser Methane Detectors (HLMD)

Testing conducted by GTI Energy and Heath Consultants personnel at CSU's Methane Emissions Technology Evaluation Center (METEC)

- OGI Device: OPGAL EYE-C-Gas
- HMLD Device: RMLD-CS from Heath Consultants



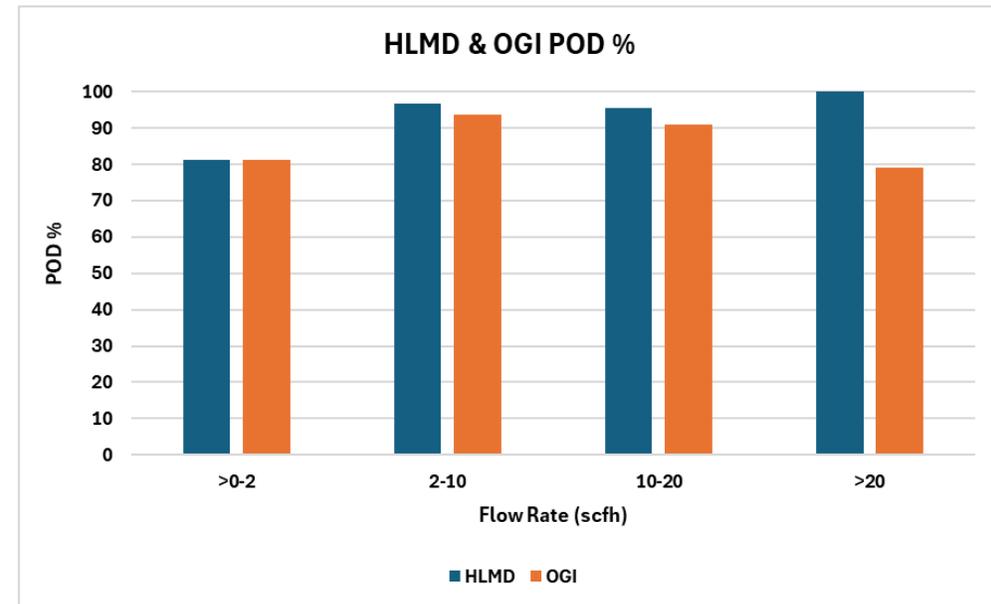
OGI Device: OPGAL EYE-C-Gas



HMLD Device: RMLD-CS from Heath Consultants

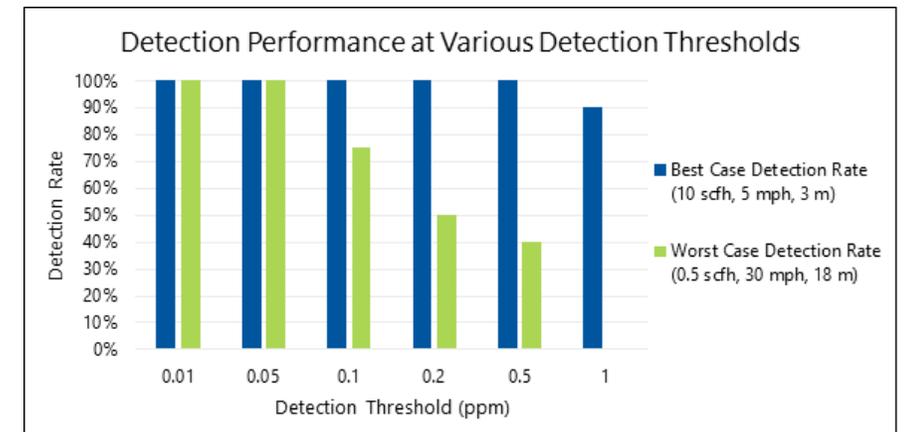
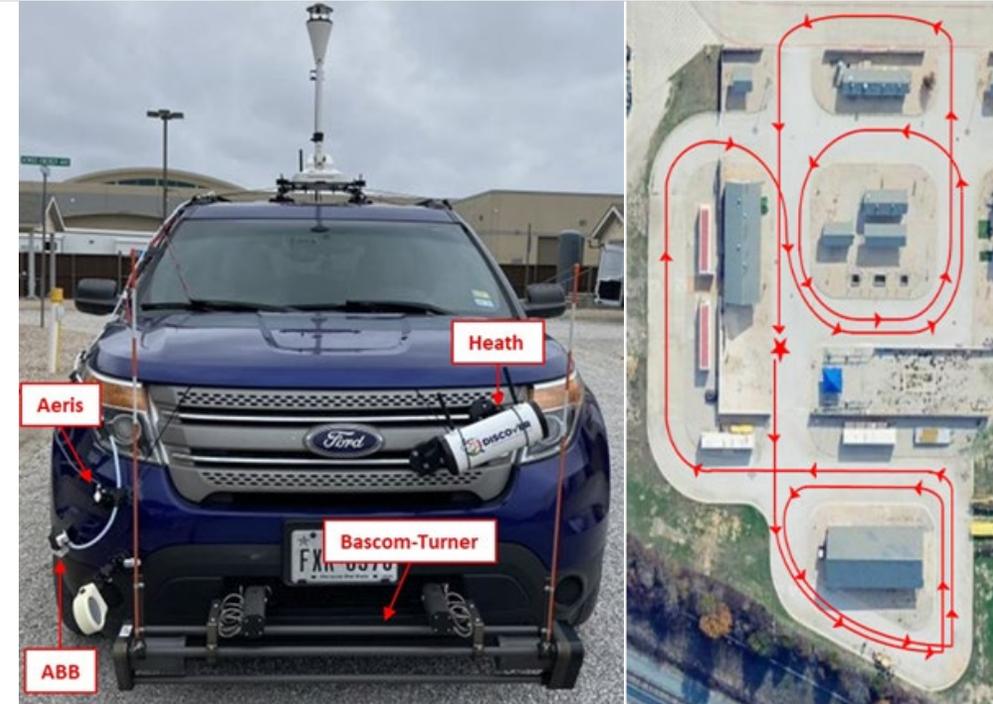
Key Findings

- Both OGI and HLMD successfully detected above-ground leaks with high confidence under the study conditions.
- No major performance differences across tested leak sizes



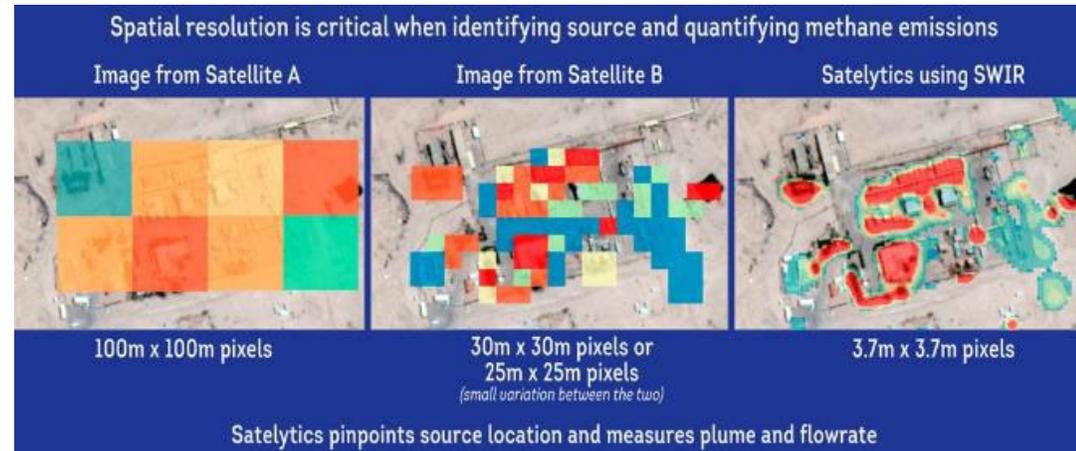
Advanced Mobile Leak Detection Systems: Field Work & Key Findings

- **Objective:** Evaluate leak detection performance of current commercially available Advanced Mobile Leak Detection (AMLD) systems
- **Approach:**
 - Controlled facility tests with direct & obscured leaks
 - Open-field tests with varied leak rates, distances & vehicle speeds
- **Key Findings**
 - Detection influenced by leak rate, distance, and vehicle speed
 - Significant drop in detection above ~20 mph
 - Reduced detection > 18 meters from leak and for leak rates < 5 scfh
 - Higher-sensitivity instruments show higher Probability of Detection (POD)
 - Phase 2 (initiated Aug 2025) expands findings to real-world field conditions

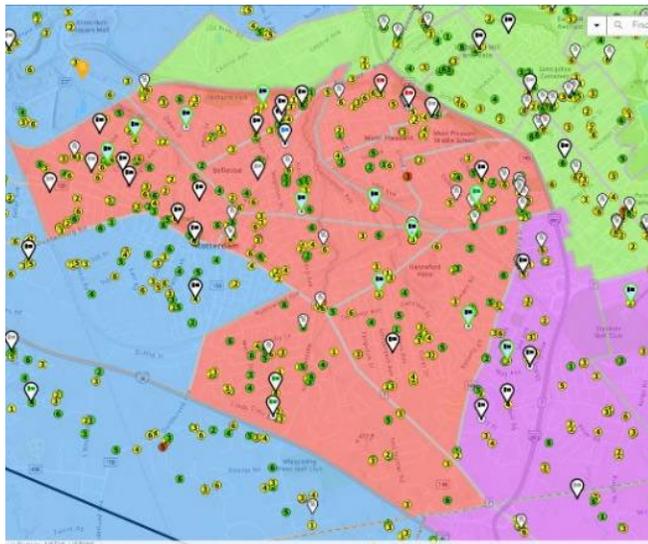


Satellite Methane Detection for Distribution Applications

- Conventional satellite detection limits are typically in the tons-per-hour range, but several companies now claim sensitivity relevant to distribution-level leaks.
- Satellites can measure entire networks in a single day, offering broad system coverage.



<https://www.satetytics.com/resources/2022-methane-measurement-a-quick-comparison>



ArcGIS-based indication and plume data map to organize satellite flags and direct field investigations.

GTI Energy Project: Investigate current satellite analytics and assess applicability for distribution and transmission leak detection use cases.

Key Findings:

- Limited value for leak prioritization
- True Positive Rate: 33–38%; False Negative Rate: 27%
- High volume of indications may strain investigation resources
- Good at confirming known leaks; effectiveness for new leak discovery remains uncertain
- Additional testing needed to validate operational use

Hydrogen Blends & Methane Leak Detection: Methods & Key Results

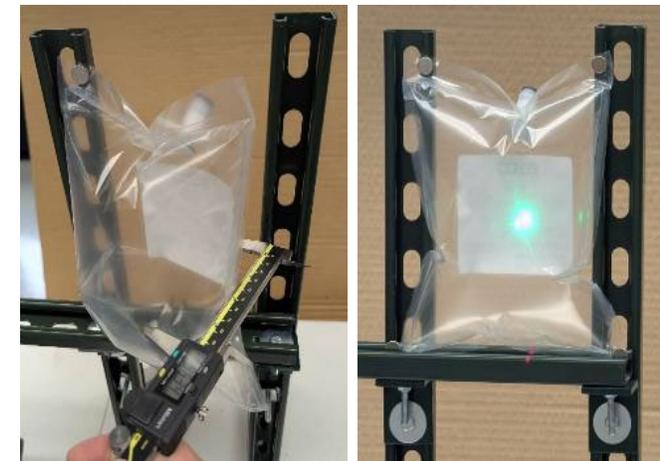
PHMSA/OTD study on leak detection & instrument integrity for NG/H₂ blends (lab + field, up to 20% H₂).

- Methods:

- Lab: Open-path laser testing with Tedlar® bags (concentration) and free-flow leak simulations.
- Field: Three campaigns at gas training facilities; pumped & laser devices at aboveground, belowground, and indoor appliance leaks.



- Key results – Open-Path Laser:
 - Consistent detection across devices
 - Slight drop near ~10 ppm threshold
 - No major performance change at 15 ft / 30 ft
 - H₂ up to 20% does not degrade leak detection
- Key results – Cross-gas sensor behavior (CGI Device 4):
 - CO & H₂S readings increase as H₂ blend rises (carryover artifacts)
 - Care needed to avoid sensor cross-interference



Acoustic Leak Detection Sensors

- Initial review of commercially available acoustic handheld instruments for aboveground gas distribution leak detection and quantification.
- Testing in progress:
 - Preliminary field evaluation of single instrument with vendor at a sponsor site
 - Preliminary laboratory evaluation with four devices
 - Unique features of the devices:
 - Agnostic to gas composition
 - Detection is predicated on sound pressure
 - Measures leak rate vs path integrated concentration which is more common



Vendor Technology Testing

Geo Technica

Optical Gas Imaging



- Lab Testing at GTI and Experimental Field Controlled Testing at GTI's Pipe Farm
- Dynamic Field of View demonstrated to optimize Search, Locate, Measure
- Significant and critical design elements have been accomplished, resulting in an initial prototype that has demonstrated essential functionality, performance and cost.



Xplorobot Instruments:

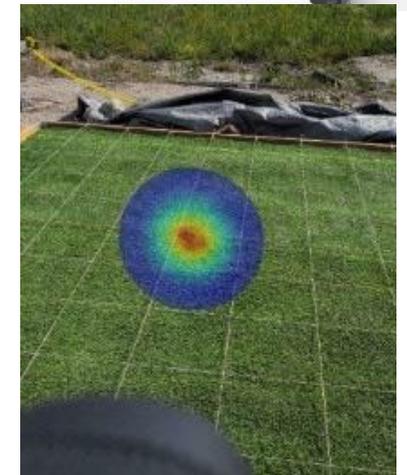
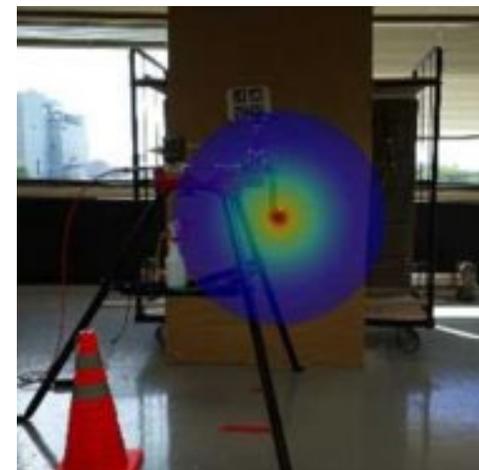
Rover & Genesis

- Vendor performed onsite testing both in in lab and Pipe Farm
- Capable of getting to very low flow rates with the wide angle instrument – the narrow devices became difficult to use as “finding” the plume became difficult

Xplorobot Laser OGI
missions monitoring under US EPA Title 40 CFR §

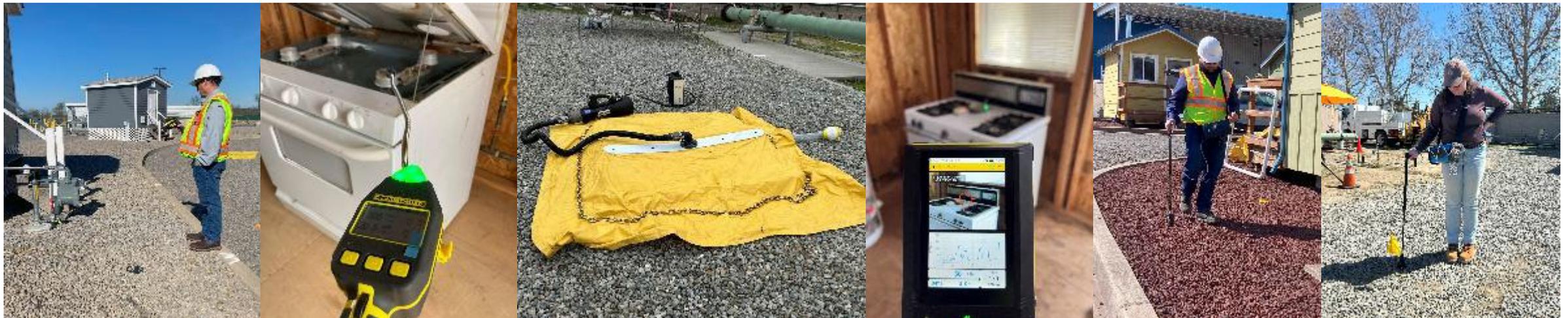


Lawrence Berkeley National Laboratory, DOE-sponsored METEC center and A
@ xplorobot



Field Testing Setup

- Three field campaigns at gas training facilities to test pumped and laser devices in simulated field conditions at aboveground meter leaks, belowground leaks, and leaks on indoor appliances.
- Ten passes were made through each leak location at normal sweeping/probing survey speed.
- The number of detections out of ten and peak measured concentrations were recorded.
- Flow rates were estimated using a high-flow sampler instrument.



Consumer Safety: Enhancing Safety Through Adoption of Natural Gas Detectors

- NGDs are commercially available however, there is low customer adoption
- Extensive laboratory testing of commercially available NGDs
- National pilot study was conducted to collect performance data in various residential settings



Recent NTSB findings have recommended the use of natural gas detectors

Improve Accuracy and Reliability

- Work collaboratively with manufacturers to ensure commercial products deliver safety enhancement expectations for the gas industry

Adoption of Codes and Standards

- NFPA code for NGD use and installation
- Modify existing UL 1484 standard with emphasis on lower detection limit
- Certification through International Code Council

Enhanced Awareness and Education

- Continue stakeholder education and outreach and develop formal advocacy plans

Product Advancement

- Determine optimal placement of detectors based on U.S. building construction practices and typical ventilation effects

PHMSA LNG LDAR Gap Analysis

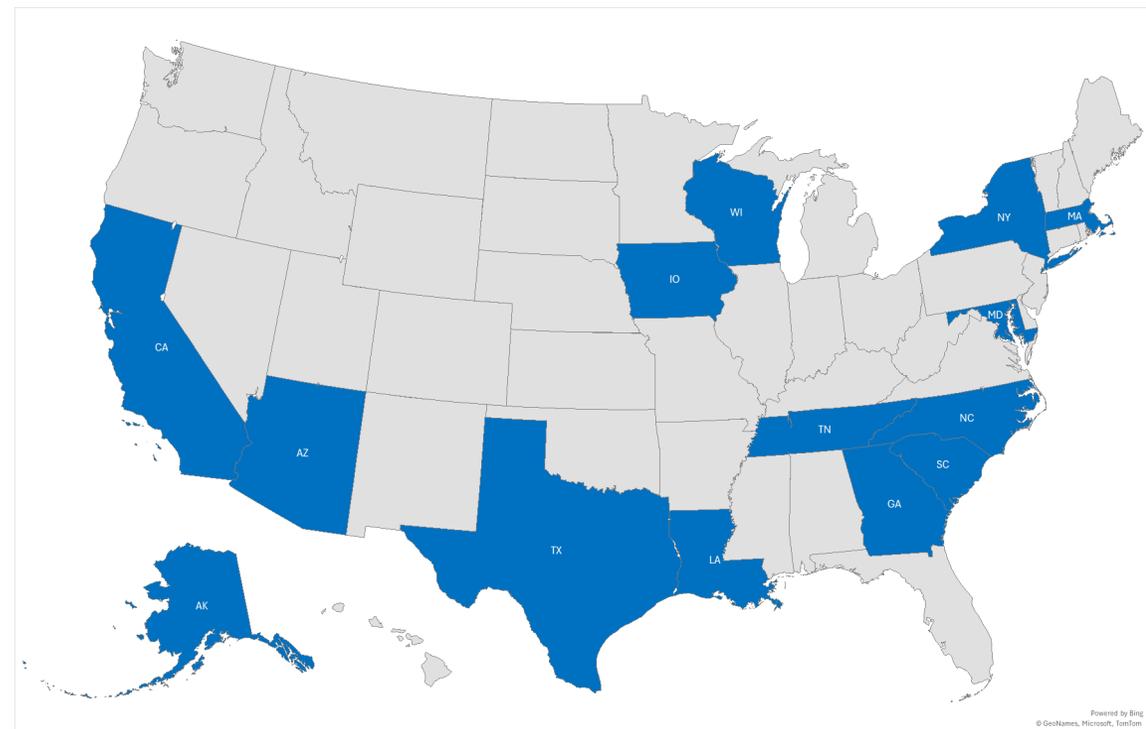
Objective: Identify regulatory gaps/duplications across federal & state LNG LDAR requirements and assess feasibility of a centralized LDAR data portal.

Approach: Reviewed 20+ federal and state regulations; engaged a Technical Advisory Panel (industry & academia) and conducted an operator survey (9 responders).

Federal Codes Reviewed

- PHMSA 49 CFR Part 193 & recent proposed amendments
- 40 CFR Part 60, Subparts VV/VVa/VVb
- 40 CFR Part 60, Subparts OOOOb/OOOOc
- EPA GHGRP Subpart W
- NFPA 59A

State Codes Reviewed



Regulatory Gap Analysis Outputs

Findings:

- Regulations varied between incident-based repairs and annual leak-reporting requirements
- Substantial variability in requirements → survey frequency & repair expectations.
- Highly variable reporting requirements and platforms.
- Operators support best-practice sharing, hesitant toward public data disclosure (prefer anonymized/aggregated).

Recommendations:

- Harmonize LDAR expectations across PHMSA/EPA/state regulators.
- Use a phased, anonymized portal model to build trust
- Continue collaboration-driven alignment to streamline compliance.

Veritas for Distribution: Leak Detection & Management



GTI ENERGY'S METHANE
EMISSIONS MEASUREMENT
+ VERIFICATION INITIATIVE

Measurement-informed approach that replaces traditional emission-factor estimates with verifiable leak data.

Streamlined mobile survey planning: local system differences require coordinated routing and deployment.

Integrated data flow from field tools into central systems strengthens leak tracking and repair management.

Cross-functional alignment (operations, IT, environmental) is essential for consistent implementation.

Prioritizes high-impact sources, enabling smarter use of detection technologies and more efficient surveys.

Supports continuous improvement, with annual cycles refining coverage, methods, and uncertainty reduction.

RNG Projects Portfolio

Active Work

- RNG Trace Constituent Database: Maintaining/expanding industry gas-quality dataset to enable safe RNG integration and informed decisions.
- Siloxane Measurement: Field evaluation of online GC-IMS vs. offline lab methods to standardize and de-risk siloxane monitoring.
- On-Line Biomethane Monitoring: Near-real-time detection of BTEX, siloxanes, organic As, halogenated HC, nitrosamines for operational risk management.
- Food-Waste Biogas Constituents: Lab digestion by feedstock category to characterize trace compounds and inform tariffs/cleanup design.

Recently Completed

- RNG Workshop: Multi-stakeholder convening; analysis shows properly upgraded RNG interchangeable with geologic NG (vs. stringent CA specs). Next workshop proposed for Spring 2026.
- Biochar-Microbial Siloxane Removal: Lab results show up to 90% siloxane removal with biochar-enhanced systems (Bio Lab).
- Innovative Gas Analyzers for RNG: Benchmarked 16 commercial + 2 emerging analyzers; GC remains most robust for custody transfer; new tech promising; follow-on likely in 2026.



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Questions / Comments

GTI Energy develops innovative solutions that transform lives, economies, and the environment

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