



# Implementing Technologies - Challenges and Success Stories

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# GTI Energy Overview

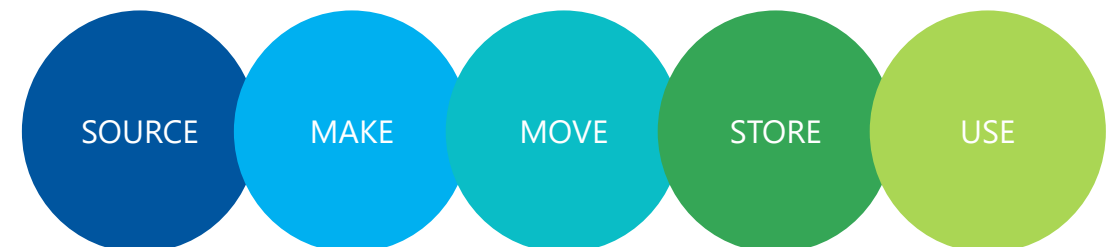
*Serving the Energy Industry Since 1941*



- GTI Energy is a leading research and training organization focused on developing, scaling, and deploying innovations that support low-carbon, low-cost energy systems.
- Our energy solutions transform lives, economies, and the environment.
- Technology development focus on safety, improving efficiency, and reducing emissions
- Research Facilities
  - 18-acre campus near Chicago
  - Laboratories in Agoura Hills, CA & Davis, CA
  - Pilot and demo facilities worldwide

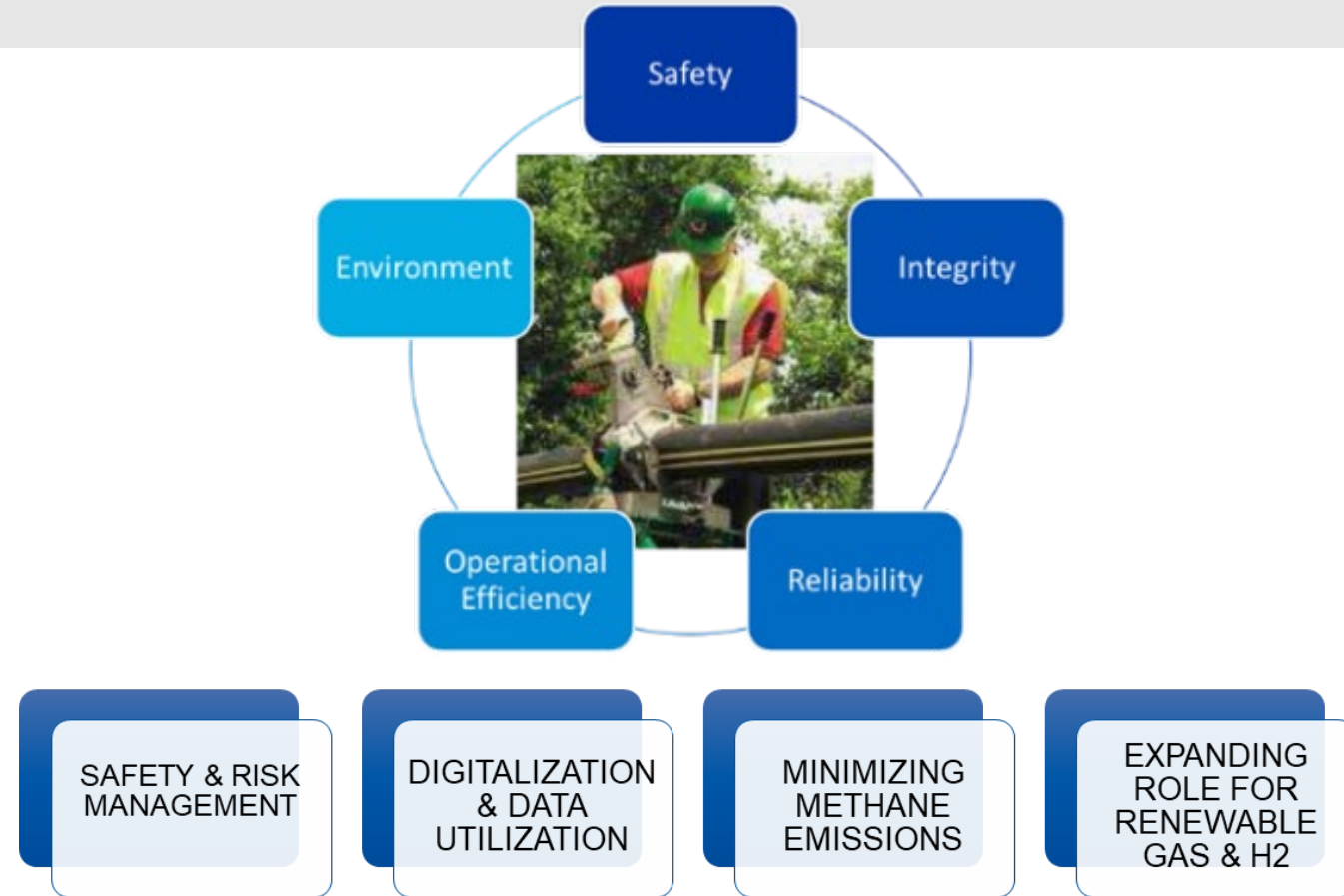


**Across the entire energy value chain**



# GTI's Energy R&D Program

- GTI has an expanding R&D portfolio focused on industry priorities:
  - **Safety, Integrity, Reliability, Operational Efficiency, and the Environment**
- Collaborative R&D efforts:
  - Highly cost effective
  - Leverages collective intelligence and experience of funders to develop the best possible solutions



# Enhancing Safety Through Adoption of Residential Methane Detectors

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



Recent NTSB findings have recommended the use of residential methane 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 RMD 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

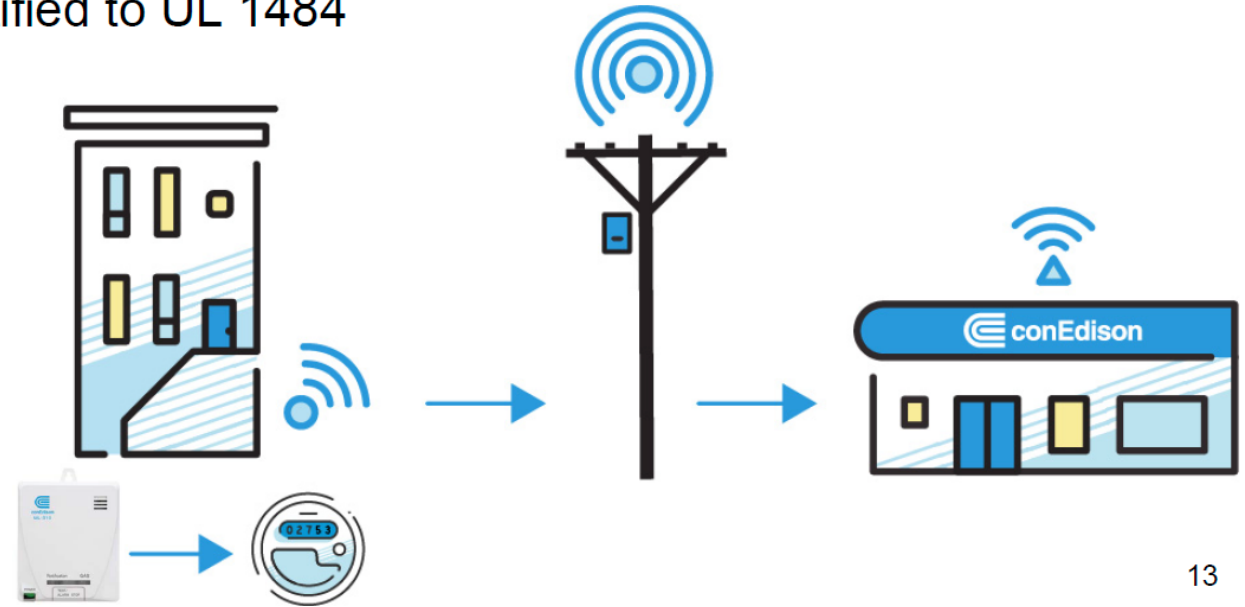
- Determine optimal placement of detectors based on U.S. building construction practices and typical ventilation effects

# Con Edison Efforts



## Detect > AMI Enabled Natural Gas Detectors

- Company asset
- Battery powered - 7 yrs.
- Certified to UL 1484
- 10% LEL alarm (0.5% gas-in-air) exceeding UL 1484 minimum alarm requirement!



# Natural Gas Detectors (RMDs)

## Residential Natural Gas Detector Program at GTI

- Extensive product testing
- Consumer Behavior Study
- National pilot field trials with various operators
- Modified standards to meet industry needs
  
- Con Edison initiate program in New York and was successful due to:
  - Support from the top, internal champions, proper planning, etc.

# Tracking & Traceability

Funded from OTD and with industry support - created unique identifier for distribution asset tracking and traceability

- ASTM F2897-11a
- Manufacturer implementation through barcoding
- Purchasing Specification Guidelines for Barcode Marking
- Continued industry and OTD funded initiatives to assist with implementation
- Created Locusview to support Utility implementation and provide a necessary tracking & traceability service for the industry

Character Number	Source	Description of Information	Character	Information
1	<a href="http://www.componentid.org">www.componentid.org</a>	Name of component manufacturer	A	Corresponds to list on <a href="http://www.componentid.org">www.componentid.org</a>
2			C	
3	Component Manufacturer's lot code	Information which can help ascertain relevant traceability information upon request	5	Corresponds to the mfg lot number input of 1234567
4			b	
5			a	
6			n	
7	Component production date code per 5.3	Date of manufacture of given component	0	Corresponds to production date of 1/4/2010
8			6	
9			C	
10	Component material type per Table 3	Material used for component	B	PE 2708
11	Component Type per Table 4	Component type	8	Electrofusion tapping tee with a stab outlet
12			F	
13	Component size per 5.6	Component size	2	Corresponds to size code of 2" IPS SDR11 x 1" IPS SDR11
14			m	
15			X	
16	<a href="http://www.componentid.org">www.componentid.org</a>	Reserved for future use	0	Default value

# Keyhole Technology – an implementation program

- Method of viewing or working on underground utilities through small holes or “keyholes” (minimally invasive excavation)
- Combination of coring, vacuum excavation, and long-handled tooling





# Keyhole Technology – an implementation program



- A long running program at GTI to support the implementation of keyhole construction methods (minimally invasive excavation)
- The keyhole program assisted with implementation of Keyhole by:
  - Communicating with the industry through industry events & webinars
  - Creating procedures and sharing of information
  - Performing demonstrations and assisted with training
  - Helping to develop tooling and procedures to meeting needs
  - Assisting with Jurisdictional acceptance
  - and much more!

# Natural Gas Safety Devices

- What Can Happen to “At Risk” Meters and Other Aboveground Piping?



# Breakaway – Shut off Device

Vehicular Impacts and Falling Snow and Ice

- Breakaway disconnect/shutoff can be easily installed to protect meter sets and other above ground piping.
- Reduce risk from vehicle collision, seismic events, falling ice & snow, etc.



## Features & Benefits

### Ideal For Any High-Risk Meter Sets

- High-Traffic Areas
- High-Snow Areas
- Installation in addition to bollards or where they aren't practical

**Immediately seals** in the event of a hard impact

**Hajo  
Valve**

# HaloValve Now Commercially Available



**Halo  
Valve**

- [www.HaloValve.com](http://www.HaloValve.com)
- Available in ¾" and 1" diameters of various lengths and end configurations
- High and Extra-high Pressures



## However...

- 49 CFR 192.353 requires each meter and service regulator to be protected from damage, including vehicular damage that may be anticipated.

# High Pressure Plastic Pipe – PA11 & PA12



## PA11 & PA12 Operating considerations...

- Can operate up to 250 psig
- Coil and Stick pipe available
- Diameters up to 6-inch
- Uses same equipment that you already use for PE

## PA11 & PA12 Benefits...

- Lower installation costs compared to steel piping systems
- Eliminates maintenance costs due to corrosion protection
- Similar benefits of using PE pipe but can now be extended for applications up to 250 psig

## High Pressure Plastic Pipe – PA11 & PA12

- Over the past 50 years, the nat. gas distribution has transformed from a near-exclusive metallic distribution piping network to a near-exclusive thermoplastic piping distribution network.
- This transformation has saved US natural gas utilities more than \$10 Billion in installation and maintenance costs.
- GTI conducted a comprehensive research program to validate PA11/12
- Procedures and standards were developed and implemented (ASTM)
- Numerous installations “on system” under Special Permits approved by the Department of Transportation and State Commissions.
- CFR 192 – Limitations for the use of plastic pipe to no more than 100 psig

# Barriers to Implementation of New Technology

**Before you can get the benefits of adopting new technology in business, you have to overcome some of these challenges.**

- Legacy culture thinking/Reluctance to change in staff and management
- Staff untrained on how to use new technology
- Price and time to procure the new tools and technology
  - Embracing new technology costs money and takes time
- Plan for new technology implementation is ineffective or missing altogether

# Change Management

**Successful change management can ensure smoother transitions, minimize resistance, increase engagement and improve the overall effectiveness of new systems and processes.**

- Clear communications
- Employee involvement
- Agile approach
  - Implement changes in smaller, manageable stages
- Leadership support
  - Demonstrate the commitment to change



# Futuristic Technology

- Did you know that in the early 1900s 1/3 of all vehicles on the road were electric?

What went wrong?

- They started to quickly disappear around 1920 with the introduction of petrol and Henry Ford.
- Ford Model T, the right vehicle at the right time.



# 1990's – Electric Vehicle Flop

## GM's EV1 Electric Car

- The EV1 was the first mass-produced electric vehicle by a major automaker.
- A total of 1,117 EV1's were produced and GM pulled them back from customers and crushed them.
- CARB mandate requiring automakers produce % of emission free cars

**Was the first mass-produced electric car simply ahead of its time?**





**GTI ENERGY**

*solutions that transform*

# Questions / Comments

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

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