DeNOva Detect®
Smarter Gas Leak Safety

GOING BEYOND THE NOSE

A Proven Addition to Gas Odorization

A Critical Layer of Protection for Natural Gas Safety

Marc A. Adams, Vice President

OUR MISSION

*TO PROTECT **PEOPLE** AND **LIVES** WITH INNOVATIVE GAS SAFETY PRODUCTS*

65 YEARS

Eliminating gas accidents around the world is at the heart of everything we do.

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KEY INDUSTRY CONSIDERATIONS

Utilities

Employee Safety & Awareness
Automated Meter Infrastructure (AMI)
Rate Base Justifications (Repair/Replace)
Odorization + Natural Gas Detectors

Regulators

Gas Service Line Inspections
Gas Leak Detection Solutions
Indoor Meter Monitoring
Rate Payer Advocacy (Expenses)

First Responders

Firefighter Safety Measures
Gas Safety Advanced Technology
Safety Training & Education Practices

Residents

Seniors, Schools, Low Income Areas
Community Safety Awareness
Education, Advocacy, Adoption

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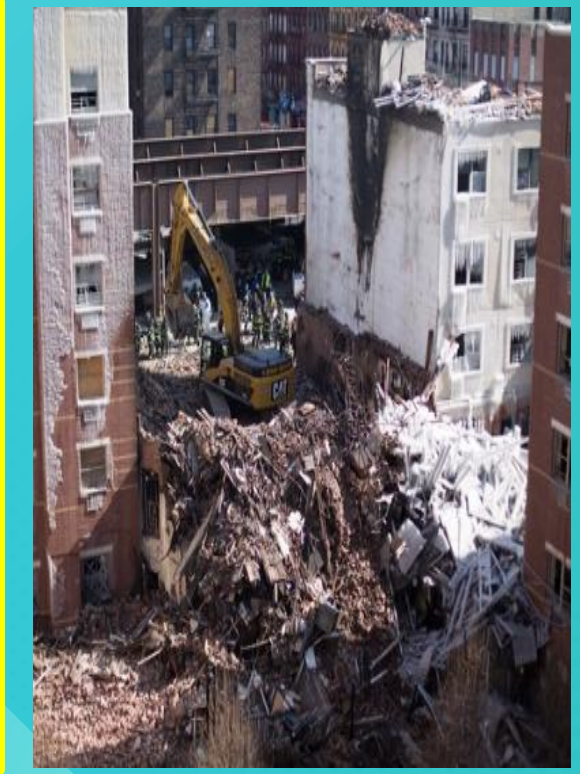
CATALYST EVENTS

15 Fatalities: Shizouka, Japan explosion, 1980



8 Fatalities: East Harlem, New York explosion, 2014

2 Fatalities: East Village, New York explosion, 2015

7 Fatalities: West Reading, Pennsylvania explosion, 2023

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NTSB RECOMMENDATIONS

REGULATORS

- Require the installation of automatic shutoff valves or remote-control valves in high-consequence areas (HCA) and in class 3 and 4 locations
- Require natural gas alarms in residential occupancies with gas service

INDUSTRY GROUPS

- Revise the National Fuel Gas Code (NFPA 54) to require natural gas alarms for all types of residential occupancies with gas service
- Add guidance identifying steps gas distribution operators can take to safely respond to leaks, fires, explosions, and emergency calls

GAS OPERATOR | SAFETY IMPERATIVES

- Education about Natural Gas Detectors
- Advocacy for Smarter Gas Leak Detection
- Adoption of Natural Gas Detectors wherever people congregate

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On March 24, 2023, a natural gas explosion at the R.M. Palmer facility in West Reading, Pennsylvania resulted in fatalities, injuries, and structural damage. The NTSB's April 2025 report underscored the value of layered safety measures—including evacuation protocols and gas detection alarms—in reducing risk and supporting the safe, reliable use of natural gas.

"Natural gas alarms can alert people of a gas leak so they can evacuate the area."— NTSB Pipeline Investigation Report PIR-25-01

Natural Gas Detectors: 101

Key Requirements for Gas Leak Detection Prioritization

Standards-backed: UL-1484 defines device performance; NFPA 715 defines installation, bringing fuel-gas detection alongside smoke/CO frameworks.

Safety threshold: Devices warn at 10% LEL and are not ignition sources when used as listed.

Clarity in communications: Methane is not Carbon Monoxide, and detecting a natural gas leak requires distinct placement and actions.

NGDs are mature, standards-driven safety devices that provide early warning distinct from CO alarms and fit seamlessly into existing life-safety practices.

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GAS ALARMS ARE PROVEN TO HELP SAVE LIVES IN JAPAN

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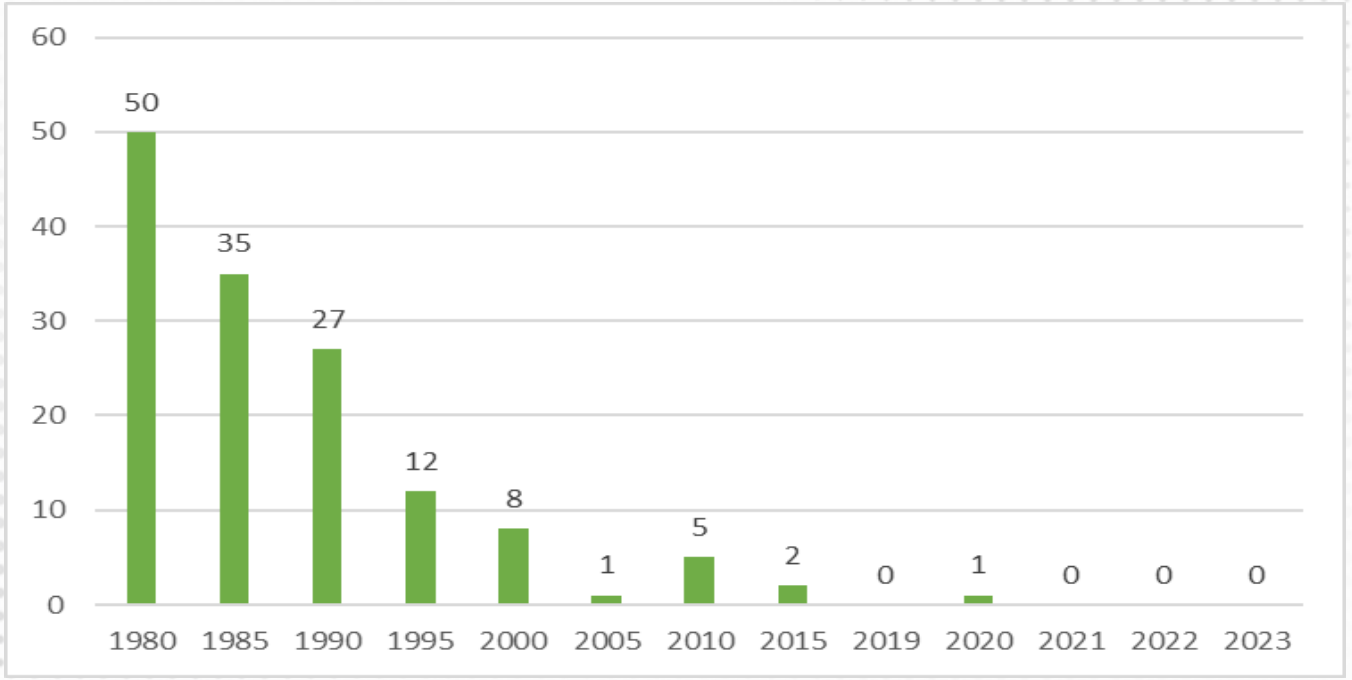
THE JAPAN EXPERIENCE

1980 – Japan mandates stand-alone gas alarms (50% use Natural gas as primary heating source)

2021+ - Zero gas explosion deaths through awareness, propane alarm mandates, and strong methane alarm advocacy

Deaths drop from 50 per year to **ZERO**



WHY JAPAN LEADS THE WORLD IN GAS SAFETY

The Japan approach includes:

1. **Smart Detection & Shutoff:** Gas alarms + auto shutoff during leaks & quakes
2. **Strong Infrastructure & Standards:** Seismic-resistant pipelines, strict appliance regs
3. **Utility-Led Education & Compliance:** Inspections, subsidized alarms, high adoption
4. **Cultural & Historical Drivers:** Safety culture strengthened after tragic incidents

Japan's Approach	What the U.S. Can Learn from Japan's Approach
Voluntary education and inspection programs led by major utilities	Incentivize utilities to run residential outreach and subsidize alarms
Advanced detectors with shutoff capability	Accelerate adoption of detectors with automatic shutoff valves
Seismic-trigger utility shutoffs	Expand real-time smart meters in earthquake and gas-prone regions
Industrial alarms required in high-density buildings	Update U.S. commercial codes to mandate detectors in basements, malls, and apartment complexes
High public trust and adoption	Safety campaigns using trusted messages

Japan has created one of the most robust natural gas safety ecosystems in the world.

Through advanced technology, regulations, infrastructure, and public engagement, they've virtually eliminated gas leak explosions.

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WIRELESS CONNECTED DEVICES = GAS INNOVATION

Using **‘Drop-in Sensor Technology’** to easily integrate with utilities’ wireless network is the next phase of innovation…

EXAMPLES OF PAYLOAD DATA

- Timestamp of payload message
- Hours spent powered on
- Status:
  - Low battery
  - System functionality
  - Gas alarm notifications
- Gas alarm concentration
  - Measured in 1% LEL intervals up to 30% LEL

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WIRELESS COMMUNICATIONS FOR GAS SAFETY SYSTEMS

Technology Overview

Wireless Advantages for GSS

DeNova Detect has proven experience with LoRaWAN, RF-Mesh, and LTE-M through development, interoperability testing, and field trials including secure connectivity, mesh and D2D functionality.

	RECOMMENDED		CURRENT	COMING SOON	
	LTE-M	**LoRaWAN**	**RF-Mesh**	**Wi-SUN**	**DeNova Detect**
Key Features	Licensed LTE spectrum; Mobility & roaming; IP-based ubiquitous networks; higher bandwidth	Unlicensed ISM band; Star-of-stars topology; AES 128-bit encryption	Sub-GHz bands; Mesh topology; AES encryption	IPv6-based sub-GHz mesh; IEEE 802.15.4g/e; Self-healing mesh	Battery-powered wireless edge sensor; Supports multiple protocols
Speed / Data Rate	~300 kbps	0.3–50 kbps	Low data rates (metering)	Up to 300 kbps	Optimized for low data rate sensing
Coverage	Nationwide via cellular networks	2–15 km (urban/rural)	Wide area via dense mesh deployments	Up to 4 km per hop; scalable	Flexible placement indoors/outdoors
Signal Propagation	Good, depends on cellular coverage	Excellent through obstacles (sub-GHz)	Strong propagation through obstacles	Sub-GHz bands for strong penetration	Operates in sub-GHz bands for robust coverage
Security	3GPP standards	AES 128-bit end-to-end encryption	AES encryption, secure key exchange	Multi-layer security; Wi-SUN Alliance certification	AES encryption and secure provisioning
Redundancy	Relies on cellular infrastructure	Limited (gateway failure affects nodes)	High redundancy via mesh topology	High redundancy via self-healing mesh	Supports fallback modes for local actuation
Benefits	High reliability & QoS; Mobility support	Low power, long battery life; Cost-effective for IoT	Long battery life; Reliable in harsh environments	Interoperable multi-vendor networks; Scalable for smart utilities	Long battery life; Compact design; Multi-network compatibility
Industry Standards	3GPP Release 13+	LoRa Alliance specifications	IEEE 802.15.4g	IEEE 802.15.4g/e; Wi-SUN FAN profile	Compliant with LoRaWAN, Wi-SUN, RF-Mesh, LTE-M integration options

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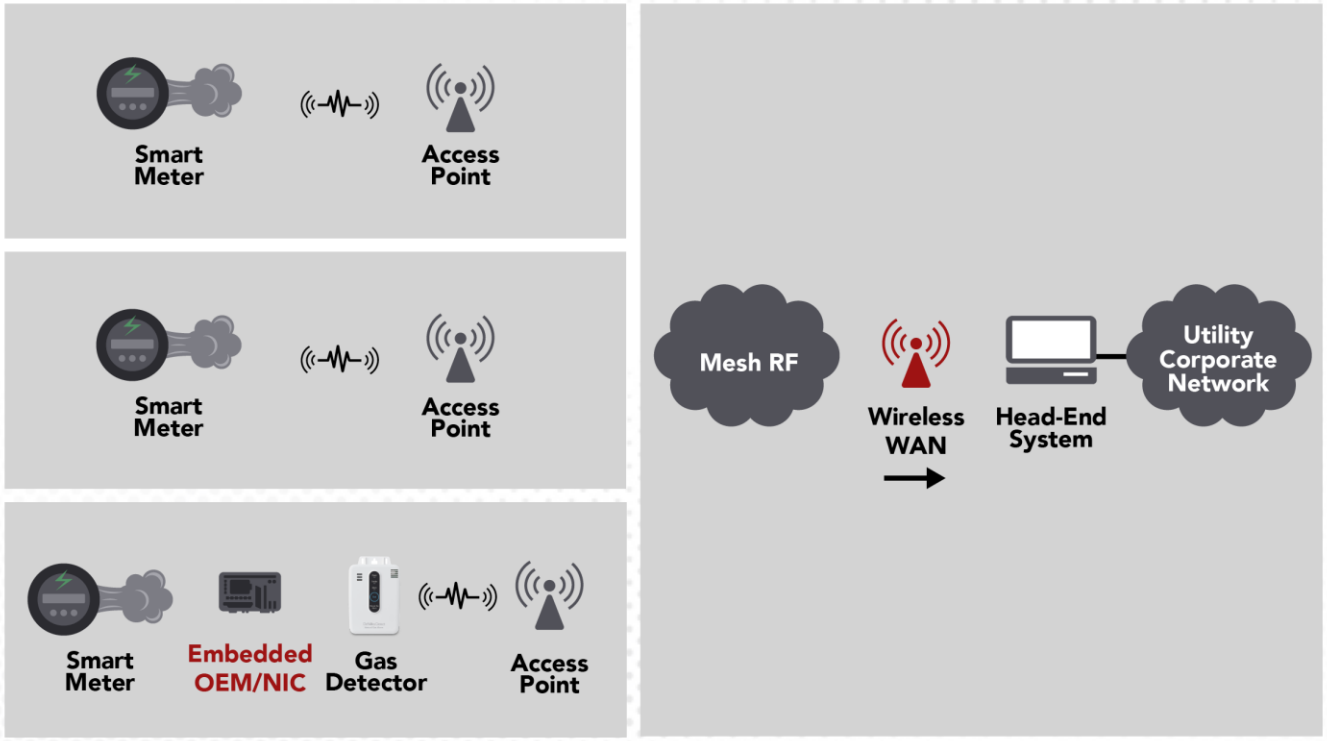
RF-MESH: OEM INTEGRATED NGD MODEL

End-2-End AMI + Detector Enablement

Joint-Vendor-enabled Solution

- **Lower Total Cost of Ownership &** reduce upfront infrastructure and IT expense.
- **Scalable and Flexible means to add** devices and features without major upgrades; support rapid expansion & compliance.
- **Centralized Services & Data for analysis with** real-time visibility and actionable insights from any location for faster decision-making.
- **Enhanced Security and Compliance to maintain** up-to-date encryption, certifications, and reduce cyber risk and regulatory burdens.



Architecture model images are developed solely by DeNova Detect and are for informational purposes only.

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THE U.S. EXPERIENCE

Started mass deployment of AMI enabled natural gas detectors in January 2020

Over 287,000 units installed through YE 2025

Over 6,700 alarms received – 13% of leaks from outside utility infrastructure

ONE false alarm due to a defective detector

Several serious events averted due to the early warning of gas leaks

Separately ~70,000 stand-alone natural gas alarms distributed to targeted customers

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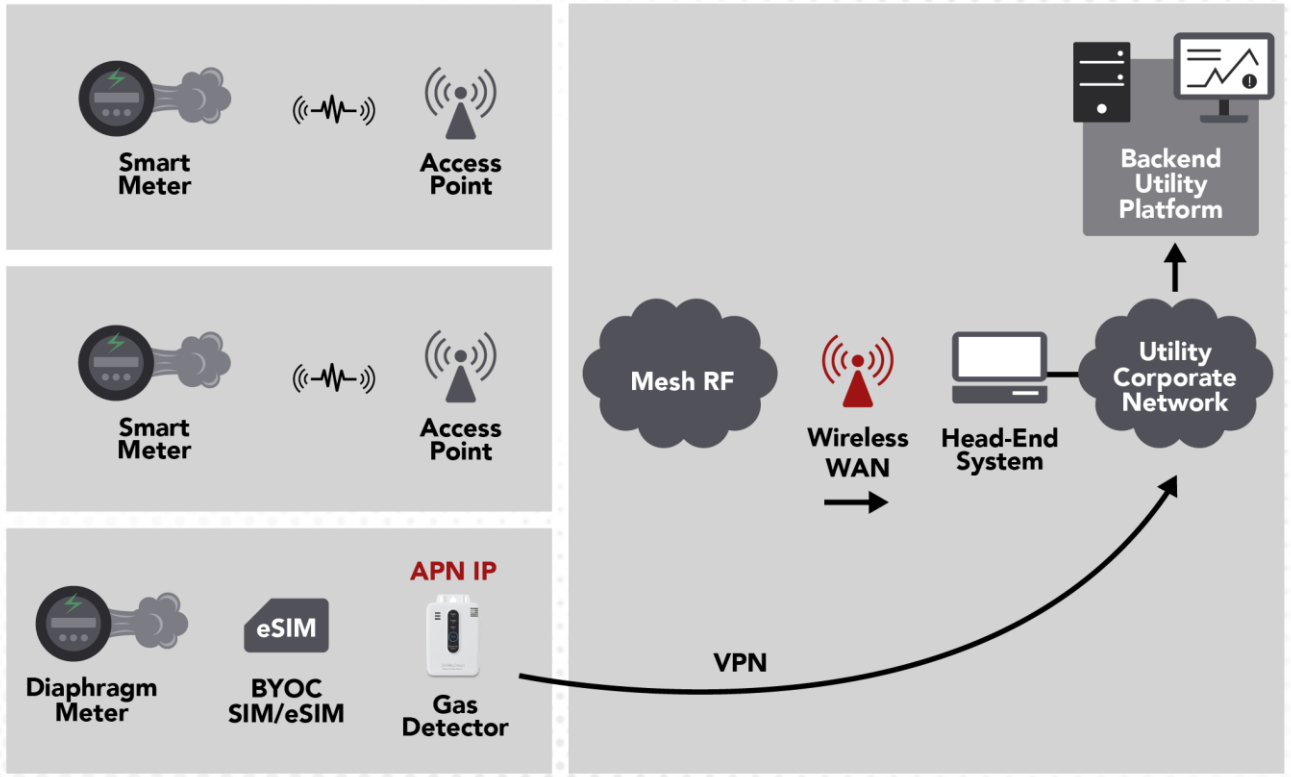
LTE: OEM-ENABLED NGD MODEL

OEM-Managed Gas Detector Enablement

LTE Wireless Solution (AMI vs. Non-AMI)

- **LTE-Enabled integration** over standard wireless protocol (i.e., MQTT, etc.) into OEM Headend system
- **Customer Provided Wireless Carrier (BYOC)** options acceptable (SIM/eSIM + Data services)
- **Direct Integration to Utility Network** via secure firewall access (IT/OT Utility resources required)
- **DeNova Detect support** of backend logistics (i.e., SIM/eSIM management, provisioning at manufacturing)
- **Dual-value approach** for evaluation/testing of AMI-enabled deployment



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WIRELESS INTELLIGENCE FOR FASTER, SAFER EMERGENCY RESPONSE

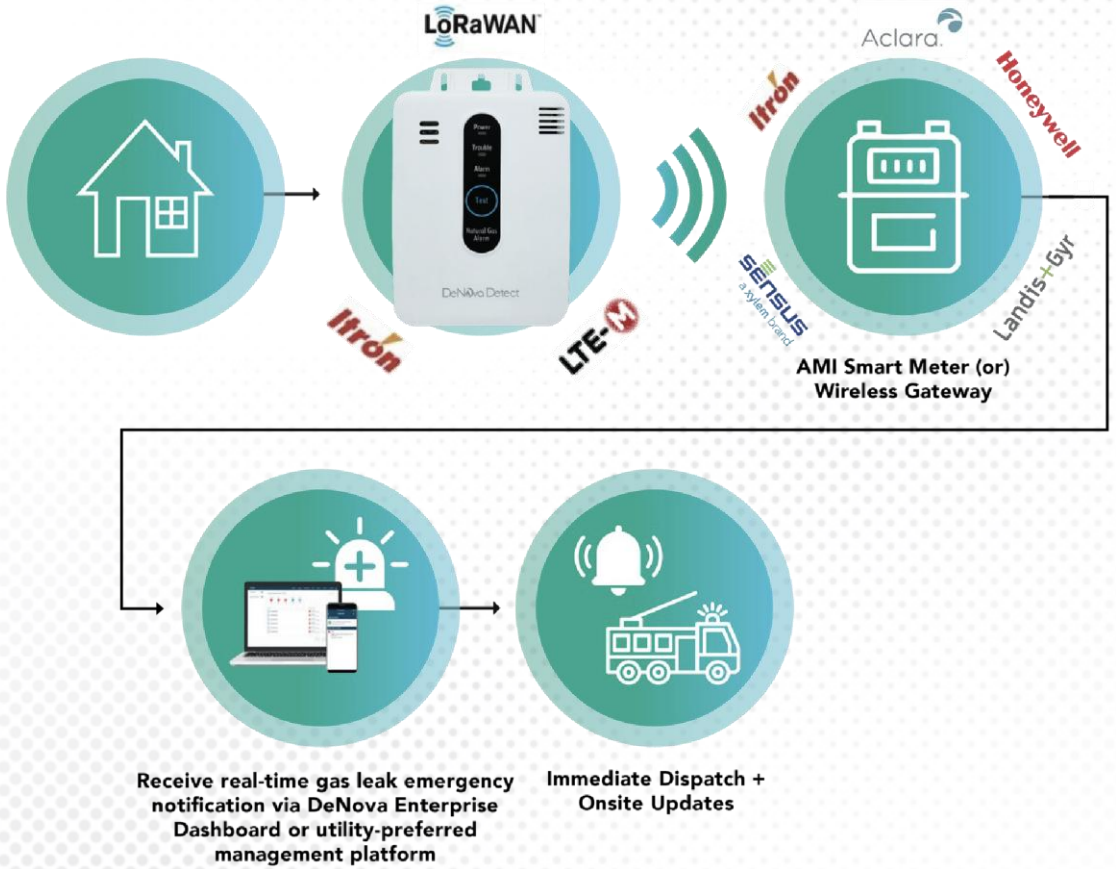
Real-time Leak Detection & Integrated Dispatch Notification

Communication Infrastructure

- Multi-channel communication (radio, cellular, IPv4).
- Redundant systems for disaster resilience.
- Secure messaging for sensitive operational data.

Monitoring and Control Systems

- Supervisory Control and Data Acquisition (SCADA) for real-time telemetry.
- Integration with AMI for sensor data (pressure, flow, leak detection).
- Automated shutoff capabilities for high-risk zones.



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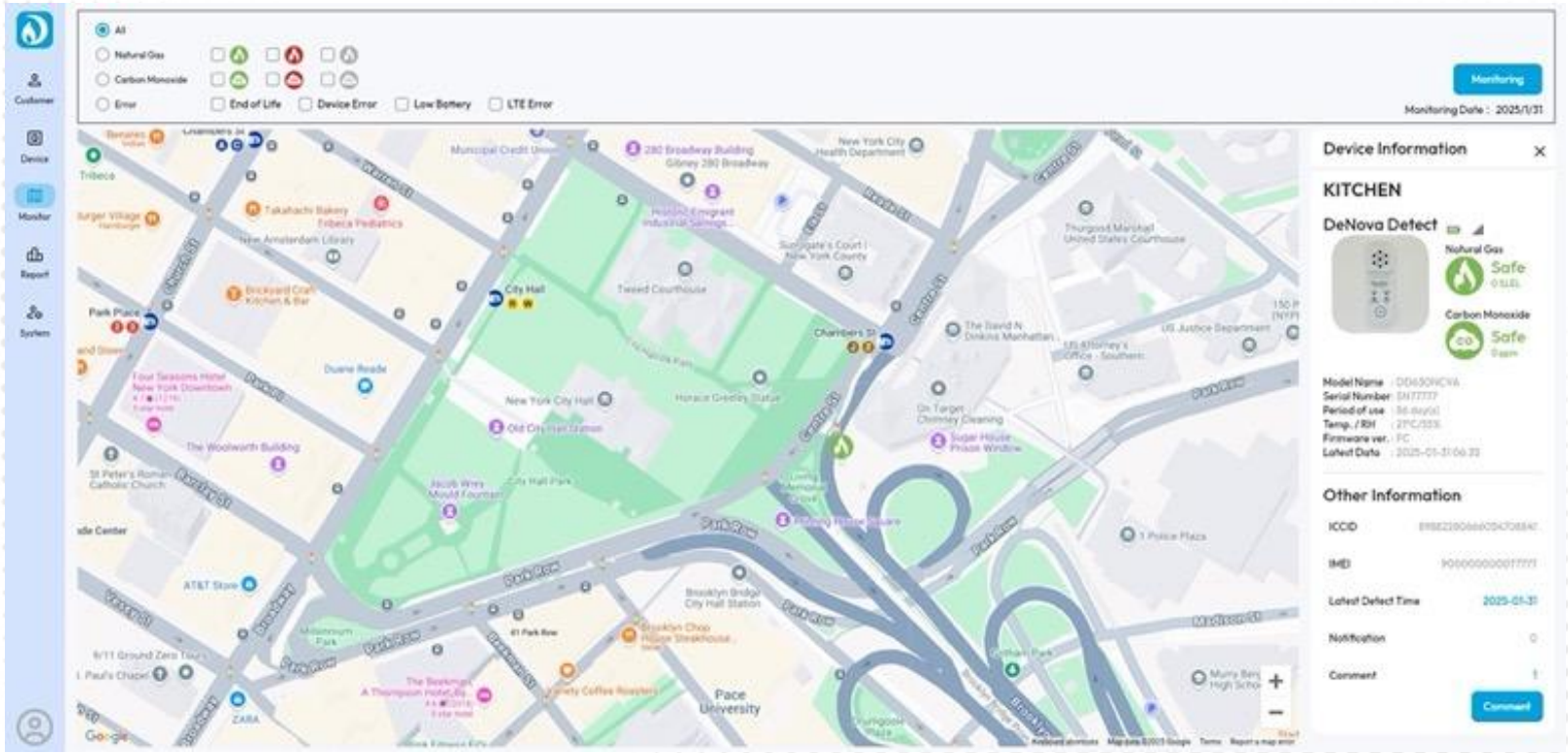
REAL-TIME VISIBILITY FOR EARLY GAS LEAK DETECTION

Always-On ‘Event-based’ Monitoring for Smarter Gas Leak Notification & Response



KEY PLATFORM FEATURES

- *Comprehensive Device Monitoring*
- *Detailed Gas Detector Info*
- *User-Friendly Navigation*
- *Alarm & Event Logging*
- *Customizable Reporting*
- *Real-time Map Views*
- *Secure Platform Access*

The DeNova Connect Enterprise Connect Dashboard is an advanced monitoring solution designed for U.S. utilities to track gas safety devices in real time using an intuitive interface with mapping and data visualization tools that enables quick decision-making and efficient gas detector-to-network management.

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GTI PILOT STATUS

LTE Project Duration: 12-month program

OTD Member Participation: 13 Utilities (>40% of membership)

Project Resources: New Cosmos USA, GTI Energy, Heath Consultants

Project Objectives:

1. Test LTE connectivity
2. Test gas concentration sensitivity
3. Get familiar with device features, functions, etc.
4. Develop standard gas operations procedures (SOPs)
5. Operator satisfaction / Ease-of-use feedback (GTI/OTD survey)

Training process:

1. 3-4 LTE units provided to each utility
2. DeNova Enterprise dashboard overview
3. Additional LTE units available thru Heath Consultants
4. Over 70% of utilities successfully onboarded & 'Active'

NEW COSMOS

GTI ENERGY

Heath®
Your Safety Our Commitment

GTI will render the results of the OTD at the 2026 Spring AGA Operations Conference

April | Tampa, FL

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PROTECTING YOUR CUSTOMERS

Marc A. Adams, Vice President

NFPA 715

Standard for the installation of Fuel Gases Detection and Warning Equipment

UL-1484

Standard for Residential Gas Detectors

DeNova NGD is not an Ignition Source

Represents the minimum amount of explosive gas concentration, set at 10%LEL

*Two of the Three Essential Elements needed to enable widespread adoption of **Fuel Gas Detectors** as **Public Safety Devices**, just like Smoke and Carbon Monoxide Detectors. The Third is **Proven Reliable Technology**.*

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BATTERY-POWERED NATURAL GAS ALARM LIFE-SAVING TECHNOLOGY

Natural Gas

Natural Gas + Carbon Monoxide

Natural Gas

Utility | AMI

Propane

2H 2026

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Heath® Your Safety Our Commitment

LOWE'S

NATURAL GAS DETECTOR: DEPLOYMENT OPPORTUNITIES

Options for Gas Leak Detection Prioritization

NON-AMI NATURAL GAS DETECTOR STANDALONE PROGRAMS

Community Outreach Program (Customer Sign-up)	**Service Area Safety Program** (Utility-based Installation)	**Hybrid Safety/Efficiency-based Program** (Assessment/Inspection Supported)	**Safety Compliance Program** (State Requirement)
• Community Education Initiative • Customer Self-Install • 1 NGD per Household • Compliment to AMI Network Model Deployment	• Direct-to-Customer (Self-Install) • Zero Resident Entry Required • Low-pressure/Low-Income Area • Maintain Migration Path to AMI Network	• Home Assessment (3rd Party) Program • Combined Community Safety & Education Initiative • Consumer Engagement Required • Energy Efficiency & Safety Modeling	• Zero Resident Entry Required • Service Order Add-on (e.g., ERT Replacements) • Direct Customer Education Initiative (PSC Recommended)

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GROWING UTILITY PARTICIPATION IN NATURAL GAS DETECTOR PROGRAMS

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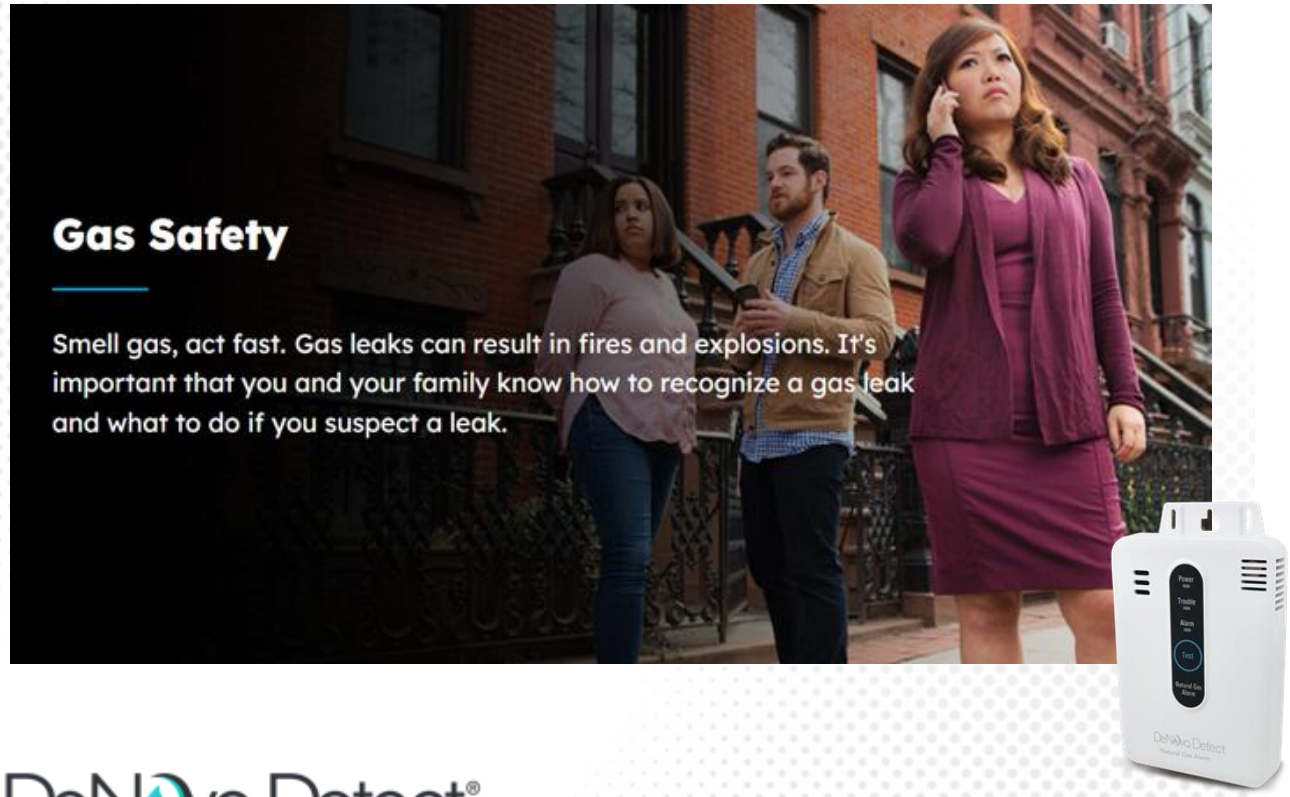
CON EDISON | NEW YORK

ConEd.com | Home > Safety > Gas Safety > Gas Leak Detectors



Smell Gas, Act Fast

Even if the odor isn't very strong, you should still leave the area immediately, taking others, and then call. Don't assume someone else has already called. You don't have to give your name.

Don't light a match, smoke, flip a switch, ring a doorbell, or touch appliances or electronics, including your phone. Doing so can produce sparks that might cause the gas to explode.

Gas Leak Detectors

A slow gas leak may not produce enough scent to be detectable, and even large leaks may not be detected by people with a weak sense of smell. A gas leak detector can give you peace of mind and help keep you and your neighbors safe by sounding an alarm before natural gas reaches the explosive range.

Safety Starts in Your Home

- Make sure all burners are turned completely off when you're done cooking and before you leave the house.
- Your pilot light should always be on. Blowing out the pilot light doesn't stop gas from escaping and can be dangerous.
- Call a professional if you need to move or replace a gas-fired appliance, like a stove or clothes dryer.
- Regularly check the flexible connector that brings gas to an appliance. Over time, it may become brittle and develop small cracks. If the connector is old and dried out, replace it.

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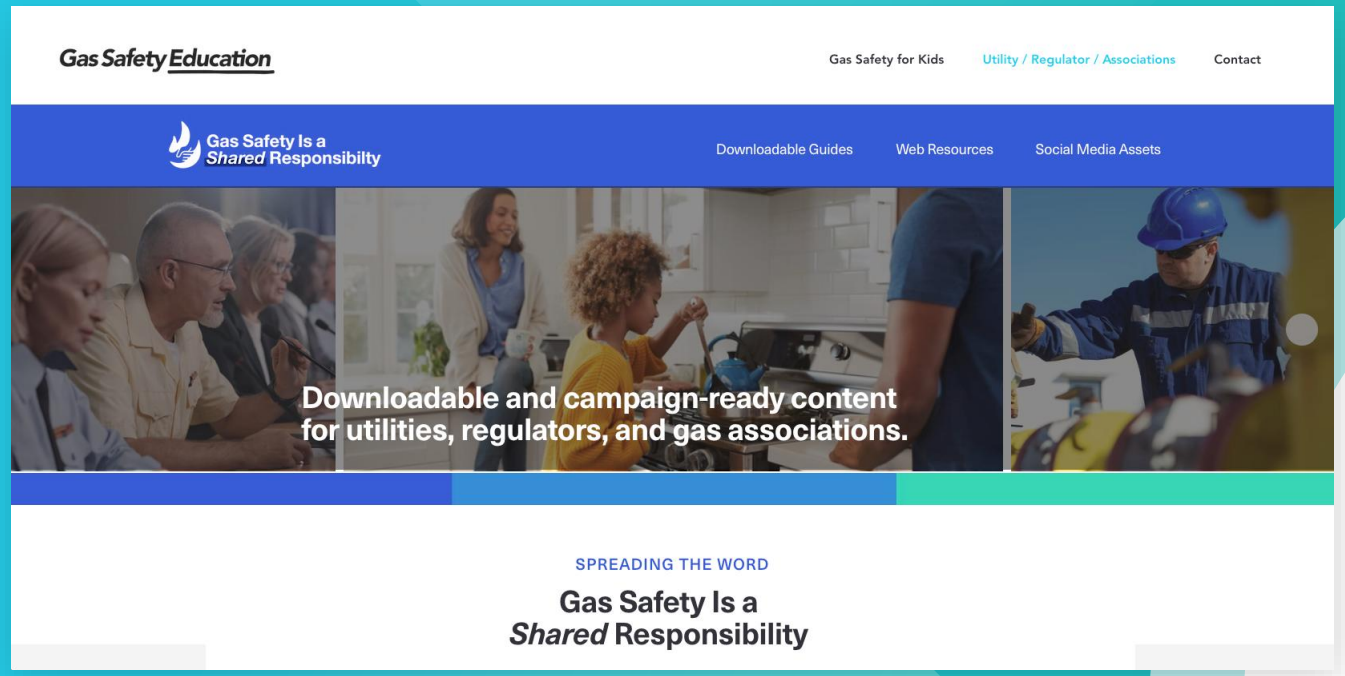
GAS SAFETY EDUCATION MATERIALS

(License & Royalty-free Materials for Gas Industry Use)

View Gas Education Materials



View Now

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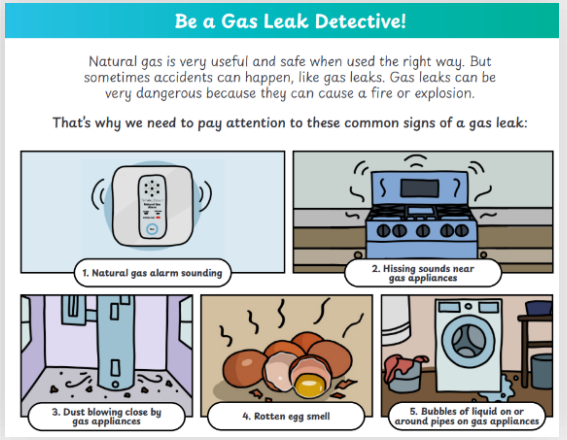
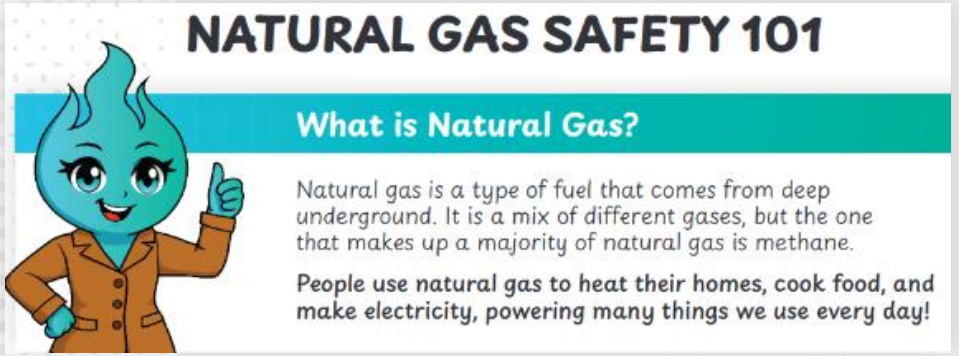
K-12 EARLY EDUCATION & SAFETY CIRRICULUM

- **Utility Partnerships** – Collaborating with utilities to deliver trusted gas safety education to communities.
- **Child-Friendly Learning** – Using our mascot and activity books to teach safety to young learners.
- **Practical Awareness** – Providing clear guidance on recognizing and responding to gas leaks.
- **Co-Branded Outreach** – Supporting utility campaigns with engaging educational content.
- **Safety Collaboration within Utility** – Introduction, Discussion & Ideation with Community/Corporate Affairs team





MARKETING & EDUCATION SUPPORT AVAILABLE FOR UTILITIES

Multiple Tools Designed for Education & Advocacy in Natural Gas Safety:

- Draft or final email communications
- Educational one-pagers and FAQs
- Intranet and internal portal content
- Visual assets and signage (digital & print)
- Clear messaging differentiating natural gas vs. carbon monoxide

All materials can be:

- Utility Company branded
- Co-branded
- Customized to align with internal policies, corporate pillars & more…
- For more access license & royalty free gas safety & detector content visit https://gassafetyeducation.com

A SIMPLE PROGRAM WITH MEANINGFUL IMPACT...

2-in-1 Natural Gas + Carbon Monoxide Alarm
Model DD623NCV (10-Yr)

Natural Gas Alarm
Model DD620NV (10-Yr)

Employee Gas Detector Program

It's about awareness, responsibility, and leadership.

Gas is safe.

Safety is shared.

And education starts at home.

Offering natural gas detectors to employees:

- Reinforces education where it matters most
- Builds internal confidence and external trust
- Demonstrates senior leadership while promoting advocacy for public safety

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THANK YOU
Q&A

Marc A. Adams, Vice President