Protecting Gas Utility Customers with New Cosmos USA Smart Natural Gas Alarm Technology

Presented by New Cosmos USA, Inc.
WISCONSIN PSC CONFERENCE

Goals:
1. Share technology innovations
2. Explore the challenges caused by US aging infrastructure
3. Take questions from you during the Q&A portion
4. Learn how we can best support you as we work together to protect people and property.
Intro to New Cosmos innovative Natural Gas detection technology

The need for Natural Gas Alarm protection

WI specific gas leak explosions

How New Cosmos Battery Powered Wireless Natural Gas Alarms are easy to install

How utilities can leverage existing wireless comms. networks and smart meters

How Con Edison implemented a mass deployment of Smart Natural Gas alarms

Successes Con Edison has experienced

New Safety Tech Integrations

Current Legislation/Codes & Standards update

Q&A
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New Cosmos USA Inc.

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Project Engineer,
New Cosmos USA, Inc.
Our Mission
Is to protect people and property with innovative Natural Gas safety products.

www.denovadetect.com
Since 1964, New Cosmos Electric has been the world-leader in residential gas explosion prevention.

- 1st residential natural gas alarm in the world
- $280M company revenue annually
- #1 manufacturer of MEMS gas sensors worldwide
- Over 70 million residential gas alarms sold globally
- 70% residential gas alarm market share in Japan
- New Cosmos Electric founded New Cosmos USA in 2019 to prevent deaths in US
WE UNDERSTAND THAT PROTECTING YOUR COMMUNITIES IS YOUR #1 PRIORITY

WHEN NATURAL GAS ALARMS ARE INSTALLED AND ROUTINE MAINTENANCE IS CONSISTENT, DEATHS DUE TO NATURAL GAS EXPLOSIONS TEND TO DECREASE.

WE HAVE A PROOF POINT FOR YOU!
JAPAN HAS VIRTUALLY **ELIMINATED DEATHS DUE TO GAS EXPLOSIONS**
GAS LEAKS ACROSS THE US

2014 - Manhattan Explosion
8 Deaths
2 five-story buildings
70+ injuries
100 families/businesses displaced

2017 – San Bruno, CA.
8 died in fire
58 injured
38 homes destroyed/70 homes damages

2018 – 1 dead, 25 injured, 30K people evacuated, 40 homes in flames

Climate and Environment

Natural gas leaks in Boston are vastly underreported – and could be coming from inside homes, study says

New research shows that methane emissions in the Boston area were six times higher than previously estimated. That could make the greenhouse effect of natural gas “equivalent to coal.”

"I've been in the fire service for almost 39 years and I've never seen anything like this in my entire career," Andover Fire Chief Michael Mansfield said at a news conference. "It looked like Armageddon, it really did."
JEFFERSON COUNTY, WI GAS EXPLOSION (2021)

Cause: Believed to be caused by a natural gas leak

Result:
- 1 death
- Roughly 1,200 people lost power as a result of the explosion.
- People living from as far as 10 to 12 miles away felt the explosion they told FOX6 News

MAY HAVE BEEN PREVENTABLE WITH DENOVA DETECT NATURAL GAS ALARMS

Source: NBCPhiladelphia.com & Wikipedia
Most Recently...

January 2022

A doorbell camera captured a shocking Natural Gas Explosion in the Bronx, New York as reported by the New York Post.

77 year-old woman died and 8 were injured

Watch the Video
NATURAL GAS LEAKS OCCUR ALMOST DAILY
HOW MANY GAS INCIDENTS DO FIRE STAFF RESPOND TO DAILY ACROSS THE US?
In the U.S., local fire departments respond to an average of 340 natural gas or LP-Gas leaks per day with no ignition

Source: NFPA
AGING PIPELINES ARE A REAL SAFETY CONCERN

“The older the pipes are, the less likely you are to have really good information about what you have out there.”

- UC Berkeley’s Steve Weissman, Director of UC Berkeley’s Center for Law, Energy and the Environment
CURRENT US CHALLENGES CAUSED BY AGING INFRASTRUCTURE

PIPELINE STATS

1.3 million - the number of miles of gas mains in the US

5,600 miles - gas mains replaced each year (.43%)

230 - the number of years it would take to replace every pipe in the US system.

.8% - the average increase in additional pipelines growing at about 9,800 miles per year

When gas mains/pipes will take centuries to replace, you must protect yourself and your community now to minimize liability.

Investing in a reliable Natural Gas Alarm system that you can trust is key.

Source: US Pipeline and Hazardous Safety Administration (PHMSA) 2018, RMI Analysis
WHY INVEST IN SMART TECHNOLOGY?

IT’S THE RIGHT CHOICE TO SAVE LIVES AND PROPERTY

Approx. 50% of all homes in the US use natural gas as their primary heat source.

Every 2 Days explosion accidents involving natural gas pipelines occur.

Approx. $50 million in property damage per year.

Most major gas incidents in the US include some type of leak, resulting in about 40 deaths, 140 injuries.

Now is the time to invest in smart technology that translates to protection and prevention.

Source: U.S. Energy Information Administration
BATTERY-POWERED NATURAL GAS ALARM PRODUCT FEATURES

- **10% LEL gas alarm threshold alerts 11 mins faster** than competitor products at 25% LEL*

- MEMS sensor technology offers 7 years of wireless battery life

- Voice alerts for residents (English and Spanish) vs. no voice with competitors

- Device can be installed in a wider variety of environments/temperatures (32°F to 122°F)

- Humidity range of 5% to 95% RH, non-condensing

- Conforms with UL1484

**MODEL: 807NLR/NIT**

Source: Fire Risk Alliance*
NEW COSMOS MEMS SENSOR TECHNOLOGY

- **600X** more power-saving energy compared to conventional sensor
- No AC power needed
- High selectivity to Methane
- Nuisance resistant to household chemicals

Conventional semiconductor Sensor

New Cosmos proprietary hot-wire semiconductor Sensor with MEMS technology

VS.
PROVEN NUISANCE RESISTANT GAS ALARM

Testing by the Gas Technology Institute (GTI) reveals the MEMS sensor’s immunity to typical household chemicals, due to the filter cap placed on the sensor.

Virtually eliminates nuisance alarms

Table 3. List of Test Household Products and Chemicals

<table>
<thead>
<tr>
<th>Test Material</th>
<th>Supplier or Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methane</td>
<td>Matheson (tech grade)</td>
</tr>
<tr>
<td>Propane</td>
<td>Matheson (CP grade)</td>
</tr>
<tr>
<td>Ethanol</td>
<td>Sigma-Aldrich (bio grade)</td>
</tr>
<tr>
<td>Acetone</td>
<td>Sigma-Aldrich (industrial grade)</td>
</tr>
<tr>
<td>Paint Thinner</td>
<td>Mineral Spirits (odorless)</td>
</tr>
<tr>
<td>Laundry Detergent</td>
<td>Tide® Advanced Power Plus Bleach Alternative Original Scent HE</td>
</tr>
<tr>
<td>Stain Remover</td>
<td>Carbona® Stain Devils</td>
</tr>
<tr>
<td>Cyanoacrylate Adhesive</td>
<td>Super Glue®</td>
</tr>
<tr>
<td>Bathroom Cleaner</td>
<td>Scrubbing Bubbles®</td>
</tr>
<tr>
<td>Home Dry Cleaning Kit</td>
<td>Dryel®</td>
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<tr>
<td>Fabric Freshener</td>
<td>Febreze® Air Effects - Linen &amp; Sky</td>
</tr>
<tr>
<td>Aerosol Hairspray</td>
<td>Suave® Max Hold Unscented</td>
</tr>
<tr>
<td>Furniture Polish</td>
<td>Old English® Almond</td>
</tr>
<tr>
<td>Bleach</td>
<td>Clorox®</td>
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<tr>
<td>Household Ammonia</td>
<td>Essential Everyday®</td>
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<tr>
<td>Duster Spray</td>
<td>Blow Off®</td>
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<tr>
<td>Disinfectant Spray</td>
<td>Lysol®</td>
</tr>
<tr>
<td>Oven Cleaner</td>
<td>Easy-Off® Heavy Duty</td>
</tr>
<tr>
<td>Rust Stain Remover</td>
<td>LIME-A-WAY®</td>
</tr>
<tr>
<td>Hydrogen Sulfide</td>
<td>GTI technical blend</td>
</tr>
</tbody>
</table>

Validated by Gas Technology Institute report, Evaluation of Residential Methane Detectors, Phase III. Project No. 21696
MANHATTAN, NEW YORK (2014) EXPLOSION

- 8 deaths
- Fire destroyed two five-story buildings
- 70+ injuries
- 100 families and businesses displaced

Source: www.1800nowhurt.com; www.amny.com

PREVENTABLE WITH DENOVA DETECT NATURAL GAS ALARMS
AFTER CON EDISON EXPERIENCED TRAGIC LOSSES TO THEIR COMMUNITY, ACTION WAS NEEDED.

GAS ALARM COMPANIES WERE EVALUATED TO SUPPLY A MASSIVE DEPLOYMENT
Con Edison Providing Smart Gas Detectors In Major Breakthrough For Customer Safety

CON EDISON UNVEILS GAS LEAK DETECTOR PROGRAM WITH NEW COSMOS USA

- First long-lasting battery-powered AMI alarm
- 10% LEL for accurate and faster detection
- 70K+ residential gas alarms have been installed across Manhattan and Westchester.
- Goal: 376K Natural Gas Alarms installations by 2025 in its gas service area.
- 800+ natural gas leaks detected from recent ConEd residential installation of NCUSA alarms.
- Virtually no nuisance alarms since 2019

In all, the major benefits of this partnership has been providing the advanced technology of a smart gas alarm to residents free of charge.
NATURAL GAS LEAK SIMULATION

Simulated over 57 minutes

10% LEL

Color Key:
- Natural Gas Accumulation
- Undetectable levels of natural gas

Battery-powered alarms are better & safer solutions, offering quicker detection with **11 mins. more escape time** on average.

Source: Fire & Risk Alliance

Denova Detect Battery-Powered alarm installed near ceiling 10% LEL

Competitors Plug-In alarms mounted near the floor. Dangerous level of gas has not reached floor level at 20-25% LEL.
WIRELESS INTEGRATION

New Cosmos USA communications system easily integrates with utilities’ wireless network.

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
Alarm Cause: Unauthorized piping operation of a coupling by a plumber
GAS ALARMS ALERTS AS OF AUGUST 2021

Mass deployment began with 70K detectors installed system-wide (2019 - Present)

“Type 1 Gas Leaks” = An immediate hazard requiring immediate attention

500 alarms alerted of potential major risk  NOTE slide is from AUGUST

Alarm Breakdowns By Category
CURRENT PRODUCTS

Battery-powered Advanced Metered Infrastructure (AMI) MEMS natural gas alarm
- 7 year battery-powered alarm (Itron)
- 7 year battery-powered alarm (LoRaWAN)
- 7 year battery-powered Non-Wireless Alarm

FUTURE PRODUCTS (2023)

Battery-powered 10 year MEMS natural gas alarm
- 10 year battery-powered alarm (Landis and Gyr)
- 10 year battery-powered alarm (Aclara)
- 10 year battery-powered alarm (Itron)
- 10 year battery-powered alarm (LoRaWAN)
- 10 year battery-powered alarm (LTE)
- 10 year battery-powered Non-Wireless Alarm
“Customers were receptive to having the detectors, and we found that they were effective in notifying us of gas leaks with few false positives,” Drury said. “They are also convenient for home and building owners, which is what we want. It takes our gas technicians less than hour to install a detector, [and] it requires no maintenance.” - Con Edison spokesman Allan Drury.

“We think the detector program is a big leap forward for safety,” said Drury. “We see no cons. They are a way to quickly detect leaks, notify occupants and get the local fire department and Con Edison on the scene to make the leak safe.”

Safety Integrations that Put the Customer’s Safety First
SMART AMI NETWORK

Alarm status signals through Mesh SMART grid system
CHALLENGE:
1.) Studies Show that Current Best Practices Include Customers Smelling Gas and Calling Which is Not Effective

2.) Sensing and control devices (including smart methane sensors, and smart natural gas shut off valves) need wireless communication to cloud applications managed by a service provider and/or a utility via battery powered communication modules

3.) This wireless communication must be reliable, and supported by a carrier/utility scale connectivity provider

4.) The wireless communication needs to be based on open standards (such that device, connectivity, and application providers can be swapped out if necessary)

SOLUTIONS:
1.) Auto Shut Off Valve
2.) Senet partnership to utilize the largest LoRaWan network provider in America

Legacy infrastructure transition to LoRaWan allows utilities to benefit from extreme flexibility in network deployment and cost efficiencies not previously available.
FUN FACT!

Lorax and New Cosmos USA are THE FIRST TO... create a smart meter gas shutoff option when methane LEL levels are exceeded.
Benefits of an Ecosystem of Safety

- Automatic gas shutoff when thresholds are met
- Utility *Remote disconnect* via cloud software
- Tested at GTI and select utilities
- Suitable for indoor/outdoor service

- Fully integrated with Sensors, Valves, Cloud Software
- Fully autonomous operation 24/7 when integrated with active sensors (eg: RMD).
- 10 year + Battery Life
DATA MATTERS

To protect communities, utilities must be armed with the right data.

Photo Source: Chris Liverani
DASHBOARD DATA

**10% LEL** – alarm signal sent to the dashboard (LEL data and LoRaWan network strength).

**20% LEL** – GTI preferred and is the trigger for the auto gas shut off valve

LoRaWan supports both indoor and outdoor installations.
Natural gas alarms offer a proven solution to the threat of gas leaks. Equipping your home with a reliable natural gas alarm can not only save you money and give peace of mind: it can save your life.

Sun Prairie, WI, Fire Department Chief Chris Garrison has experienced devastation firsthand in a tragic natural gas explosion that led to the death of one of his firefighters and multiple injuries within his department.

SUN PRAIRIE, WI.

“I’d like to see our homeowners having natural gas alarms, just like they do smoke detectors and carbon monoxide detectors, to alert them if there’s an issue in their home so they can evacuate,” said Garrison.

“If we have lead time where the alarm is sounded, it will help us in our response.”
SUMMARY OF BENEFITS

- SAVE LIVES
- PREVENT PROPERTY DAMAGES
- PROTECT AGAINST POTENTIAL LAWSUITS/DECREASE LIABILITY
- REDUCE ENERGY COSTS VS. PLUG-IN ALARMS
- GAIN PEACE OF MIND WITH ADDED SAFETY AND SECURITY
- OPTIMIZES TIME & RESOURCES ALLOCATED FOR PIPELINE SAFETY OPERATIONS AND FIRE DEPARTMENTS
- POTENTIALLY REDUCES SERIOUS RISKS TO PIPELINE SAFETY OPERATIONS AND FIRE PERSONNEL
CODES & STANDARDS

UL1484

These requirements cover electrically operated gas detectors intended for installation in residential occupancies and recreational vehicles (RVs). These requirements cover gas detectors intended to detect flammable gases such as propane and natural gas. We expect the standard LEL to lower from **25% to 10% LEL**.

NFPA715

REQUIRED IN EVERY ROOM THERE’S A GAS APPLIANCE. THIS VOTE WILL BE IN MAY OR JUNE OF 2022. CITIES AND STATES COULD ADOPT THIS IMMEDIATELY.
CURRENT LEGISLATION

MAINE IS THE FIRST STATE IN THE US TO PASS A **NATURAL GAS BILL (2469)** REQUIRING THE INSTALLATION OF NATURAL GAS ALARMS IN ALL ROOMS WHERE GAS APPLIANCES EXIST.
NATURAL GAS LEGISLATION IN PROGRESS

- MASSACHUSETTS BILL #H2452
- TENNESSEE BILL #HB1831
- ILLINOIS BILL #SB2932
- NEW JERSEY BILL #A3304
- NEW YORK BILL #S3705
WE WANT TO HEAR FROM YOU....
Q&A

HOW CAN WE SUPPORT YOUR EFFORTS TO MAXIMIZE SAFETY?
WHAT CAN YOU DO NOW?

• VISIT US AT WWW.DENOVADETECT.COM

• COME TO OUR DENOVA DETECT BOOTH TO LEARN MORE

• FOLLOW US ON LINKEDIN AT “DENOVA DETECT”
THURS., FEB. 17 & SUN., FEB. 20
FOX BUSINESS NETWORK PRIMETIME (6-11:45PM)
CNN, MSNBC, CNBC, Discovery Life and CNN Headline News
THANK YOU

Your Communities’ Safety is our mission.

DeNova Detect™
By New Cosmos USA, Inc.

www.denovadetect.com
BENEFITS

• The LoRaWAN protocol uses LoRa radio technology which stands for “long range”, meaning fewer gateways (used to transmit data from/to devices and cloud applications) are needed, driving costs lower

• LoRaWAN is an LPWAN technology (low power wide area network) consuming very little power which increases battery life (often to 10+ years depending on device type and use case)

• LoRaWAN is a secure protocol and has been used for mission critical deployments globally

• LoRaWAN is a global open standard that was launched in 2015, supported by hundreds of companies, and declared a global communications standard in 2021 by the ITU (International Telecommunications Union) enabling those deploying LoRaWAN to choose best of breed devices, connectivity, and application providers

LoRaWAN outdoor & indoor gateways:
The benefits of Senet...

• One of the founders of the LoRa Alliance, Senet is the first and largest LoRaWAN connectivity provider/enabler in the United States

• While providing a carrier/utility scale cloud platform for the provisioning and ongoing management of LoRaWAN gateways and end devices, Senet has been praised for its reliability of getting data from devices to cloud applications and vice versa, and for its support infrastructure and customer obsession

• Senet enables its customers (typically solution providers) to bundle LoRaWAN connectivity with the device and cloud application solutions they offer, providing a simple and cost-effective path to solve for the connectivity piece of a solution offering
LORAWAN & SENET BENEFITS

benefits to the solution providers and their customers:

• Solution providers can focus on the device and cloud application parts of the solution they provider to their customers while leaving the wireless communications piece to a reliable partner that operates scaled connectivity services based on a global open standard

• The low total cost of ownership of a solution based on LoRa chipsets for devices along with the LoRaWAN protocol for device integration to cloud applications, and overall connectivity management, enables use cases that have not had a viable cost footprint in the past

• Peace of mind is important and with Senet’s deep experience in mission critical LoRaWAN deployments, both solutions providers and their customers can be confident in having a successful connectivity service for their implementations on Senet