The Future of Residential Fuel Gas Detection Codes, Standards & Advocacy

A Layers-of-Protection Approach to Pipeline & Consumer Safety

NGA 2022 Fall Operations Conference,

October 6-7, Saratoga Springs New York

Robert Wilson, Northeast Gas Association

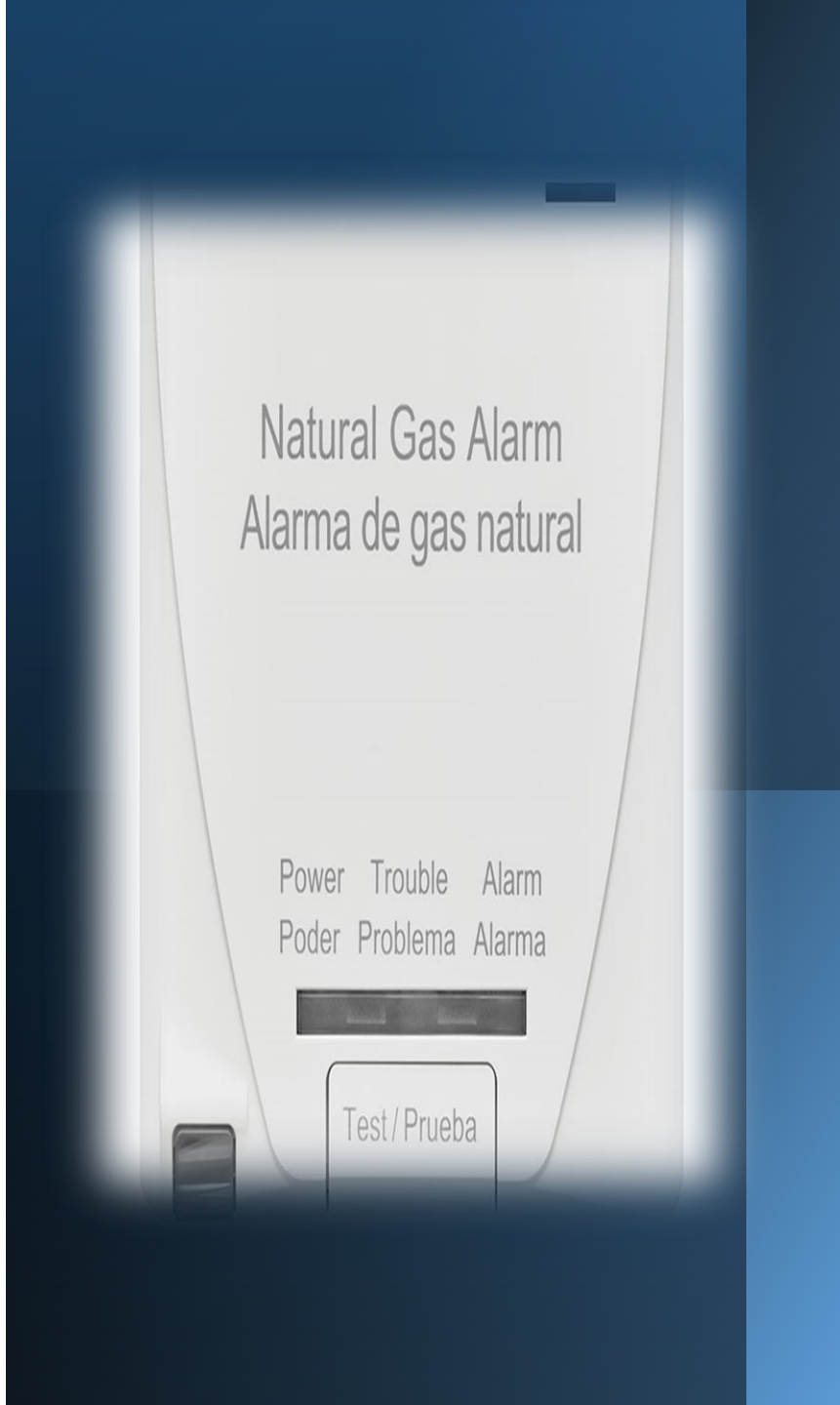
NFPA 715

Standard for the Installation of Fuel Gases Detection and Warning Equipment

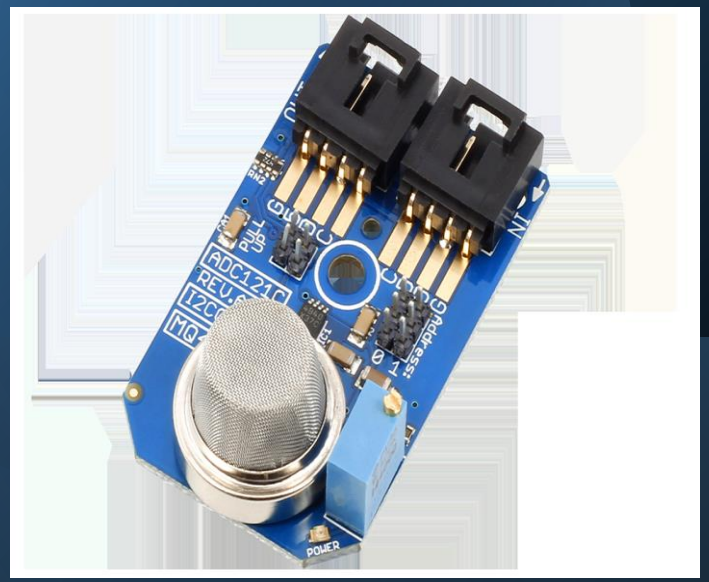
UL-1484

Standard for Residential Gas Detectors

Advocating Use of Public Safety Devices



Fuel Gas Detector History……..



- Can be purchased at home improvement stores or on-line
- Prices range from $45 - $100+
- National Regulations do not exist for use of residential methane detectors (recent changes in NYC LL 157 & recently enacted State-Wide requirements in ME)
- Lack of public awareness & industry advocacy
- Historic concerns with performance
- Battery powered devices now available with 10% LEL detection threshold !!

Low customer adoption

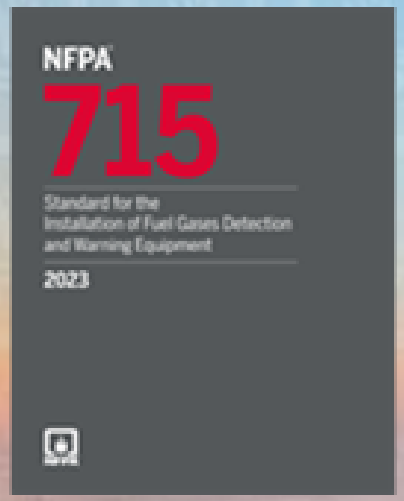
Fuel Gas Detector History……..

Comprehensive Industry Adoption Approach

- Evaluation of device response to varying levels of methane.
- Effects of common household chemicals on “false positive” detection and alarms including contaminants such as, hairspray, bleach and disinfectant spray.
- Impacts on performance from common household environmental changes such as temperature and humidity.
- Evaluation of proper placement to ensure detection if a release occurs - **NFPA 715 Developed !!**
- Evaluation of existing UL Standards and recommendations for improvements including lowering the detection threshold from 25%LEL to 10% LEL - **UL 1484 Updated !!**
- Consumer behavior studies and public awareness improvements.

NGA, NYSEARCH, Con Ed, GTI Energy, NFPA Fire Research Foundation, GEXCON & Fire & Risk Alliance LLC – ***Putting “science” around placement and detection thresholds***

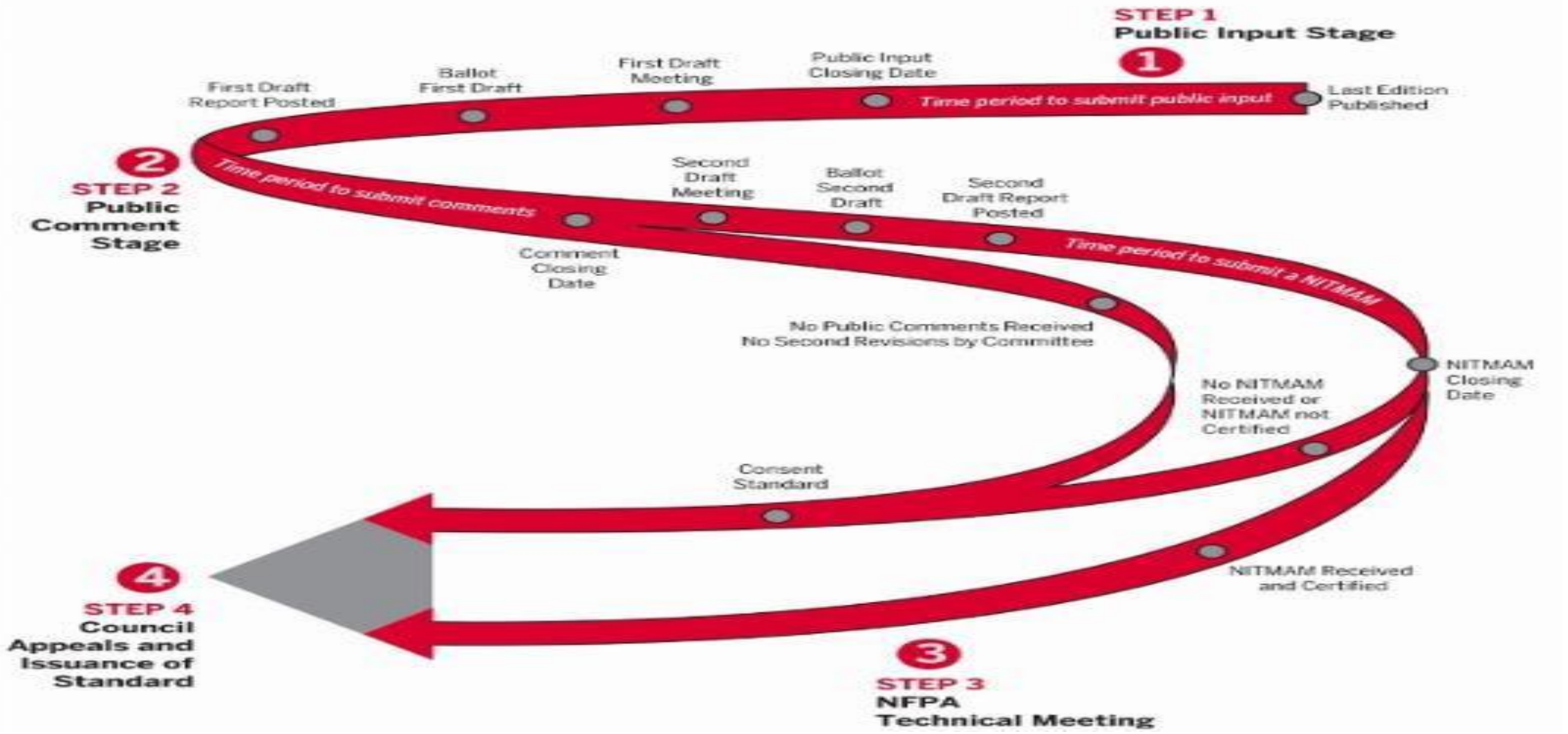
FWE-AAA
NFPA 715 TC



Technical Committee Fuel Gases Warning Equipment

IT'S A BIG WORLD. LET'S PROTECT IT TOGETHER.®

The Standards Development Process



NFPA 715 *Standard for the Installation of Fuel Gas Detection and Warning Equipment*

The Evolution of NFPA 715

- This standard provides requirements for vital equipment intended to warn occupants of the presence of fuel gas in time to escape or take other action.
- The document addresses the selection, design, application, installation, location, performance, inspection, testing, and maintenance of fuel gas detection and warning equipment in buildings and structures. *Supports AHJ adoption of fuel gas detection into building codes*

This new standard is essential for anyone concerned with helping to ensure safer fuel gas system installations and clears a path for LDC's to advocate use of residential methane detectors (RMD's) as another pipeline safety layer-of-protection.

NFPA 715 *Standard for the Installation of Fuel Gas Detection and Warning Equipment*

Comprehensive Installation Standard Building on NFPA 72 *National Fire Alarm and Signaling Code*

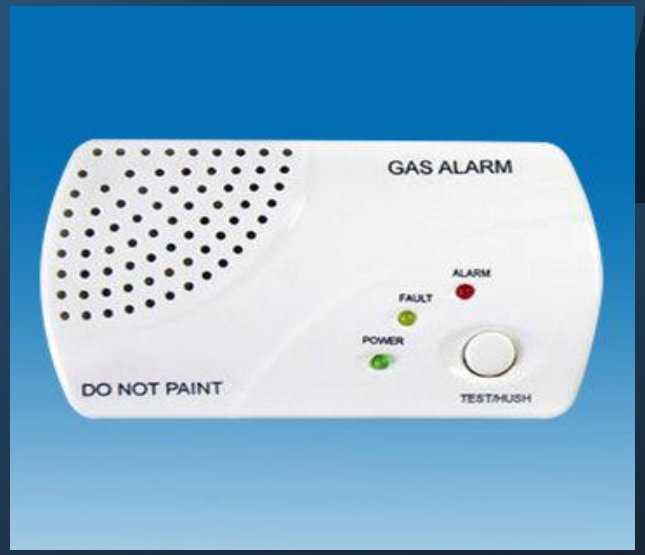
- NFPA 715 addresses the means of signal initiation, transmission, notification, and annunciation, the levels of performance, and the reliability of fuel gas detection and warning equipment.
- **Featured topics:**
  - Ch 4 - Fundamentals of fuel gas detection systems
  - Ch 5 - Protected premises fuel gas detection systems
  - Ch 6 - Notification appliances for fuel gas detection systems
  - Ch 8 - Inspecting, Testing & Maintenance
  - Ch 9 - Single- and multiple-station alarms and household fuel gas detection

NFPA 715 *Standard for the Installation of Fuel Gas Detection and Warning Equipment*

Annex Materials Provide the "Why"

- **Annex A -** Explanatory Materials
- **Annex B -** Dangers and Properties of Fuel Gases
  - ✓ LEL of Fuel Gas Mixtures
  - ✓ Gas Density & Temperature Effects
  - ✓ Gas Mixing
  - ✓ Gas Odorants as Fuel Gas warning Agents
  - ✓ Properties of Common Fuel Gases
- **Annex C -** Guidelines for Emergency Responders (*NGA First Responder Certificate Program Referenced in the Standard)*
  - ✓ Guidelines for Occupants
- **Annex D -** Informational References

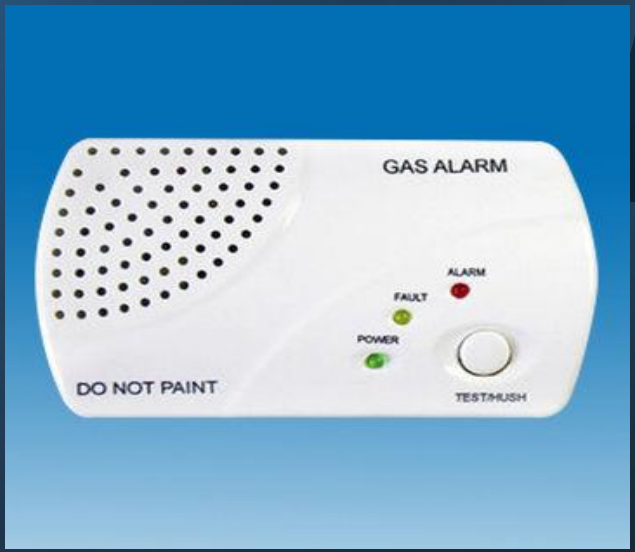
UL 1484 Device Manufacturing Standard



Standard for Safety Residential Gas Detectors

- ✓ 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.
- ✓ These requirements also cover all remote accessories that may be connected to a gas detector.
- ✓ These requirements do not cover gas detectors for use in hazardous locations, as defined by the National Electrical Code, NFPA 70, for industrial or commercial use, or for use as smoke and fire detectors.

UL 1484 Minimum Detection Threshold Updated



UL's Collaborative Standards Development System (CSDS)

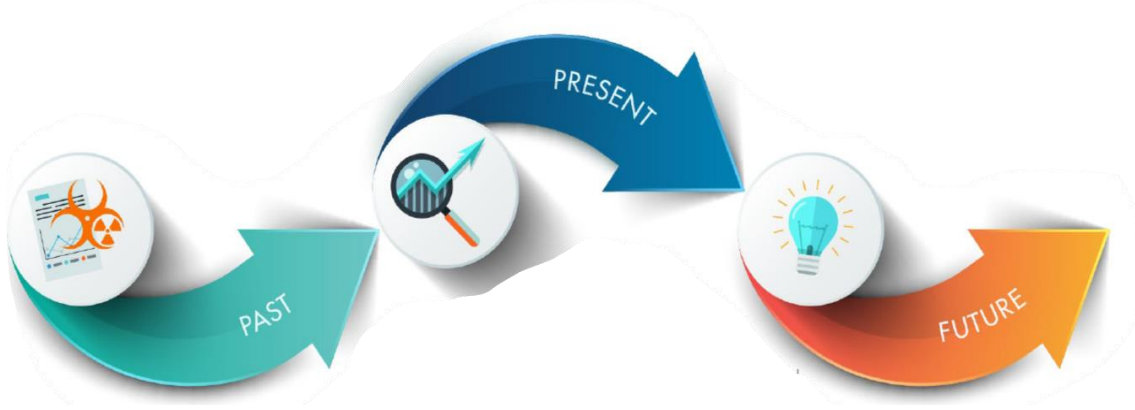
- UL is pleased to announce the adoption of ANSI/UL 1484-2022 as the American National Standard for *Residential Gas Detectors.* Each member of the STP who participated by voting and/or commenting is to be congratulated for their role in accomplishing this important achievement.

The following summarizes the milestones associated with this ANSI approval of UL 1484:

Announcements in Standards Action:	**December 10, 2021**
Date of Ballot:	December 10, 2021
Notification of Right to Appeal for Continuing Objectors:	January 27, 2022
Date of ANSI/UL Designation:	February 23, 2022
Anticipated Publication of ANSI/UL Material:	February 2022

Detection Threshold Updated from 25% LEL min to 10% LEL min

Human Behavior Challenges



Change these Thoughts…	Into these Cognitions…
I don't know much about /never heard of natural gas or RMDs	I am familiar with what natural gas is, how it works, and that there are separate devices to detect NG leaks
I don't know what this smell is	This is definitely a natural gas leak
If a NG smell is not very strong or does not persist, there is no danger	Just because NG smells are faint or go away, there may still be danger
It takes a while for NG to turn into something dangerous	If NG accumulates it can ignite and explode in an instant, when you least expect it.
Nothing has ever happened to me with NG, so it is not that dangerous	I need to be aware of what natural gas is.
My appliances are all in good working order, so there is really no danger	Just because your appliances are working doesn't mean there is not a leak
Other detectors (like CO) also detect natural gas, so I am covered	Other detectors do not detect natural gas, I need a separate device
If I can smell a natural gas leak, I don't need a RMD	Natural gas leak danger can exist before I smell it.

Public Awareness Program Opportunities

Comprehensive Industry Adoption Public Awareness Approach Considerations

- Consider embedding enhanced levels of device awareness in public awareness campaigns
- Integration strategy can generally include other safety devices such as use of Smoke/Fire Alarms, CO Detectors and ***Fuel Gas Detection***…
- Build on existing CPSC and NFPA Public Awareness approaches for CO and smoke/fire alare devices
- ***Messaging needs to re-enforce actions to be taken in the event of an odor OR alarm, smell gas act fast messaging enhancements***
- Begin the process of crafting appropriate language and strategy to reflect NFPA 715 publication.
- Work with other industry groups to ensure consistency in messaging
- Measure effectiveness of messaging in the spirit of continuous improvement

Public Awareness Program Messaging

Strategy Essential Elements

Comprehensive Industry Adoption Public Awareness Approach Considerations

- Use a “What, Why, Where/How” human factors approach to messaging based on requirements in NFPA 715 including:

✓ What are these devices used for ?

✓ Why do I need these alarms if gas is odorized ?

✓ Where/How should devices be installed ?

NOTE: Include modified instructions to address Alarm vs Odor detection and actions that need to be taken.

Common Approach to Messaging is Key to Behavior influencing Success…….

Public Awareness Program Messaging

Strategy Essential Elements

Comprehensive Industry Adoption Public Awareness Approach Considerations

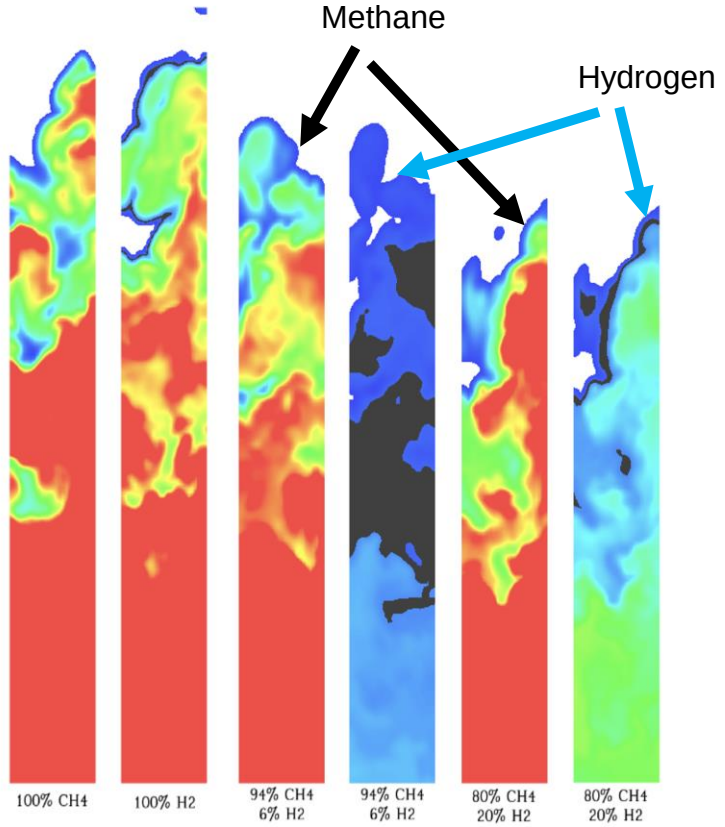
- ✓ It is important to note that the primary safety indicator for the presence of fuel gas and the potential of a fuel gas leak is the presence of a “gassy odor.”
- ✓ Odorants are sulfur compounds that impart a gassy odor, typically associated with “rotten eggs” and are added to fuel gases for detection by an average sense of smell since typically fuel gases in their natural state are odorless.

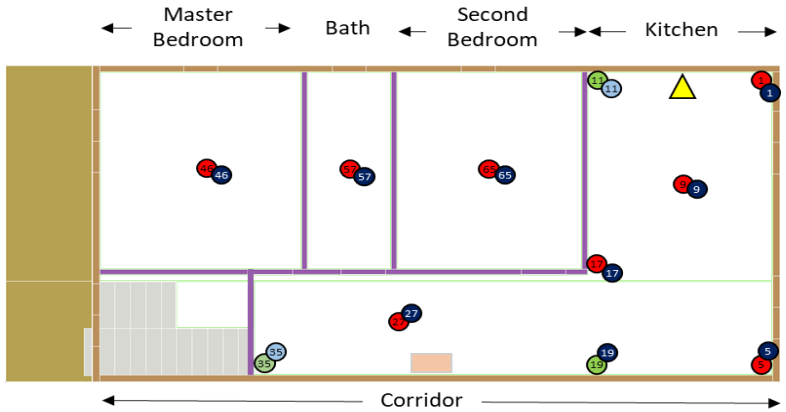
Gas odor detection by a person with an average sense of smell could precede fuel gas alarm activation and, as a result, a gas odor *or* gas alarm indication should trigger identical response actions.

Impact of H2 on NG Dispersion in a Residential Structure

- Methodology
  - For different hydrogen blends (up to 100%): characterizing gas blend behavior – study buoyancy and gas separation
  - A series of experiments in a **single room** configuration with appropriate gas release rates to provide highly resolved gas concentration data & modeling to expand test data
  - Physics of H2/NG mixture tested in full scale residence

- Results (Study completed in 12/21)
  - **H_2 and CH_4 stay together as they spread**
  - **Increasing the concentration of H_2 did not always lead to increase delivery time from source to sensor**
  - Conditions of the environment and within the compartment may have led to air currents that affect gas dispersion





Courtesy of NYSEARCH,© 2022

SAFETY NOTICE

For your safety, propane has an odor added so you can detect leaks. You and each person using or handling propane of your household must know the smell of propane. Ask for a scratch 'n sniff brochure or MSDS to demonstrate the odor. If anyone is unable to recognize the odor of propane, call us immediately.

Propane is heavier than air; therefore, leaks will initially tend to settle to floor or ground levels. To check for propane, carefully smell in low spots.

under some of the following conditions, you may not be able to smell a gas leak. For Example:

-----=-...;Age, colds, allergies, sinus congestion or the use of tobacco, aJconoiordriitjsmay,,diminish youi:.seos.e..ofsmell.

Cooking or other strong odors may cover up the smell of gas.

In certain circumstances, propane gas may lose its distinctive smell - this is called "ODORANT FADE".

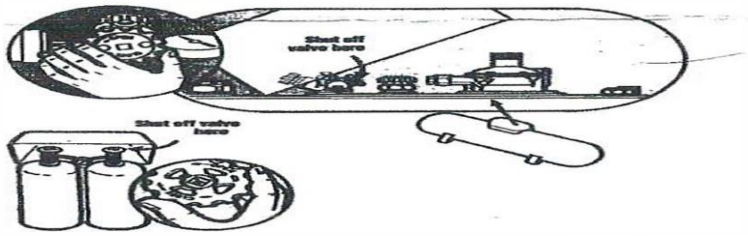
Sometimes propane gas can lose its odor if a leak occurs underground or if there is rust on the inside of the cylinder or piping.

Some persons are physically unable to detect the smell of gas. If you are one of these people, call us immediately.

For these reasons, it is recommended that you purchase and install propane gas detector(s) according to the manufacturer's instructions as a back-up warning device. If anyone using or handling propane is unable to recognize the odor of propane, you should not use it until you have purchased and installed gas detector(s).

WHAT TO DO IF YOU SMELL GAS ...

1. Put out all smoking materials and other open flames.
2. DO NOT operate a light switch, telephone, cigarette lighter, appliance or thermostat. Any spark in the area where propane gas is present may ignite the gas.
3. Get everyone out of the building immediately.
4. Shut off the gas supply at the tank or cylinder.
   (See below)



5. Call Company - use your neighbor's telephone if gas odor is in the building.
6. Have your Company service person locate and repair the leak. Have your Company service person air out the area and check and re-light your gas appliances. Do not return to the building until you are advised that all leaks have been repaired and it is safe to return.

Carbon Monoxide Safety

Often called the invisible killer, carbon monoxide is an invisible, odorless, colorless gas created when fuels (such as gasoline, wood, coal, natural gas, propane, oil, and methane) burn incompletely. In the home, heating and cooking equipment that burn fuel can be sources of carbon monoxide.

- CO alarms should be installed in a central location outside each sleeping area and on every level of the home and in other locations where required by applicable laws, codes or standards. For the best protection, interconnect all CO alarms throughout the home. When one sounds, they all sound.
- Follow the manufacturer's instructions for placement and mounting height.
- Choose a CO alarm that is listed by a qualified testing laboratory.
- Call your local fire department's non-emergency number to find out what number to call if the CO alarm sounds.
- Test CO alarms at least once a month; replace them according to the manufacturer's instructions.
- If the audible trouble signal sounds, check for low batteries. If the battery is low, replace it. If it still sounds, call the fire department.
- If the CO alarm sounds, immediately move to a fresh air location outdoors or by an open window or door. Make sure everyone inside the home is accounted for. Call for help from a fresh air location and stay there until emergency personnel declare that it is safe to re-enter the home.
- If you need to warm a vehicle, remove it from the garage immediately after starting it. Do not run a vehicle or other fueled engine or motor indoors, even if garage doors are open. Make sure the exhaust pipe of a running vehicle is not covered with snow.
- During and after a snowstorm, make sure vents for the dryer, furnace, stove, and fireplace are clear of snow build-up.
- A generator should be used in a well-ventilated location outdoors away from windows, doors and vent openings.
- Gas or charcoal grills can produce CO — only use outside.

HOME HEATING EQUIPMENT

Have fuel-burning heating equipment and chimneys inspected by a professional every year before cold weather sets in. When using a fireplace, open the flue for adequate ventilation. Never use your oven to heat your home.

FACTS

- A person can be poisoned by a small amount of CO over a longer period of time or by a large amount of CO over a shorter amount of time.
- In 2010, U.S. fire departments responded to an estimated 80,100 non-fire CO incidents in which carbon monoxide was found, or an average of nine calls per hour.

NFPA NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

Your Logo

www.nfpa.org/education ©NFPA 2017

Smoke Alarms at Home

Smoke alarmS are a key part of a home fire escape plan. When there is a fire, smoke spreads fast. Working smoke alarms give you early warning so you can get outside quickly.

SAFETY TIPS

- Install smoke alarms in every bedroom. They should also be outside each sleeping area and on every level of the home. Install alarms in the basement.
- Large homes may need extra smoke alarms.
- It is best to use interconnected smoke alarms. When one smoke alarm sounds, they all sound.
- Test all smoke alarms at least once a month. Press the test button to be sure the alarm is working.
- Current alarms on the market employ different types of technology including multi-sensing, which could include smoke and carbon monoxide combined.
- Today's smoke alarms will be more technologically advanced to respond to a multitude of fire conditions, yet mitigate false alarms.
- A smoke alarm should be on the ceiling or high on a wall. Keep smoke alarms away from the kitchen to reduce false alarms. They should be at least 10 feet (3 meters) from the stove.
- People who are hard-of-hearing or deaf can use special alarms. These alarms have strobe lights and bed shakers.
- Replace all smoke alarms when they are 10 years old.

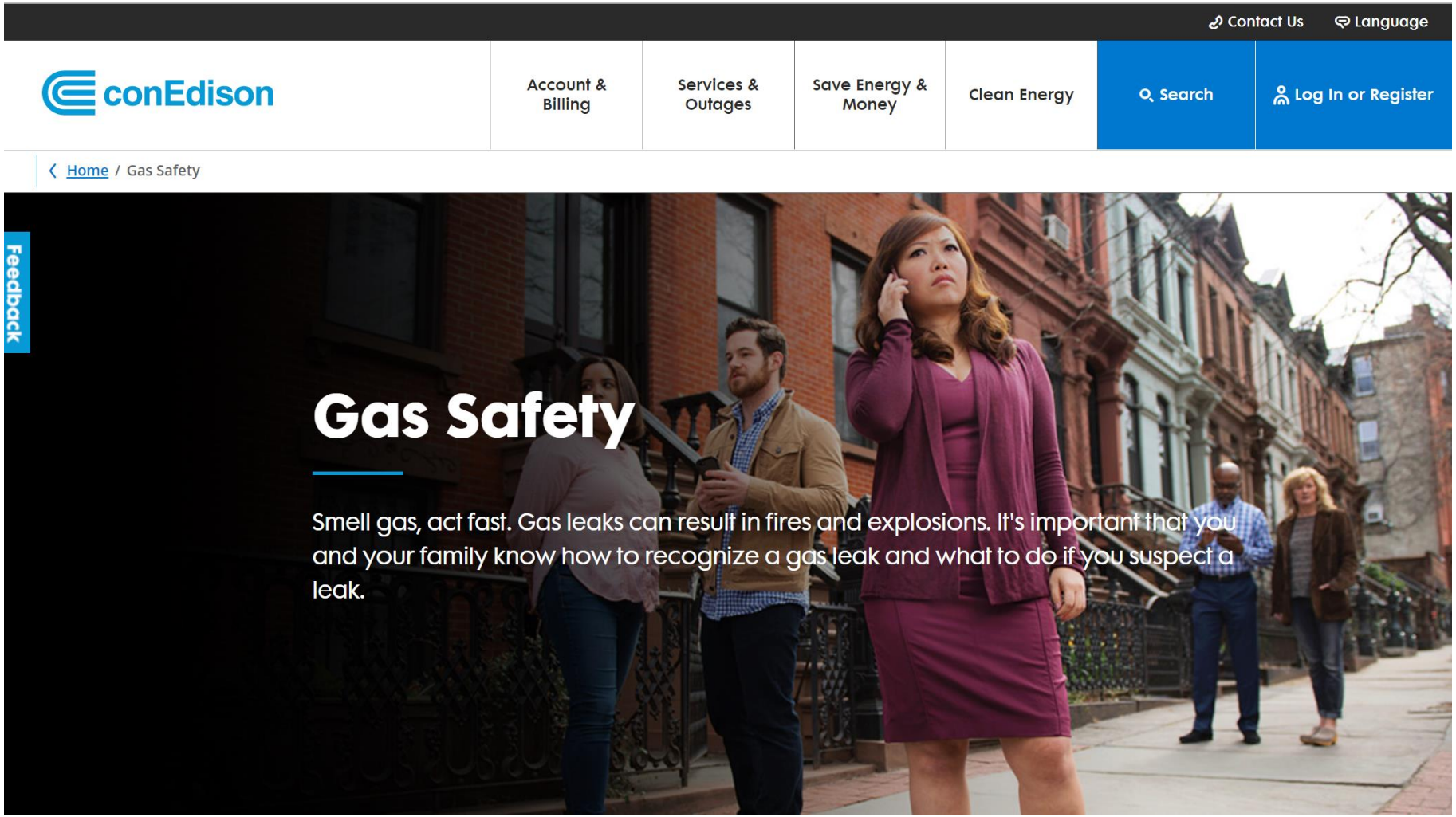
FACTS

- A closed door may slow the spread of smoke, heat, and fire.
- Smoke alarms should be installed inside every sleeping room, outside each separate sleeping area, and on every level. Smoke alarms should be connected so when one sounds, they all sound. Most homes do not have this level of protection.
- Roughly 3 out of 5 fire deaths happen in homes with no smoke alarms or no working smoke alarms.

NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

Your Logo

Safety Advocacy



Safety Advocacy - www.coned.com

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.

Gas leak detectors are available at many hardware and home improvement stores, as well as online. These combustible gas detectors come battery operated or require power from an electrical outlet. The best installation is within 12 inches of the ceiling in the same room with the natural gas pipe or appliance, such as a stove or gas-powered fireplace. For your protection, it's important to follow your device's installation instructions carefully.

Good to know: A carbon monoxide detector is not the same as a gas leak detector. While there are combination devices on the market, most carbon monoxide detectors do not detect combustible gasses. Be sure to check the label.

What to look for in a gas leak detector:

- **Underwriter Laboratory Standard 1484 for Residential Gas Detectors certification**
- **A detection level ≤ 10% of the lower explosive level for natural gas**
- **Battery-powered with a lifetime battery included**

Questions
Discussions