

REDUCING GAS LEAKS IN MASSACHUSETTS

An Action Manual

By

HEET (Home Energy Efficiency Team)

A nonprofit that has mapped natural gas leaks in over 180 municipalities

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Overview

|||| The Problem

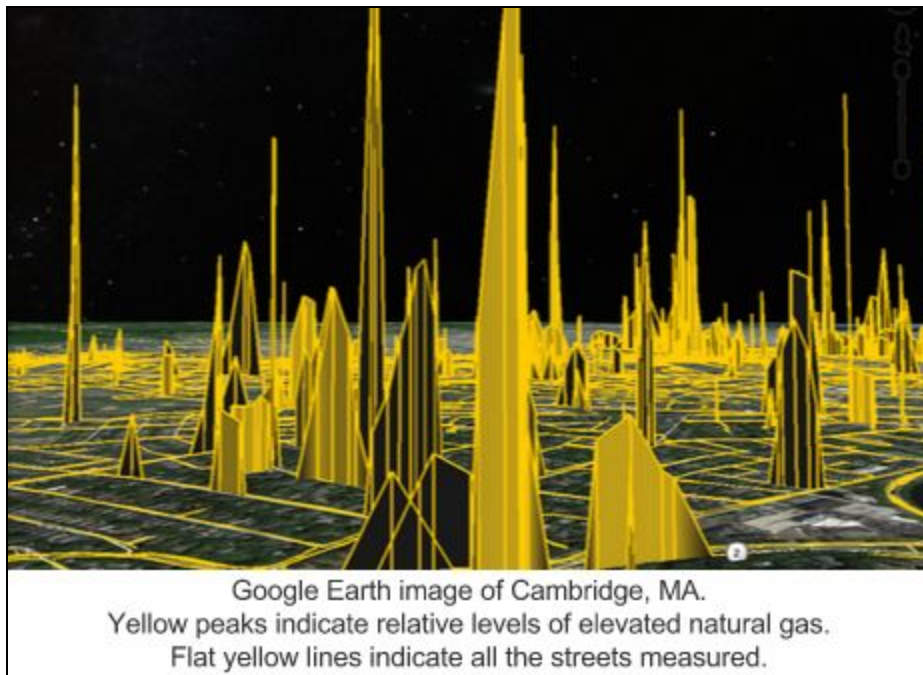
Natural gas is our major fuel here in Massachusetts. It is how 50% of our buildings are heated¹ and 59% of our electricity is generated.² Since it delivers more heat per pound of carbon dioxide at a lower cost, it is considered a “bridge fuel” to a more efficient renewable-energy economy.

However, there are problems with this rosy image. The gas is sent to our homes and buildings primarily through pipes under the street. The oldest type of pipe is made of cast iron. Some of these iron pipes have been in the damp ground for decades and are in bad repair. Over 50% of the pipes in Boston are over 50 years old.³



As the pipes corrode, especially along the joints, they begin to leak natural gas into the ground, where it percolates up into the atmosphere.

Using a GIS-enabled high-precision natural-gas analyzer, a 2012 survey of Boston streets by Boston University Professor, Nathan Phillips, found over 3,300 leaks –over four leaks per linear street mile.



¹ <http://www.eia.gov/state/print.cfm?sid=MA>

² <http://www.eia.gov/state/?sid=MA>

³ <http://www.edf.org/climate/methanemaps/city-snapshots/boston>

|||| Natural Gas Leaks

- **Are potentially explosive:** When natural gas leaks out of pipes and accumulates in confined spaces, all it takes is a small spark to ignite the gas into flames. This spark can originate from something as commonplace as a cigarette, an outlet, a poorly wired light switch, or exposed wires.

In order to reduce the chances of explosions, utilities run surveys of all public streets every six months to 2 years. If a leak is either in a contained space or near a building, it is deemed “potentially explosive” and, therefore, is repaired. The current system for detecting leaks has minimized explosions but has not eliminated them completely.

In 2014, 12 people were hurt in an [explosion](#) in Dorchester. A month earlier, a [natural gas leak explosion in Harlem](#) left eight people dead and 70 injured.

- **Kill trees:** As the natural gas percolates up through the soil, it displaces oxygen and dehydrates the soil,⁴ asphyxiating nearby plant roots. The connection between damaged vegetation and natural gas leaks is so reliable that utility personnel are trained to look for dead or dying trees when searching for natural-gas leaks.

To cut down and replace a public tree costs between \$1,000 and \$15,000 per tree,⁵ depending on the size of the tree. It can take decades for them to grow back to the previous size. The cities of Brookline, Hingham, Milton, Nahant and Saugus all have pending legal actions against National Grid totaling over \$2 million in damage to city trees.



- **Hurt human health:** Natural gas increases ground-level ozone and reduces the level of oxygen in the air. At high concentration it can lead to headaches, nausea, dizziness, fatigue and an [increase in human morbidity](#).
- **Damage the climate:** A 2015 Harvard University-led study published in the *Proceedings of the National Academy of Sciences* monitored the atmosphere in the Greater Boston area for ethane, a chemical marker found *only* in natural gas. The results showed that 2.7% of the natural gas in our distribution network is lost before it reaches our homes and businesses.

Not only is this valuable fossil fuel being wasted—a fuel harvested through fracking, a destructive environmental practice—but as the gas is released into the atmosphere, it also damages the climate.

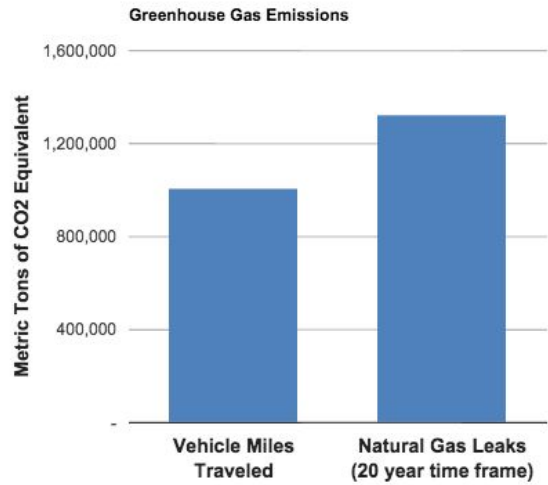
⁴ <http://www.npr.org/2011/11/21/142504812/bostons-leaky-gas-lines-may-be-tough-on-the-trees>

⁵ http://www.boston.com/news/local/articles/2007/12/13/gas_leaks_killing_trees/?page=full

Natural gas is primarily made of methane, a remarkably potent greenhouse gas that is 85 times⁶ more destructive to the climate than carbon dioxide over its first 20 years.

The Harvard study reports that even when considered on a 100-year time frame (methane gradually weakens in impact over time), the leaks account for 10% of the state’s inventory of greenhouse gasses. This is roughly equivalent to the emissions of all the state’s businesses and factories combined.⁷

It is easier to fix a majority of these leaks than to persuade most factories and businesses to stop emitting.



Who is Paying for the Lost Gas?

To add insult to injury, the utilities don’t pay for the wasted gas, but instead pass the cost onto ratepayers by factoring the lost gas into the price we pay per therm. The 2014 Harvard-University-led study calculated the total cost of lost gas to be \$90 million per year in the Greater Boston area.

The Speed of Repair

The utilities perform regular surveys searching for potentially explosive leaks, which require repair. However, they aren’t required to repair leaks that are not considered explosive. Leaks that are not considered a “probable future hazard” don’t have to be fixed, ever.



A 2015 National Grid report to the Massachusetts Department of Public Utilities stated that a leak on the corner of Park Drive and Beacon St. in Boston was first reported in 1985 and has yet to be repaired.

The least expensive time for a leak to be repaired is just before repaving since the utility can patch the hole using a less expensive (and permanent) surfacing material. Over the 30 years since 1985, this street has probably been repaved twice⁸, but this leak still has not been fixed.

“The unseen patchwork of aging natural gas pipelines in our country threatens public safety, takes money out of the pockets of consumers who pay for gas they never receive, and releases emissions that worsen climate change”
–Senator Edward J. Markey

The utilities have been given the cost-recovery funds to fix all the leaks currently on the books within 20 years. This means this leak should be fixed before 2030.

⁶ https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf; page 731

⁷ <http://centerforenergyenvironmentalstudies.blogspot.com/2015/01/a-27-methane-leak-rate-represents-10-of.html>

⁸ City streets tend to be repaved every 15 to 20 years according to Kathy Watkins of the City of Cambridge DPW.

Solutions

Support State Legislation

Although Massachusetts is one of the states with the most leak-prone natural gas infrastructure,⁹ methane leaks are not unique to Massachusetts. It is a nationwide problem. By fixing the problem in Massachusetts, we can help lead through example for other states.

Representative Lori Ehrlich and Senator James Eldridge are sponsors of two current bills that, if passed, will help solve the problem. Both bills have more than 50 cosponsors, meaning there is a good chance they can get passed. The more voters that speak out in favor of these bills, the better the chance is.

- **[A Bill Protecting Consumers](#)** (H2870): This bill prohibits the utilities from passing the cost of wasted gas onto consumers, incentivizing the utilities to fix the leaks as quickly and cost effectively as possible. When a similar bill was passed in Texas, 55% of the leaks were fixed within 3 years.¹⁰
- **[A Bill Requiring Gas Leak Repairs During Road Projects](#)** (H2871): This bill requires that whenever a street is already open for construction, gas companies check and repair *all* gas leaks. Repairing leaks before repaving is not only cheaper for the utilities, it also decreases the chance the street will need to get opened up soon afterward for pipeline repairs, reducing future street repaving needs (and costs) for the local municipality and disruption for nearby residents.

When a similar bill was passed in Texas, 55% of the leaks were fixed within 3 years.

Bob Ackley of Gas Safety Inc. worked for the utilities for 30 years on natural gas safety. He surveys natural gas leaks in towns across Massachusetts using a high-precision natural gas analyzer.

One rainy night, he drove through Cohasset and noticed a high read of natural gas in the air.

When he stopped the car to find the leak, he didn't need to pull out his equipment to find the leak because in front of him was a puddle where the gas was coming out so fast it was bubbling up through the water.

He called the utility to tell them to get there quickly to repair the leak and they said not to worry. The leak had been there for years but because it was far from houses and not contained in an enclosed space, it didn't need to be repaired. As far as Bob knows, the leak is still there.



⁹ 2014 ICF report commissioned by the DPU, <http://www.mass.gov/eea/docs/dpu/gas/icf-lauf-report.pdf>, page B-4.

¹⁰ Senator Markey. *America Pays for Gas Leaks*. http://www.markey.senate.gov/documents/markey_lost_gas_report.pdf

Maps to Educate

HEET is a Cambridge-based nonprofit with a mission to catalyze community engagement to achieve climate stability and create resilient communities.

HEET's innovative programs have received local and national recognition. Winners of the 2010 EPA Regional Environmental Merit Award and the 2009 City of Cambridge GoGreen Award.

During the summer of 2014, HEET used a GIS-enabled high-precision natural-gas-analyzer to map all the natural gas leaks along public streets in Cambridge and Somerville. HEET worked with Boston University Professor Phillips, among others, to create [a report](#) to deliver to the cities of Somerville and Cambridge. The report has educated citizens both inside and outside the two cities.

In March 2015, for the first time, every utility in Massachusetts filed a report to the Department of Public Utilities detailing the location and age of all the leaks in their territory. HEET used the data from the



Dying tree poisoned by natural gas seeping into the soil. Notice the dry extremities and lack of leave in comparison to healthy trees.

National Grid, Eversource, and Columbia Gas reports to map the gas leaks in over 200 Massachusetts towns and cities.

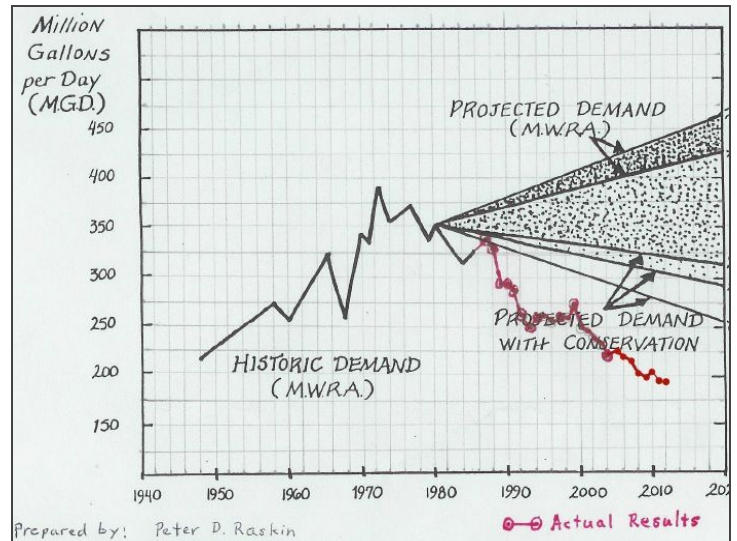
Using these maps, residents can zoom in on their homes, schools, and/or businesses in search of unrepaired gas leaks.



Fix it First Learning from the 1980s Proposed Water Pipeline

The Kinder-Morgan pipeline is one of the many natural gas pipelines currently being proposed to meet New England’s energy needs. The question is do we really need more natural gas or can we instead use what we have more wisely?

Back during the 1980’s, Greater Boston residents were told they needed a new water pipeline because demand for water in the area averaged about 10% above what could be safely supplied by the Quabbin and Wachusett Reservoirs. The experts predicted Boston would shortly face a dire water shortage. In response, the Massachusetts Water Resource Authority (MWRA) suggested building a \$500 million pipeline from the Connecticut River Valley.



When Connecticut Valley residents objected to selling their water, the MWRA decided to [implement water conservation initiatives](#),¹¹ which remain in place today. The initiatives included, but were not limited to, reducing pipeline leaks, improving metering, and retrofitting homes. Not only did ratepayers save \$500 million from the proposed pipeline, they also saved an additional \$153 million through not having to pay for the associated costs of increasing treatment plant capacity.¹²

Between the time of the proposed pipeline and 2014, the MWRA system has *decreased water use by over 40%* despite an increase in local population and GDP. Even today, our demand for water continues to drop by over 1% per year.

The graph above shows the 1986 projection for future demand for water use in Massachusetts. The projections show the business as usual scenario as well as the “projected demand with conservation.” The red line on the graph shows the actual results which lowered the water use more than previously thought possible.

Efficiency can not only minimize waste, but also save ratepayers large sums of money.

Stopping natural gas leaks and increasing the efficiency of how we use the gas in our homes and businesses will help us all. We ratepayers and taxpayers won’t have to shoulder the cost of the new gas pipeline(s) and their associated facilities. Our businesses will be more efficient and competitive.

We will reduce the danger and damage of the leaks, while caring for the planet all live on.

¹¹ <http://commonwealthmagazine.org/environment/were-not-facing-an-energy-crisis-in-new-england/>

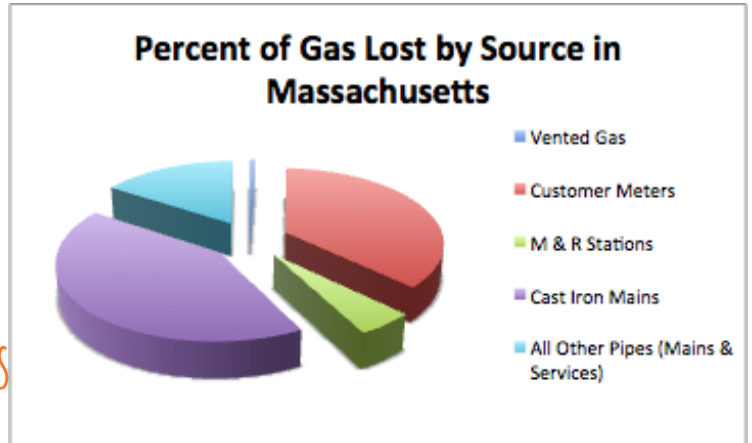
¹² <https://www.epa.gov/sites/production/files/2017-03/documents/ws-cases-in-water-conservation.pdf>, pg. 27 - 28

Fixing Leaky Pipes

Managing Cast Iron Pipes

The largest source of natural gas leaks is cast iron mains.

An ICF independent report commissioned by the Massachusetts Department of Public Utilities (DPU) found that 42% of the lost gas leaked out of cast iron mains,¹³ the oldest type of pipe.



HOW CAN WE REDUCE THESE LEAKS MOST EFFECTIVELY AT THE LOWEST

COST?

However when asked how much it will cost to reduce this waste, the utilities commonly mention the large cost of \$1 million per mile to dig up and replace these old pipes.¹⁴

However, the [DPU-commissioned report](#) identified other methods that can reduce the leaks at a much lower cost:

- “Sleeving” cast-iron pipes (insert a plastic sleeve inside the old pipe) will reduce the leaks to the level of a new plastic pipe until the pipe can be replaced.
- Decreasing the pressure in all the pipes as much as possible, especially during the summer when demand is low, will slow all the leaks along the pipes.
- When working on pipes, the utilities should not vent the gas into the atmosphere. Instead, they should create an alternate path for the gas or pump the gas out of the pipe being worked on into another line.

Material	Emissions Factor (scf/hour/mile)
Cast Iron	27.25
Unprotected Steel	12.58
Plastic	1.13
Protected Steel	0.35

¹³ <http://www.mass.gov/eea/docs/dpu/gas/icf-lauf-report.pdf>

¹⁴ <http://www.usatoday.com/story/news/nation/2014/09/23/gas-pipes-cast-iron-deaths-explosions-investigation/15783697/>

Given the right incentives, utilities will be motivated to select the best solutions to fix the leaks in the most cost effective manner.

Take Action!

How you can help

Help Make These Bills Into Law

The Massachusetts bills (2870 and 2871) sponsored by Representative Lori Ehrlich and Senator James Eldridge have over 50 cosponsors, which means they have a good chance of becoming law. Meet with your local state representative or senator (or call them at 617-722-2000) and urge them to pass the current state bills. Bring in a copy of your town's natural gas leaks map from [HEET's maps of the leaks](#).

Pass a local city resolution in support of the proposed state legislation.

Cities, such as Waltham, Framingham, Somerville and Cambridge, have already done this. City resolutions like this make it more likely the state will take action. A draft of the Framingham Resolution is included below.

Educate others using the information from this document.

This action plan provides a comprehensive overview of the information on gas leaks. By sending this document to your municipality's elected officials, you can help this issue pick up momentum through spreading awareness. Also, by writing a letter to the editor and posting it in your local newspaper you can spread awareness.

Suggest your municipality talk to HEET

HEET has been working with municipalities to help them reduce their gas leaks. It has learned of a variety of inexpensive methods that municipalities can use to work with utilities to reduce gas leaks. These methods will help reduce the associated costs for more frequent repaving, damaged trees, and danger to residents and first responders.

Donate to HEET:

No large foundation has paid for HEET to map all the utility data. In spite of this, HEET has decided to provide the maps for free to all. Donating to HEET will allow us to map more of Massachusetts, as well as continue to educate residents about the issue.

HEET's mission is to save fossil fuels and money for residents.

Letter Template

Send to Town Officials or Organizations

INSERT YOUR LETTERHEAD

Dear **NAME OF OFFICIAL** -

In March 2015, the utilities filed with the Massachusetts Department of Public Utility reporting data on every natural gas leak in its territory.

NAME OF THE LOCAL UTILITY's report shows that **NAME OF YOUR TOWN** has over **NUMBER OF LEAKS** active gas leaks¹⁵. The oldest of these unrepaired leaks was first reported to the utility in **YEAR OF OLDEST LEAK** and it is still unrepaired.. Since the utilities are only mandated to fix the leaks that are considered potentially explosive, nonexplosive leaks can remain unrepaired for decades.

HEET, an energy efficiency nonprofit, has used the data to create the attached map of **TOWN NAME**'s natural gas leaks.¹⁶

Natural gas leaks:

- Can cause explosions
- Kill trees by suffocating the roots
- Are harmful to human health
- Release methane, an extraordinarily potent greenhouse gas

To add insult to injury, the utilities do not pay for the gas that is wasted through leaks, but pass that cost onto the ratepayers by factoring it into the price we pay per therm.

In response, I ask that you and the city council pass a resolution in support of two state bills that would reduce the leaks across the state.

- [Bill H.2870](#) forces the utility to pay for the gas wasted through the leaks rather than pass the cost onto the ratepayer
- [Bill H.2871](#) requires the utilities fix *all* gas leaks while streets are already open for other road projects rather than only fix the leaks deemed potentially explosive

We further ask that the city council set up a commission/group to study gas leaks in our municipality and come up with a plan to fix the problem.

If you need more information, please contact me.

NAME

ORGANIZATION

¹⁵ You can look up the number of unrepaired leaks and the age of the oldest leak on HEET's website—SqueakyLeak.org.

¹⁶ Don't forget to attach the map.

Press Release Template

For Immediate Release

NAME OF ORG
CONTACT INFO
DATE

The Stink of Waste

NUMBER OF LEAKS found in **NAME OF TOWN**

For the first time ever, **NAME OF TOWN**'s local natural gas utility, **NAME OF UTILITY**, released data in March 2015 listing the number and location of the gas leaks in their territory. The data, reported to the Massachusetts Department of Public Utilities lists **TOTAL NUMBER OF LEAKS** in **NAME OF TOWN**. That is about **AVERAGE NUMBER** of leaks per linear mile of street.



Note: The generic screenshot of the map should be replaced by a screenshot specific to your town.

HEET, a Cambridge-based nonprofit, has used the data from several utilities to map the leaks in over 200 municipalities in Massachusetts using Google Maps. These maps can be found on SqueakyLeak.org.

The oldest unrepaired leak in **NAME OF TOWN** was first reported to the utility in **YEAR** – **NUMBER OF YEARS** ago. It has yet to be fixed.

Massachusetts underground gas pipes are among the most leak-prone in the country due to their old age. The utilities are not required to repair the leaks unless they are categorized as potentially explosive, a designation reserved for leaks in contained areas. A large leak pouring gas into an open area cannot cause an explosion; thus, there is no current legal requirement for its repair.

These leaks kill trees as the gas percolates through the soil. At the surface, ground-level ozone increases which is hazardous to human health, and methane traps heat 85 times more effectively than CO₂ in its first 20 years of life.

To add insult to injury, ratepayers must pay for the wasted gas since the utilities factor the cost into the price per therm they charge.

INSERT QUOTE BY CITY OFFICIAL.

There are 2 state bills that can help solve the problem. [Bill H.2870](#) forces the utility to pay for the gas wasted through the leaks rather than pass the cost on to the ratepayer. [Bill H.2871](#) requires the utilities fix *all* gas leaks while streets are already open for construction, rather than only fix the leaks that are potentially explosive.

INSERT QUOTE BY ORGANIZATION HEAD.

Sample Resolution for Your Town to Pass From Framingham's Draft Resolution

DRAFT 5-19-15

WHEREAS: According to a study by Harvard University, the amount of gas leaking from pipelines and storage facilities is significantly higher than estimated; and

WHEREAS: This leaking gas, called unaccounted-for gas, represents the difference between the total gas available from all sources and the total gas accounted for as sales, net interchange, and company use and includes leakage or loss by other means, discrepancies in measuring or monitoring inaccuracies, variations of temperatures or pressures and other variants; and

WHEREAS: Often, the cost of this unaccounted-for gas is passed downstream from providers to consumers; and

WHEREAS: A new bill, H2870, seeks to protect all gas and electricity customers, whether businesses, manufacturers, homeowners, municipalities, and other government gas users, from paying for unaccounted-for gas by prohibiting providers from including the cost of unaccounted-for gas, as well as the costs of reducing or remedying loss, in the rate base; and

WHEREAS: This bill, while protecting customers, will also provide economic incentive to providers to mitigate loss, pushing development of improved technology and practices as well as help reduce heat-trapping gasses released during transportation, distribution and storage which have a considerable effect on global warming; now therefore be it

RESOLVED: That the Framingham Board of Selectmen does hereby go on record supporting H2870 An Act relative to protecting consumers of gas and electricity from paying for leaked and unaccounted for gas; and be it further

RESOLVED: That the Town Clerk be and hereby is requested to forward a suitably engrossed copy of this resolution to the elected Framingham delegation in the House and Senate as well as House Speaker Robert DeLeo and Senate President Stanley Rosenberg on behalf of the entire Board of Selectmen.

Further Readings

- ❖ [Leaks in Boston Area Gas Pipes Exceed Estimates](#). *Boston Globe*, January 2015.
- ❖ 2015 [Harvard-University-led study](#) quantifies natural gas leaks in the Boston area
- ❖ *New Scientist* Google Earth [video of natural gas leaks](#) in San Francisco and Boston
- ❖ [Into Thin Air](#). Conservation Law Foundation, 2012.
 - Explores the impact and reasons for the natural gas leaks and how to solve the problem
- ❖ [America Pays for Gas Leaks](#). Senator Markey, House Natural Resources Committee Democratic staff, 2013.
 - Explores why legislation is necessary to repair leaky pipelines
- ❖ [Boston Riddled with Mostly Small Natural Gas Leaks](#). *Boston Globe*, 2012.
 - Found and mapped 3,356 natural gas leaks across Boston.
- ❖ [Natural Gas Pipelines Leaks Across Washington, D.C.](#) Jackson, Robert B., et al.
 - Found and mapped 5,893 natural gas leak in Washington, DC.
- ❖ [Greater Focus Needed on Methane Leakage from Natural Gas Infrastructure](#). Alvarez. Ramon, et al.
 - Analyzes the importance of considering the effects of leakage when calculating the climate impact of natural gas.

DID YOU KNOW?
If a flame clicks on when you turn on the gas burner on your stove, natural gas is being burned and becomes CO₂. If you turn on the burner and the flame does not light, the gas is released as methane and will hurt the climate 85 times more than if the methane had been "combusted."

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