

GAS LEAKS, HUMAN HEALTH & CLIMATE CHANGE

Dr. Marty Nathan

Physician at Baystate Brightwood Health Center

Climate Action NOW

October 16, 2017

Gas Leaks

- Can explode



April 2014: 12 hurt in Dorchester gas leak explosion

Gas Leaks

- Can explode



- Springfield November 22, 2012.

Gas Leaks – Natural gas is Methane

(mercaptan has been added so that we can smell it)

- Can explode
- **It can Harm human health**



Methane can aggravate asthma and other respiratory diseases.

SUNLIGHT OXIDIZES METHANE TO OZONE.

Example: Oxidation of methane



The net reaction is that for each mole of methane oxidized, 2 moles of O₃ is produced.

Ozone is toxic to humans

Ground level ozone causes:

- **Premature death:** Even at low levels (<80% less than EPA danger zone) associated with deaths from cardiovascular disease, strokes, and respiratory causes.¹
- **Immediate breathing problems:** shortness of breath, wheezing and coughing and asthma attacks;
- increased risk of respiratory infections;
- increased susceptibility to pulmonary inflammation; and
- increased need for people with lung diseases, like asthma or chronic obstructive pulmonary disease (COPD), to receive medical treatment and to go to the hospital. ¹³

Ozone is toxic to humans cont....

- **Cardiovascular disease:** Increased arrhythmias and heart attacks in adults.
- **Longterm effects (more than 8 hours):** The risk of admission to hospitals for asthma increased with chronic exposure to ozone. Younger children and children from low-income families were more likely than other children to need hospital admissions
 - Exposed children more likely to DEVELOP asthma as adolescents
 - Lower birth weight and decreased lung function in newborns to ozone levels in their community.

Gas Leaks

- Can explode
- Harm human health
- **Kill trees**

New England is losing trees at a time when we need them most.



Gas Injury to Trees

Identification and Treatment

Bruce R. Fraedrich, Ph. D., Plant Pathologist

“Gas can leak from underground pipes and move vertically and horizontally into the soil surrounding the leak causing root asphyxiation in the contaminated area. Gas injury symptoms range from slow decline and chlorosis to necrosis and death.”
– arborist textbook

Gas Leaks

- Can explode
- Hurt human health
- Kill trees
- **Are paid for by YOU, not the gas company**

Gas Bill (SAMPLE)
Residential Gas Service

Detail of Charges for Gas Service

Charges for Residential - Rate 213

Gas Supply Charges	
Gas Commodity Charge	\$80.81
Intrastate Transportation and Storage	\$8.47
Total	\$89.28

Delivery Charges

Delivery Charge	\$45.76
Total	\$45.76

Indiana Sales Tax \$7.98

Total Charges for Gas Service This Period \$141.02

1 Gas Supply Charges (option to be provided by NIPSCO or one of 12 Choice Suppliers)

2 NIPSCO Gas Delivery Charges (this portion of your bill remains if you participate in Choice)

Gas leaks cost Massachusetts ratepayers \$50-128 million a year. –Sierra Club

Gas Leaks

- Can explode
- Hurt human health
- Kill trees
- Are paid for by you
- **Emit methane, a potent greenhouse gas responsible for climate change*. 2-6% of state's yearly greenhouse gas emissions.**

*The international scientific consensus says methane is **84 times more powerful than CO₂** for the first 20 years in the atmosphere. *IPCC report, September 2013*

Climate change is a public health emergency!

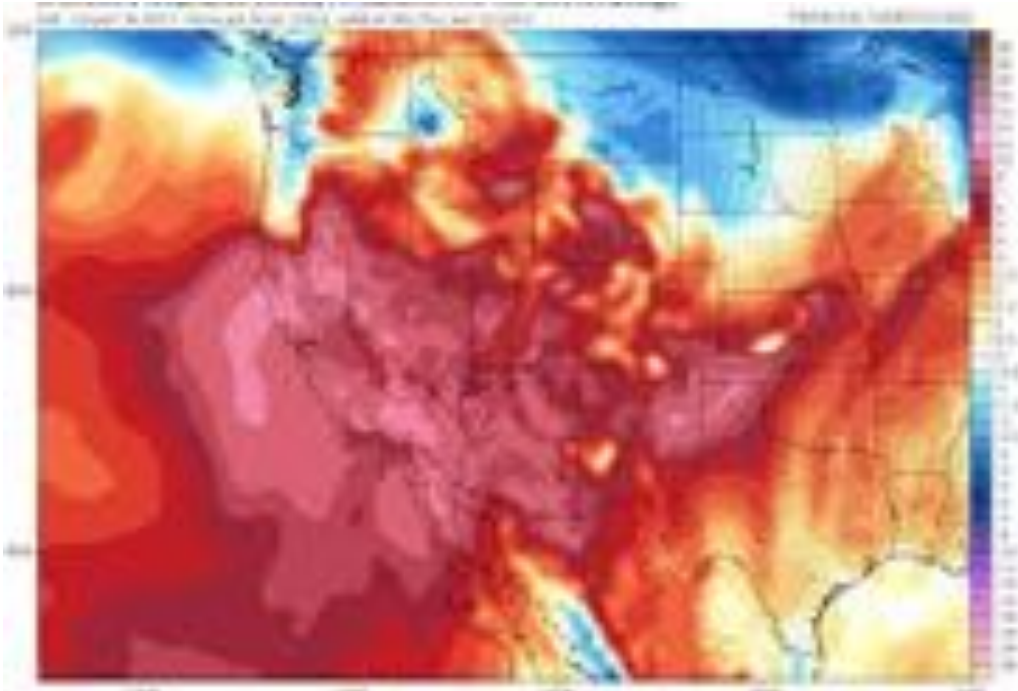


Hurricane Maria



Hurricane Harvey





SOUTHWEST HEATWAVE

California fires



The Problem

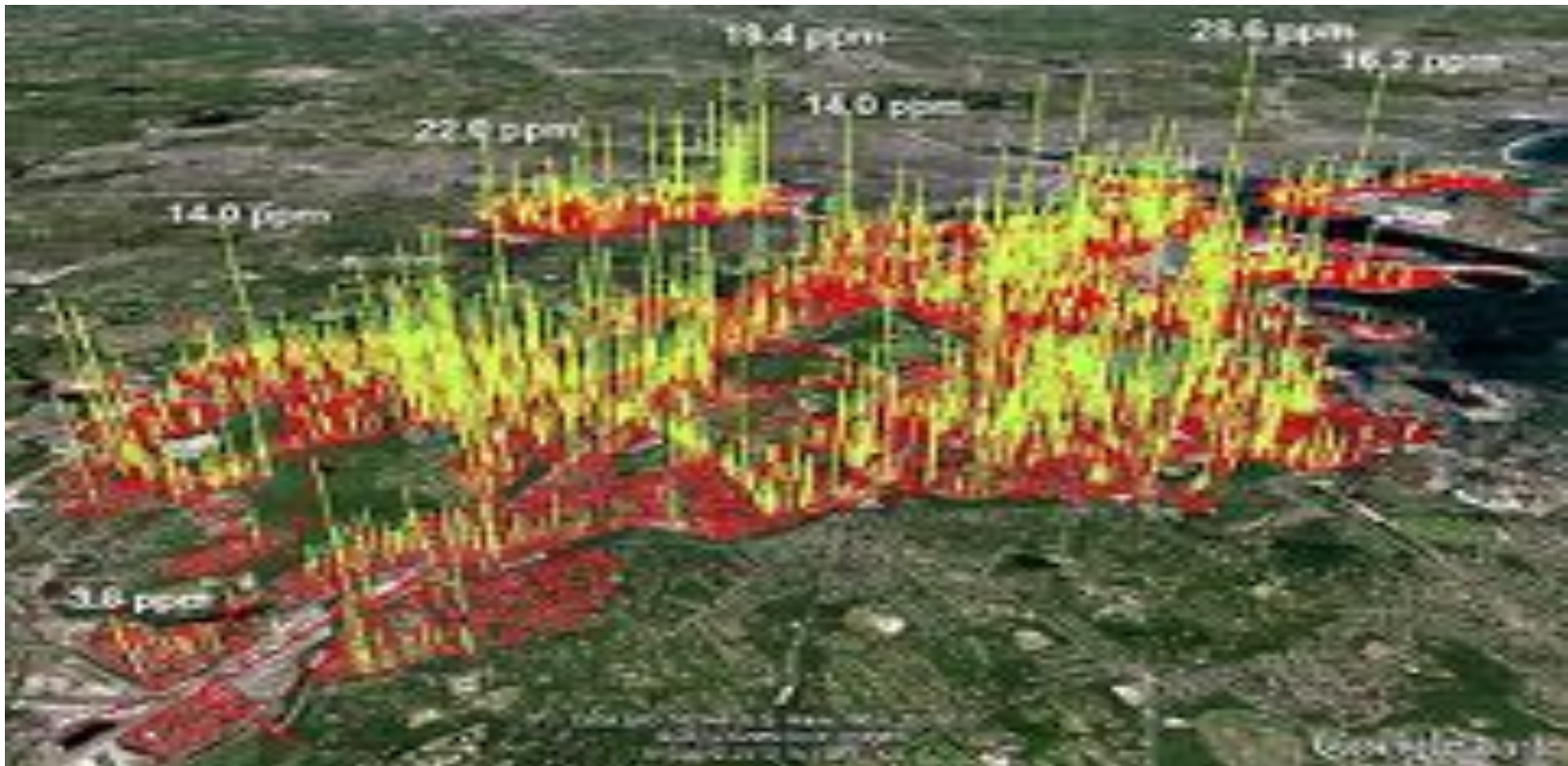
Natural gas, aka methane, is being spewed from Massachusetts' century-old gas pipes.



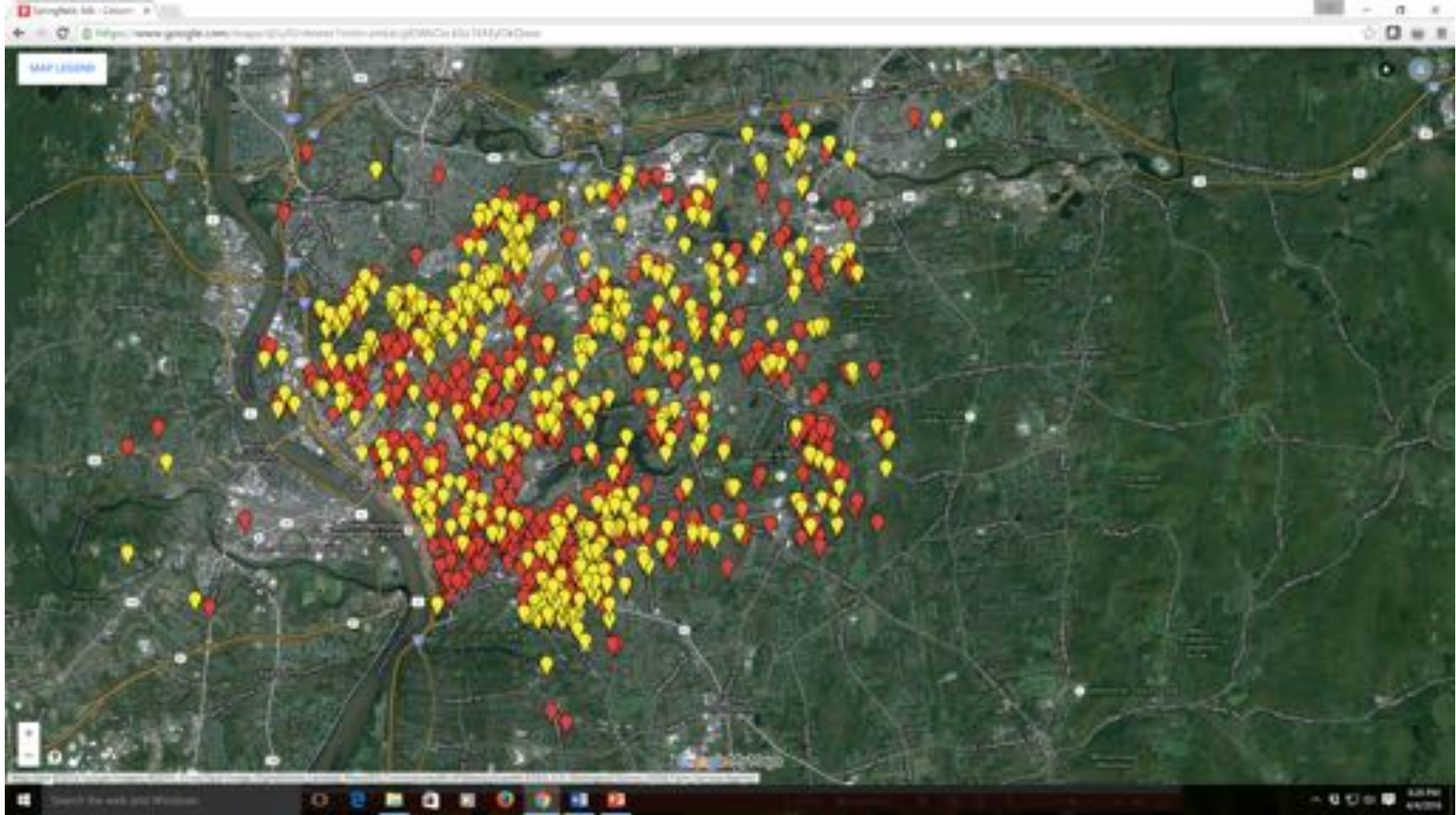
More than 16,000 gas leaks at the end of 2015. These leaks spill more than eight billion cubic feet of natural gas into the air every year – and possibly as much as nineteen billion cubic feet.

A 2013 Harvard study found that

Methane levels in the Boston urban area are two to three times larger than previously estimated and could heat 200,000 homes per year.



Data from Utility Companies 2016: Springfield-600 leaks



 Repaired leak

 Unrepaired leak

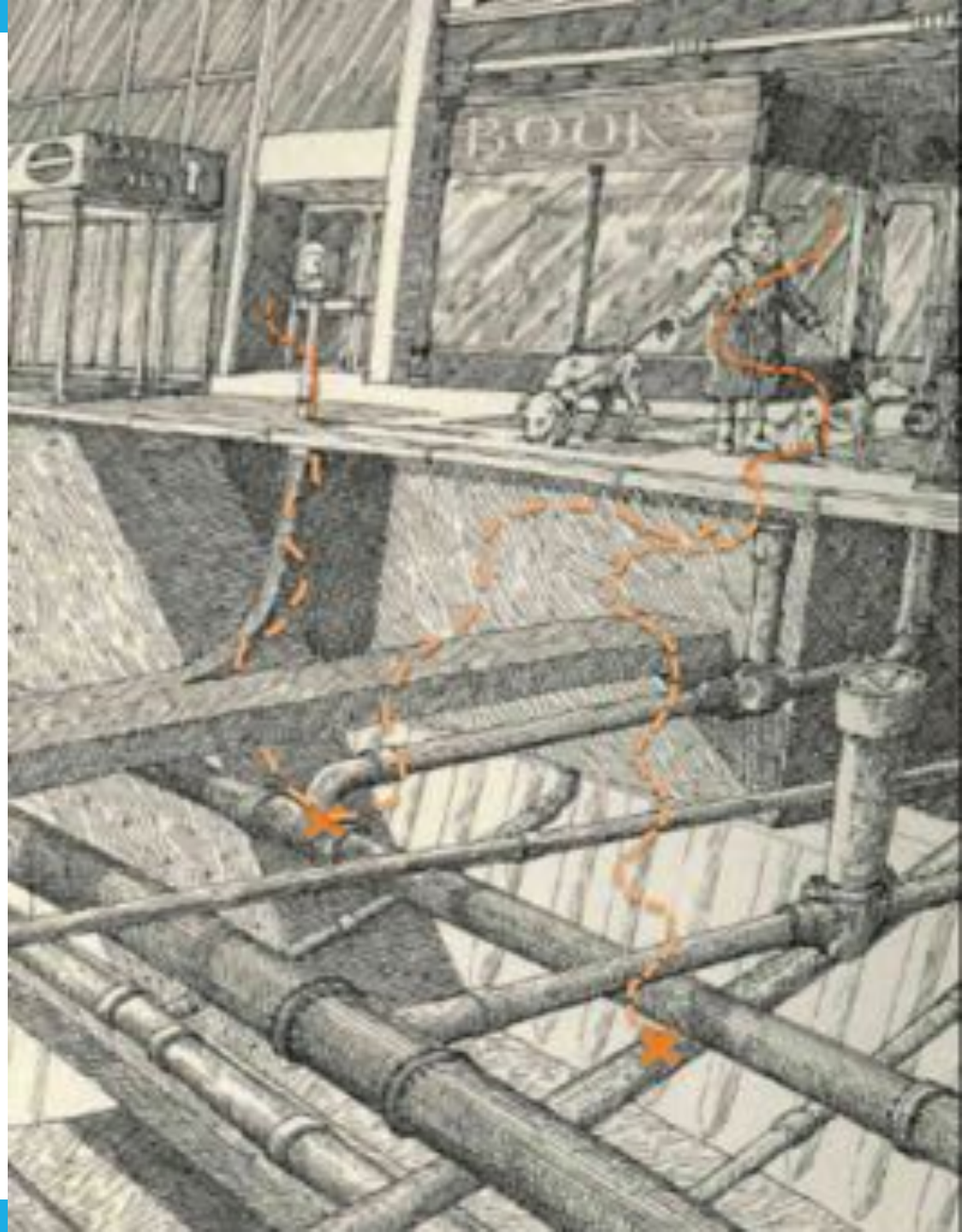
Source HEET Website: www.heetma.org/squeaky-leak/natural-gas-leaks-maps/

What is a Gas Leak Grade?

Grade 1: presents an existing or probable hazard to persons or property. Requires immediate repair or continuous action until the conditions are no longer hazardous.

Grade 2: non-hazardous at the time of detection, but justifies scheduled repair based on probable future hazard.

Grade 3: non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous.



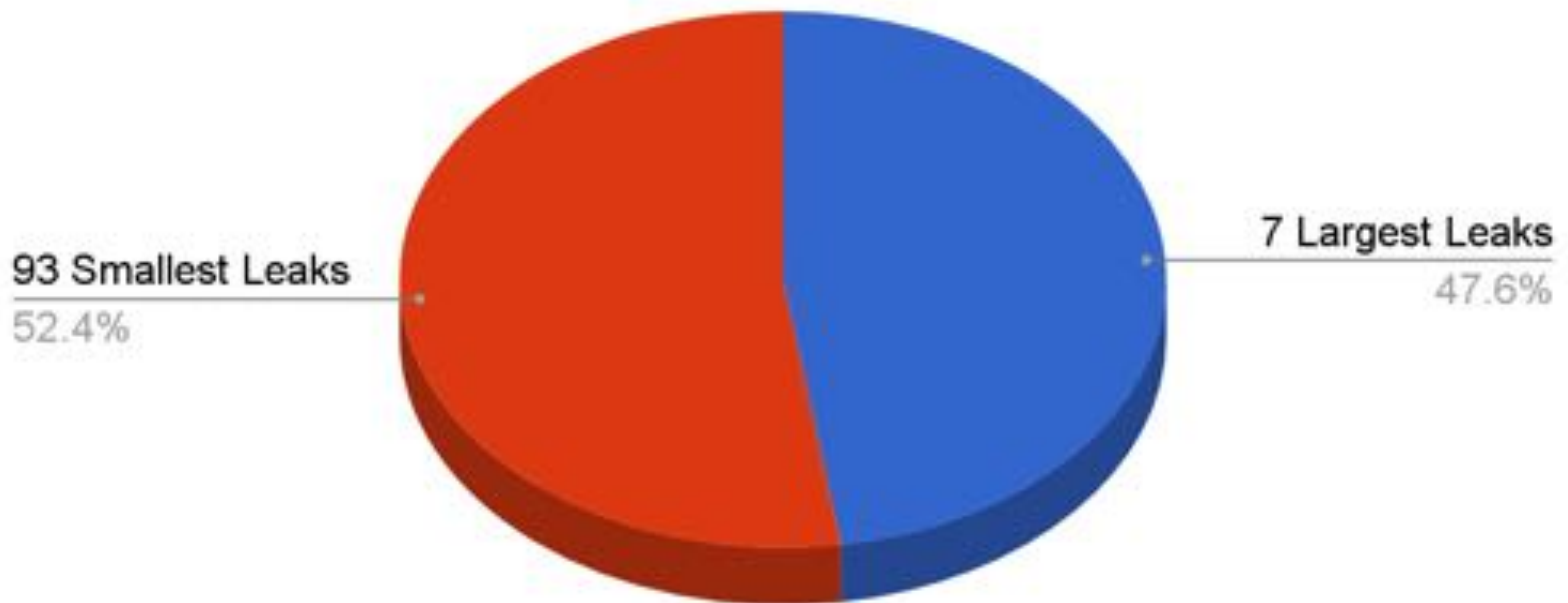
Historically grade 3 leaks were ignored, while grades 1&2 addressed.

But as concern about public health and climate health has grown and the extent of **the problem of methane in our atmosphere has been recognized**, pressure has increased on gas companies to **“Fix the Leaks”**, spearheaded by Boston activists HeetMA.

Hendrick et al. (2016) "Super-emitter" Study

Emissions of 100 leaks in Boston area
(cast iron, primarily low pressure)

Emissions from:



Of the 16,000 leaks in the state, how do we detect and fix the “Large Volume Leaks” (Super-emitters)?



Need to be efficient. Not feasible to correct all the leaks immediately – tearing up streets, lots of equipment, manpower and cost.

Measuring leak size by its Footprint...

Has been found to be an affordable way to ID the size of a gas leak.

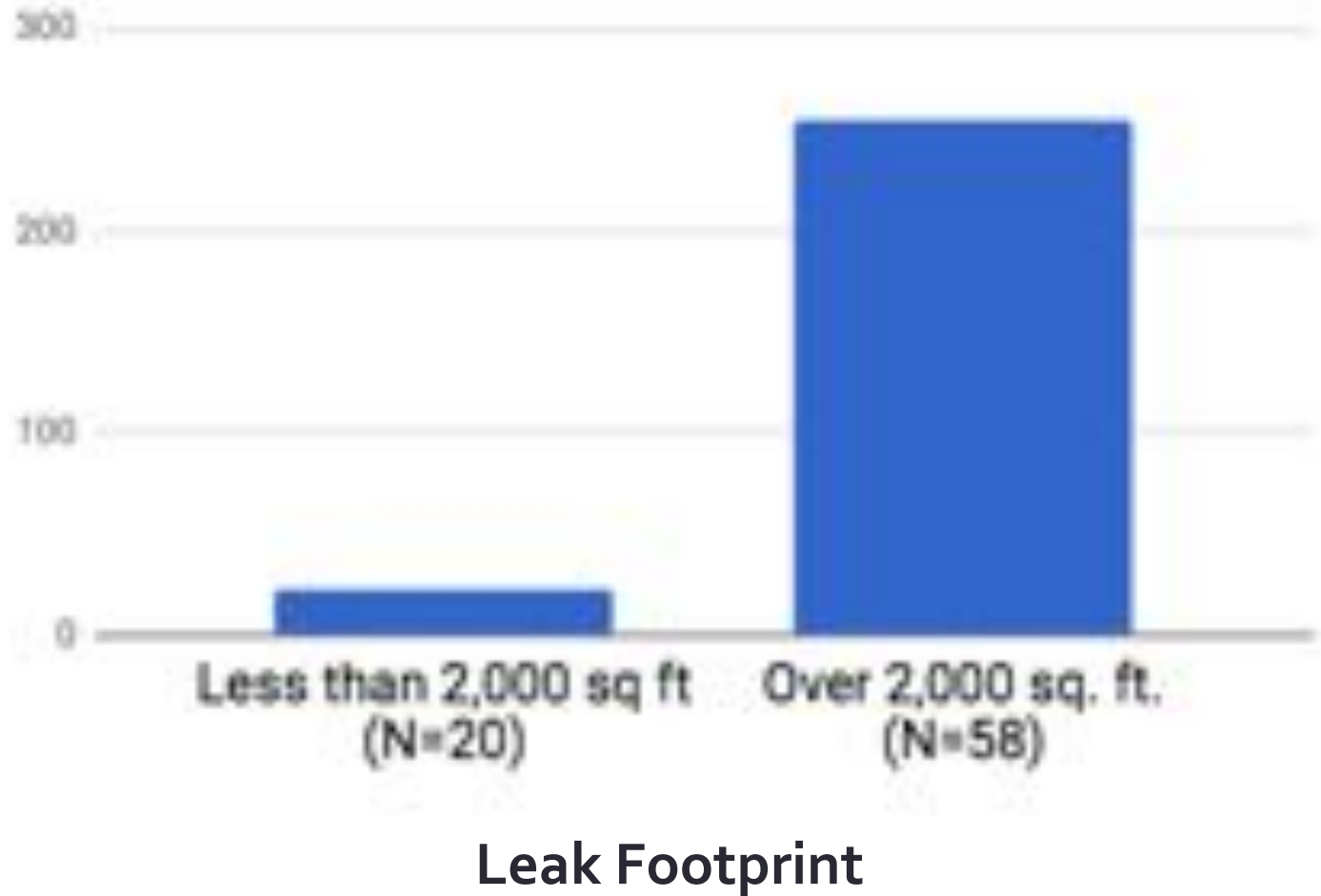
Workers walk with a detector at ground level to measure the footprint.



$$35' \times 60' = 2100 \text{ sq. ft.}$$

Leak Footprint **IS** Correlated with Emissions

Average
Emissions
(cubic ft/
day)

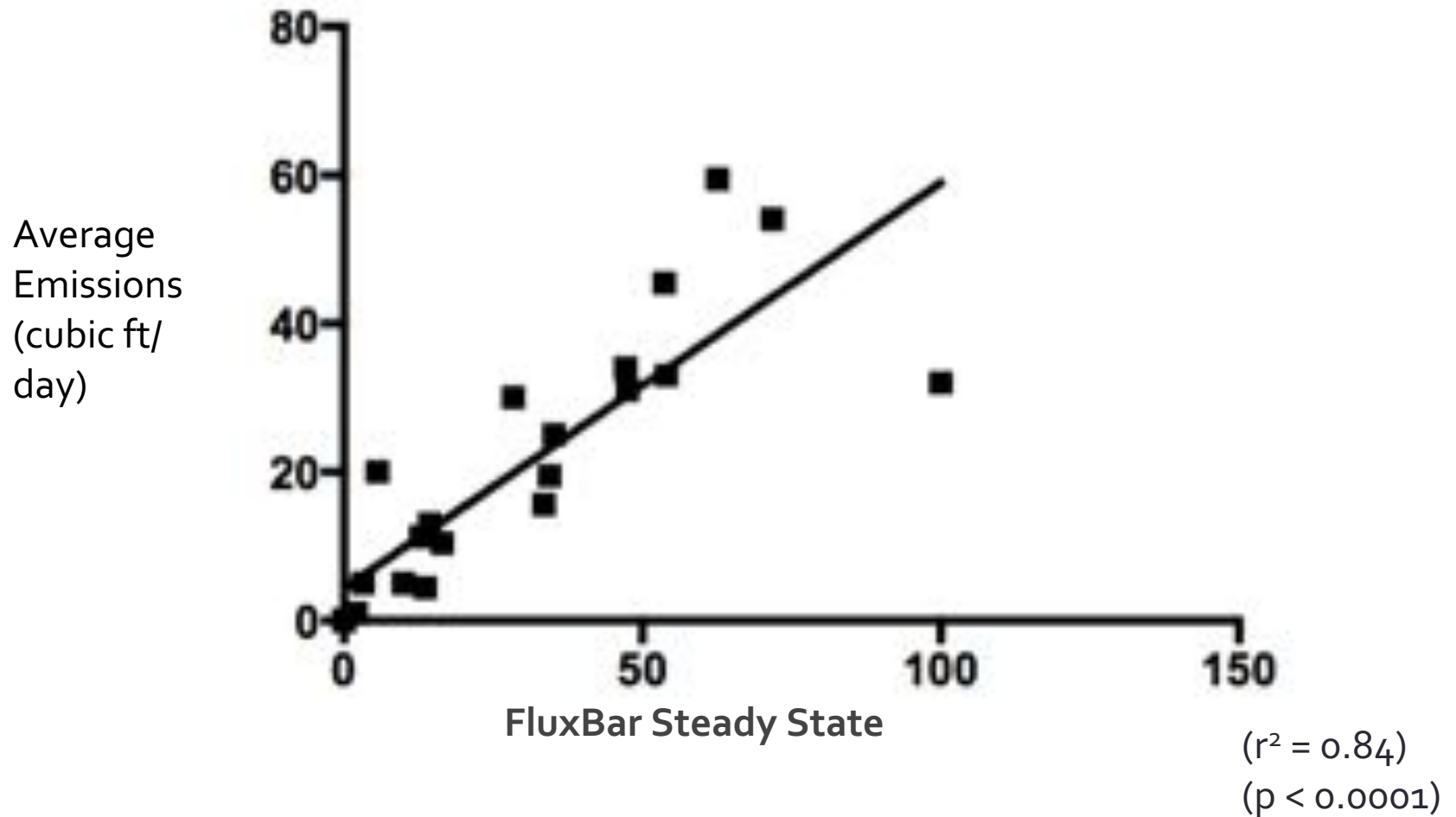


Using a FLUXBar

1. Inserted into hole drilled over leak.
2. Sucks air from under street at consistent rate.
3. Measures percent of gas in airflow.
4. Can calculate rate of leak.



FLUXBar readings **ARE** Correlated with Emissions



How to Chop Emissions in Half:

Identify large volume leaks with Leak Extent $>2,000$ sq. ft. and fix them



Shared action plan by HeetMA, Mothers Out Front, National Grid, Columbia Gas and Eversource:

1. Identify large volume leaks by leak footprint.
2. Fix leaks with footprints >10,000 sq feet in 1 year.
3. Fix leaks with footprints > 2,000 sq feet in 2 years.
4. Verify with Fluxbar after 1 year.
5. Report large volume leaks to DPU.
6. Reassess annually for at least 5 years.

The Consumer Cost Protection Act

(H.2683 / S.1845)

Rep. Barber / Sen. Eldridge

- Corrects costly utility disincentive for leak repair by shifting burden of lost gas, over time, from consumers to gas utilities.
- Specifically, creates an annually declining maximum that utilities can include in the rate for natural gas charged to consumers the amount of leaked natural gas.
- Mirrors policies enacted in New York, Pennsylvania, Texas, and other states



Legislation pending

*Ask your
legislators to support
this bill!*



A
MOVEMENT
FOR
CLIMATE
JUSTICE
AND
HEALTH
