

Opportunities to Reduce Pipeline Methane Emissions

5/5/2021

Reducing Methane Emissions is Critical to Address Climate Change

- Methane has 87x the warming power of carbon dioxide over the first 20 years after its release, and 36x the warming power over 100 years
- **New Research:** A rapid, full-scale effort to reduce methane emissions could slow the worldwide rate of warming by as much as 30%
 - A go-slow approach that starts now but stretches out full adoption from 2030 to 2050 would mean a 5% increase in the average worldwide warming rate
 - Ocko et al., 2021 *Envtl. Research Letters*; *New York Times*

Methane Emissions from the U.S. Oil & Gas Sector

- Onshore oil and gas sector is the largest domestic industrial source of methane emissions. The US O&G sector emits 13 MMT methane/yr
- Extensive peer-reviewed research (EDF 16 studies series) indicates methane emissions associated with U.S. oil and gas production are 60%+ higher than EPA estimates

EDF's Decade of Methane Work

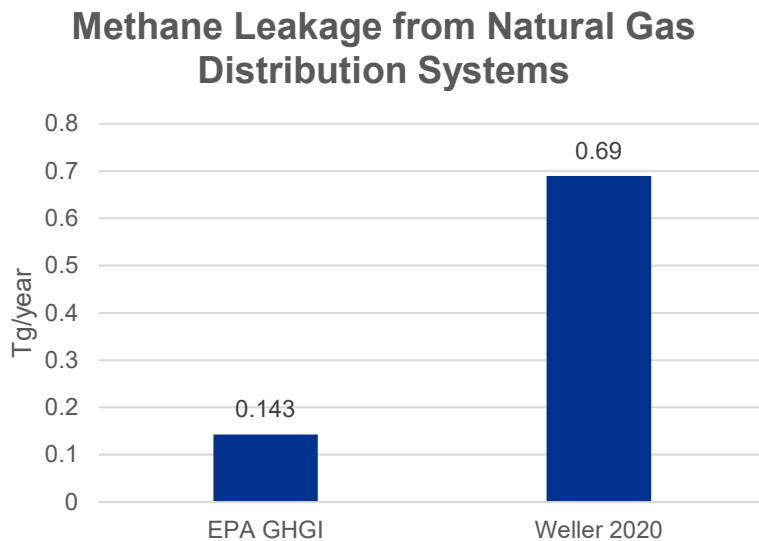
- Series of 16 research studies; ongoing gas distribution ALD research
- Methane Detector Challenge: expedited development and commercialization of low-cost methane detection technologies, w/ ARPA-E
- Mobile Monitoring Challenge: invited entrepreneurs to advance mobile methane monitoring tech, with Stanford
- PermianMAP: Initiative to pinpoint, measure, & report to the public on oil and gas methane emissions in the Permian Basin.
- Project ASTRA (EDF providing support to UT): establishing network to provide near-continuous monitoring of Permian Basin oil and gas facilities
- Numerous legal & policy interventions
 - California SB 1371
 - Advocating for advanced leak detection in gas utility regulatory dockets
- MethaneSAT: A satellite by EDF subsidiary MethaneSAT LLC, scheduled for launch in 2022, providing global methane emission tracking

PHMSA Has an Important Role in Addressing Climate Change

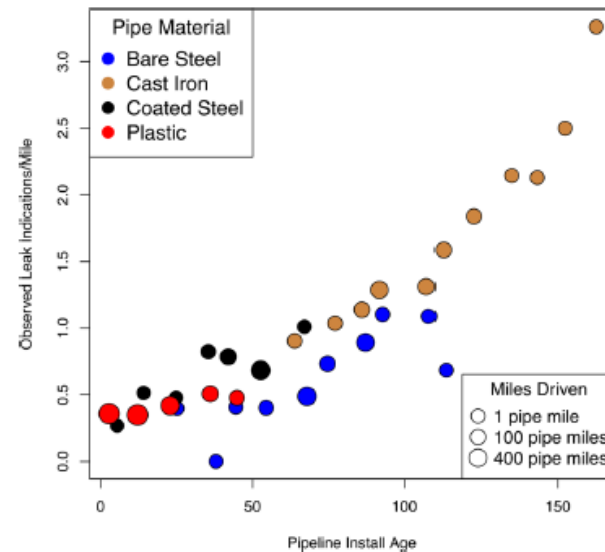
- PIPES Act of 2020
 - Reaffirms and expands PHMSA's responsibility to protect the environment in pipeline oversight.
 - Congress issued clear direction to develop strong, comprehensive advanced leak detection standards to reduce climate pollution from gathering, transmission, and distribution pipelines.
 - PHMSA must set standards to find and fix leaks
- President Biden has announced ambitious U.S. climate targets to reduce greenhouse gas pollution 50% by 2030 (below 2005 levels) and to achieve a net zero emissions economy by 2050.
- Reduce methane = fight climate change AND improve safety

Understanding Methane Leaks from Distribution Pipelines

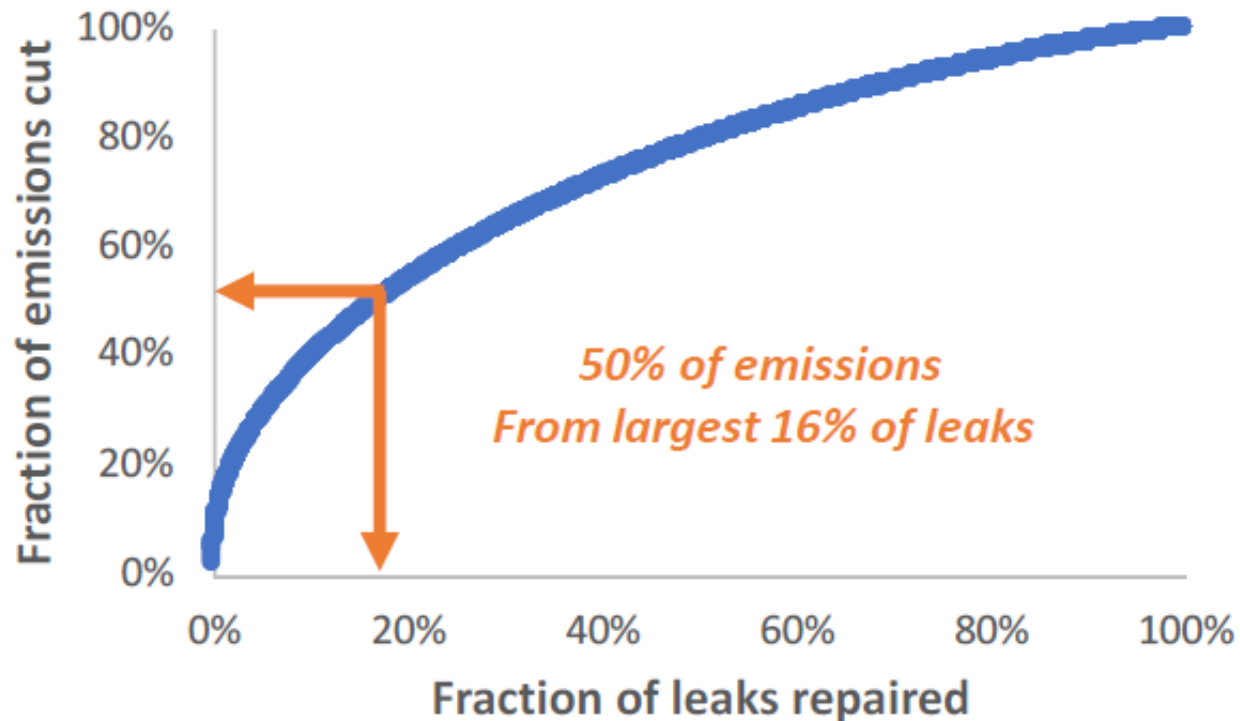
Recent research estimates a national methane leakage rate from gas distribution mains approx. 5x greater than the EPA GHG Inventory



[Source: Weller et al., A National Estimate of Methane Leakage from Pipeline Mains in Natural Gas Local Distribution Systems, *Envtl. Sci. & Tech.*, 54, 8958-8967 \(2020\).](#)



Largest Leaks = Most Emissions



Source: [Weller et al. PLoS ONE 2019](#); CSU database of >6000 leaks from 15 cities

Significance of Large Leaks

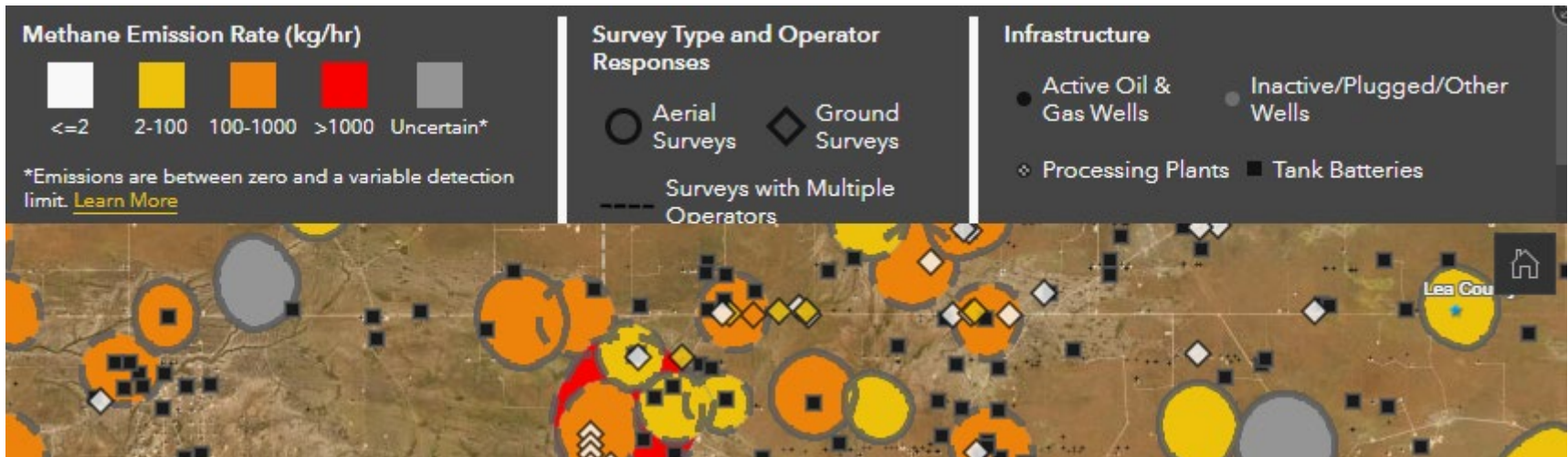
5% of sources accounted for 50% of total emissions across a range of equipment and facility types, according to a meta-analysis of approximately 15,000 measurements from 18 peer-reviewed studies.

- Brandt et al., Methane Leaks from Natural Gas Systems Follow Extreme Distributions, *Environ. Sci. Technol.* 2016, 50, 22, 12512–12520



([source](#))

Diverse Survey Technologies: EDF PermianMAP



- Data sources:
 - air (fixed-wing aircraft & helicopters);
 - stationary towers;
 - ground team using mobile methane detection vehicle.
- Full methodology. This analysis will be cross-referenced with satellite data.

Benefits of Advanced Leak Detection



- ALD finds more leaks on distribution systems: Traditional surveys in 2 cities failed to find 65% of the leaks identified by ALD including multiple Grade 1 leaks (Weller et al. 2019)
- Estimates leak size, GHG emissions rate
- Data-driven decision making can guide leak repair, pipe replacement and retirement
- Commercially available on a variety of platforms and survey methods.

Benefits of Transparency and ALD-Based Leak & Emissions Reporting

- Transparency around gas leaks (location, size, duration) allows for public accountability, which can improve safety & encourage responsible management
 - Gas utilities in NY and CA publish leak maps online
 - See [EDF Methane Mapping project](#)
- Accurate climate disclosures and demonstrable improvements can enhance shareholder value
 - See [EDF: Hitting the Mark, Improving the Credibility of Industry Methane Data \(Feb. 2020\)](#)
- Achieve & track GHG emission reductions

PHMSA Needs Clear, Performance-Based ALD Standards

- What are the core elements of ALD?
 - Instrumentation: Methane analyzer sensor technology that allows parts-per-billion level sensitivity while capturing wind direction, variations, GPS location
 - Variety of platforms, including handheld, vehicle, drone, plane, satellite, fixed sensor
 - Defined deployment strategy or work practice
 - Data products: leak location; estimate leak flow rate (gas emission rate); coverage map; contextual data; summary or cumulative loss estimates
- Ensure ongoing process for continuous technology improvement

ALD is Used by Utilities and Supported by State Policy

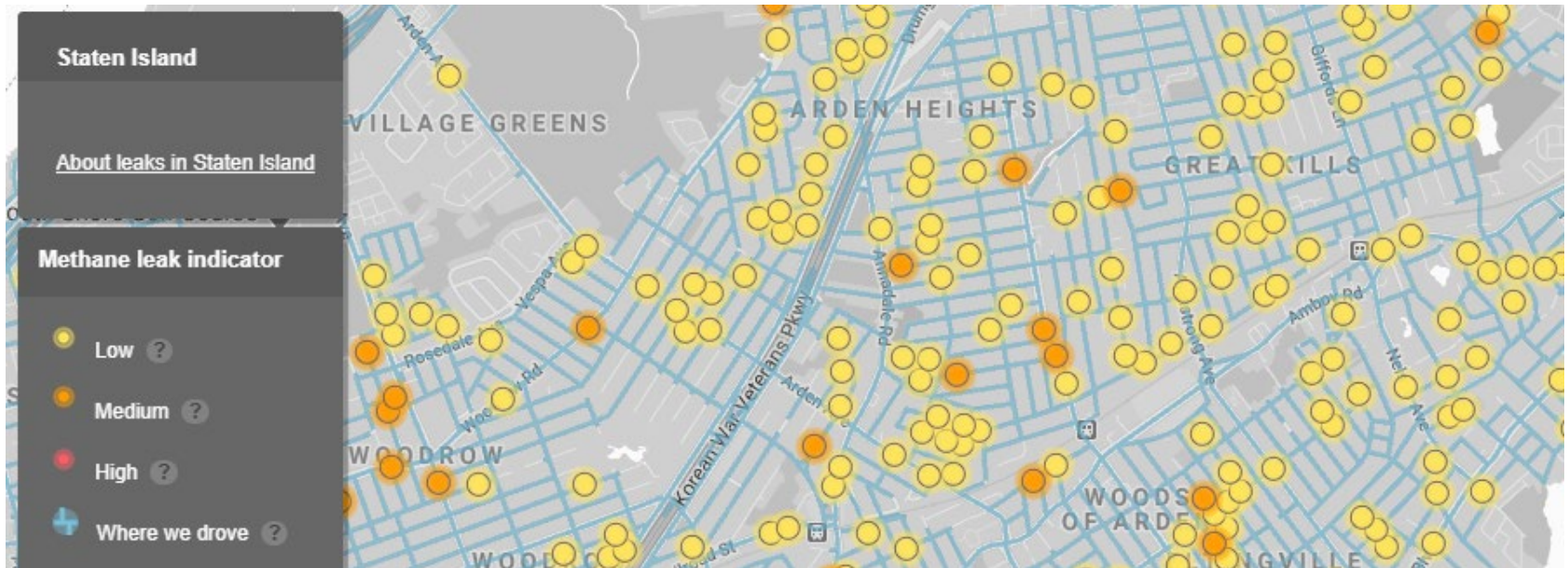
- New Jersey
 - ALD drives decision-making for pipeline replacement programs for multiple utilities
 - Energy Master Plan
- California
 - SB1371 requires annual methane reporting and emissions reduction plans by utilities
- Texas
 - Approved advanced leak detection technology for safety-focused leak surveys
- New York
 - Methane Reduction Plan & NYSERDA Strategic Plan emphasize novel leak detection and prevention methods

Utility Example: PG&E



- Transmission pipelines: employs aerial ALD for surveys since 2018, found 16% more leaks over 2017
- Distribution pipelines:
 - Systemwide vehicle ALD survey for Super Emitter leaks and to assess systemwide emissions
 - 2018: Identified 220 super emitter leaks
 - 1/3 was compliance survey, 2/3 of territory surveyed for emissions data without triggering sub-10 scfh leak indications)
 - Special leak survey on vintage materials achieved 7,800 Mscf emissions reduction

Utility Example: National Grid NY



- 2014: EDF & Google methane mapping project (see map above; more [here](#))
- Nat Grid publishes its own leak maps ([link](#))
- 2019-2020: Nat Grid proposes Enhanced High Emitter Methane Detection Program using ALD



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