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Improving fossil gas regulation now for a post-fossil fuel future

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Executive Summary

The United States' extensive fossil gas infrastructure is characterized by greenhouse gas emissions, methane leaks, and explosions that imperil lives, disproportionately affect the health and well-being of marginalized communities, and enable the global climate crisis. These issues are exacerbated by a regulatory apparatus distributed among various agencies at different levels of government, a fragmentation that has stymied efforts to protect those most vulnerable to the gas system's hazards and reduce fossil-gas use.

This report details three key obstacles to the effective policing of the US fossil gas system:

- ***Regulatory Fragmentation.*** The atomization of the regulatory system structurally privileges fossil fuel interests, leading to the persistent delay or cooptation of climate and safety legislation.
- ***Market Logic.*** To determine trajectories of repair, decommissioning, and replacement, US gas regulation relies predominantly on market forces and corporate logic, resulting in unequal and unjust consequences.
- ***Misguided Policy.*** To the limited extent the gas regulatory regime has tried to address the climate crisis, it has done so by focusing on methane emissions, an all-too-narrow approach that could serve to entrench gas infrastructure further.

Although the focus of this report is the regulatory system's shortcomings vis-à-vis methane leaks and emissions, **the only way to address emissions from the gas system completely and ensure safe energy provision is the managed decommissioning of the gas system.** In the absence of mandated decommissioning, improved methane monitoring programs may simply lead utilities to invest more in the gas system, contributing to more gas consumption and emissions.

We recommend a suite of policies to ensure a managed decommissioning of gas infrastructure and the development of an energy system safe for people and the climate:

1. Accountable gas monitoring that directly links gas leaks to gas decommissioning;
2. Public ownership of gas systems to ensure a safe transition for both infrastructure and workers;
3. Gas bans, the elimination of gas subsidies, and public investment in an electricity system that serves heating needs; and
4. Energy systems designed to prioritize not profitability but rather people's energy needs, appropriate technologies, and the climate crisis.

Introduction

In 2014, a 127-year-old Con Edison fossil-gas pipe exploded in Harlem, New York City, killing 8 people, injuring more than 50, collapsing two buildings, and displacing over 55 families in a largely immigrant community.[1,2] A year later, a fossil gas leak at Southern California Gas Company's Aliso Canyon Underground Storage Facility in Los Angeles spewed over 4.6 billion cubic feet of methane into the atmosphere over 4 months.[3] The disaster led federal regulators to establish minimum safety standards for underground gas storage[4], yet storage disasters persist: In 2022, a gas reservoir in Jackson Township, Pennsylvania, operated by Equitrans Midstream, released over 1 billion cubic feet of methane over two weeks, the biggest leak from a gas storage facility since Aliso Canyon.[5]

Of course, these are only some of the most extraordinary examples of gas storage accidents. They exist alongside routine methane leaks and emissions that endanger the health and safety of communities, especially low-income communities and communities of color.

This report leverages document reviews and interviews with regulators and activists to illustrate how **the fossil gas regulatory regime is fragmented, underfunded, and unaccountable—and thus unable to address the climate crisis.** The current regulatory environment leads to three prevailing issues:

First, the fragmentation of the system structurally privileges fossil fuel interests, leading to the persistent delay or cooptation of climate and safety legislation. Gas companies and industry lobbyists like the American Gas Association (AGA) spend millions of dollars to ensure that gas regulation serves industry interests at the expense of public health, costs to consumers, and, ultimately, the climate.[6]

Second, US regulators rely largely on market forces and corporate logic to determine the trajectory of infrastructure repair, decommissioning, and replacement, an approach that yields uneven and unjust consequences. Already, fossil gas

1 This report uses the terms "fossil gas" and "gas" rather than the more common "natural gas" to avoid the conflation of "natural" fuels with "clean" or "green" fuels. For more on the term "fossil gas," see Julian Spector, "We Need to Talk about How We Talk about Natural Gas," Canary Media, March 21, 2022, https://www.canarymedia.com/articles/fossil-fuels/we-need-to-talk-about-how-we-talk-about-natural-gas. Where the term "natural gas" is used in a quote, program name, legislation name, or in a technical name such as "liquefied natural gas," we have left it unchanged.

2 Marc Santora and Patrick McGeehan, "Search for Bodies Yields to Hunt for a Cause of East Harlem Explosion," The New York Times, March 14, 2014, sec. New York, https://www.nytimes.com/2014/03/15/nyregion/new-york-city-to-arrange-housing-for-families-displaced-in-blast.html.

3 Ken Ditzel et al., "Aliso Canyon I.17-02-002 Phase 3 Report," FTI Consulting and Gas Supply Consulting, December 31, 2021, https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/natural-gas/aliso-canyon/fti-aliso-canyon-i1702002-phase-3-report.pdf.

4 California Public Utilities Commission, "Background on Aliso Canyon and Actions to Date," accessed January 29, 2024, https://www.cpuc.ca.gov/regulatory-services/safety/gas-safety-and-reliability-branch/aliso-canyon-well-failure/background-on-aliso-canyon-and-actions-to-date.

5 Katie Smolen, "DEP Reaches Deal with Equitrans Regarding Admin Order over Jackson Township Gas Leak," The Tribune-Democrat, April 19, 2023, https://www.tribdem.com/news/dep-reaches-deal-with-equitrans-regarding-admin-order-over-jackson-township-gas-leak/article_397c61d0-de22-11ed-82a4-2be416d90b54.html.

6 Energy and Policy Institute, "AGA Uses Millions of Dollars from Utility Customers to Promote a Fossil Fuel Agenda," accessed January 29, 2024, https://energyandpolicy.org/gas-utilities-greenwashing-to-expand-fossil-fuels-rng-hydrogen/aga-usesmillions-of-dollars-from-utility-customers-to-promote-a-fossil-fuel-agenda/; Susan Phillips, "As the City Works to Stem Climate Change, a Question Emerges: Is PGW on Board?," WHYY, May 28, 2021, https://whyy.org/articles/as-philadelphia-works-to-tackle-climate-change-a-question-emerges-is-pgw-on-board/.

corporations are offloading liabilities by selling undesirable assets—like older and leakier pipelines—to smaller firms, fulfilling fiduciary duties that directly conflict with climate action.[7] These profit-maximizing logics extend to how gas companies react to gas-leak regulation. A 2021 assessment of Massachusetts's gas pipeline repair and replacement program by the coalition Gas Transition Allies found that gas utilities routinely neglect to repair leaks and replace pipelines in communities with more renters, low-income residents, or people of color, where infrastructure might be older and repair permits more difficult to acquire.[8]

Third, to the limited extent the gas regulatory regime has attempted to address the climate crisis, it has done so by focusing on methane emissions, an all-too-narrow approach that could lead to gas infrastructure's further entrenchment rather than its decommissioning. Without a clear regulatory obligation to wind down gas, the gas industry can frame speculative technologies that allow them to expand their infrastructure—for example, "renewable natural gas" (RNG) or "blue hydrogen"—as viable low-carbon options, though both contribute to global warming when combusted or leaked.[9] The dangers of this infrastructure are already apparent: In Black communities in Coffee County, Alabama, incessant flooding has caused homes to subside toward a high-pressure RNG line that runs through residential parcels, steps away from occupied homes.[10]

The Harlem Con Edison, Southern California Gas Company, and Equitrans Midstream disasters and the associated governmental responses underline how fossil gas regulation has primarily been focused on reactive monitoring. However, there has been some recognition of the limitations of gas regulation in recent federal and state legislation. At the federal level, the Infrastructure Investment and Jobs Act (IIJA) allocated federal funding for orphaned well site remediation and plugging, and the Inflation Reduction Act (IRA) levied a charge on methane emissions.[11] At the state level, recently adopted regulations in Massachusetts prescribe repair requirements for gas leaks.[12]

7 isaac sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem," Climate and Community Project, May 17, 2023, https://www.climateandcommunity.org/building-decarb-natural-gas-problem.

8 Doris Seavey, "GSEP at the Six Year Mark," Gas Leaks Allies, October 2021, https://static1.squarespace.com/static/634abba43f1e2f4dfd5e07dc/t/63559391bd5978258fc5c52c/1666552722328/GSEPatTheSix-YearMark%5B1%5D.pdf; Marcos Luna and Dominic Nicholas, "An Environmental Justice Analysis of Distribution-Level Natural Gas Leaks in Massachusetts, USA," Energy Policy 162 (March 2022): https://doi.org/10.1016/j.enpol.2022.112778.

9 Energy and Policy Institute, "Gas Utilities Push RNG and Hydrogen to Expand Fossil Fuel Infrastructure," accessed January 29, 2024, https://energyandpolicy.org/gas-utilities-greenwashing-to-expand-fossil-fuels-rng-hydrogen/; Leigh Collins, "Hydrogen 'Twice as Powerful a Greenhouse Gas as Previously Thought': UK Government Study," Recharge, April 8, 2022, https://www.rechargenews.com/energy-transition/hydrogen-twice-as-powerful-a-greenhouse-gas-as-previously-thought-uk-government-study/2-1-1200115.

10 Adam Mahoney, "How a Flooding Crisis Unearthed Another Environmental Injustice in Rural Alabama," Capital B News, August 24, 2023, http://capitalbnews.org/gas-pipeline-alabama/.

11 US Department of the Interior, "Interior Department Releases Implementation Guidance to States on Infrastructure Law Efforts to Address Legacy Pollution," December 17, 2021, https://www.doi.gov/pressreleases/interior-department-releases-implementation-guidance-states-infrastruture-law-efforts; US EPA, "Questions Regarding OAR's Implementation of the Inflation Reduction Act," January 18, 2023, https://www.epa.gov/inflation-reduction-act/questions-regarding-oars-implementation-inflation-reduction-act.

12 Massachusetts Department of Public Utilities, "Uniform Natural Gas Leaks Classification," March 22, 2019, https://www.mass.gov/doc/220-cmr-114-uniform-natural-gas-leaks-classification/download.

These measures may indeed reduce methane emissions. But, to keep frontline communities safe and mitigate the climate crisis, gas infrastructure must be decommissioned. The United States' extensive gas infrastructure threatens publicly safety and the health and wellbeing of marginalized communities.[13] The only remedy is to take that infrastructure offline.

We recommend four key policies to ensure a managed decommissioning of gas infrastructure and the development of an energy system safe for people and the climate:

1. Accountable gas monitoring that directly links gas leaks to gas decommissioning;
2. Public ownership of gas systems to ensure a safe transition for both infrastructure and workers;
3. Gas bans, the elimination of gas subsidies, and public investment in an electricity system that serves heating needs; and
4. Energy systems designed to prioritize not profitability but rather people's energy needs, appropriate technologies, and the climate crisis.

13 Lilia R. Lukowsky et al., "Impact of the Aliso Canyon Gas Leak on Respiratory-Related Conditions Among US Department of Veterans Affairs (VA) Users," Disaster Medicine and Public Health Preparedness 13, no. 3 (June 2019): 419–23, https://doi.org/10.1017/dmp.2018.83.

PART ONE

The Fragmented Landscape of Gas Regulation

The Fragmented Landscape of Gas Regulation

Gas leak and emission regulation is distributed among multiple federal and state agencies. This fragmentation occurs (1) because safety and environmental goals are given separate treatment and fall under different agencies in US gas regulation and (2) because states have different commitments to methane regulation and reduction. **The resulting regulatory system decentralizes accountability and benefits well-resourced companies at the expense of non-corporate groups, especially grassroots or climate justice organizations.**[14]

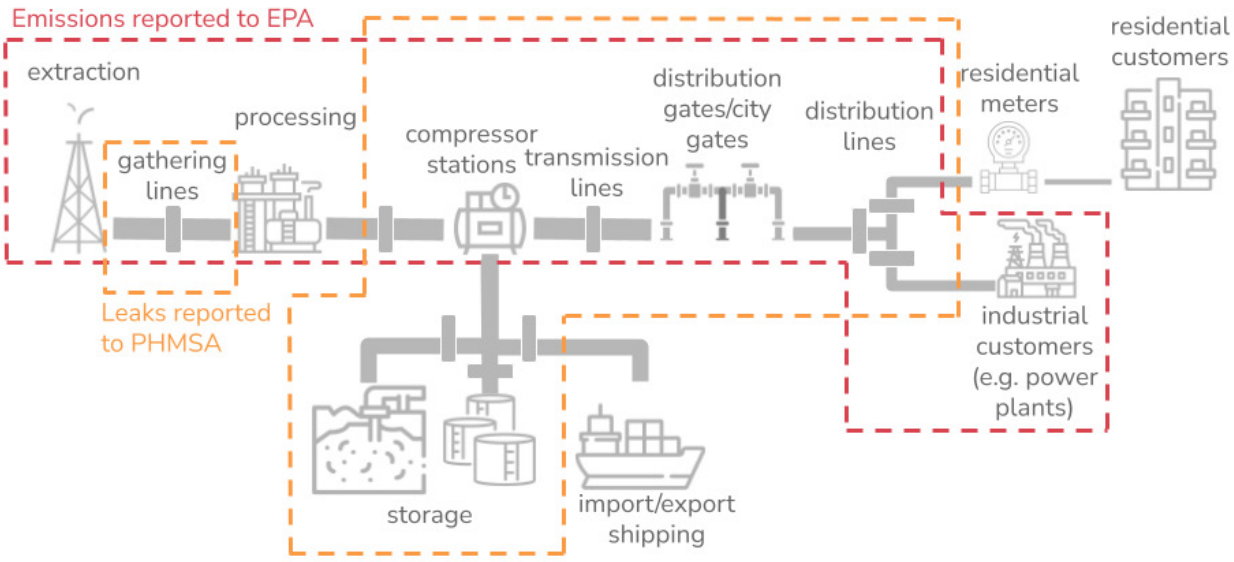
At the federal level, two agencies regulate fossil gas leaks and emissions: the Pipeline and Hazardous Material Safety Administration (PHMSA) and the Environmental Protection Agency (EPA). As Figure 1 demonstrates, both import/export facilities and "behind-the-meter" leaks (occurring in or near homes) do not have comprehensive federal reporting structures. Though the Federal Energy Regulatory Commission (FERC) authorizes the siting of some liquid fossil gas import/export terminals, it declines jurisdiction over others, further contributing to a fragmented landscape of fossil gas import/export regulation in the United States that is inaccessible to community-based, environmental, and other non-corporate organizations.[15] Though operators are

14 Jacob M. Grumbach and Jamila Michener, "American Federalism, Political Inequality, and Democratic Erosion," The ANNALS of the American Academy of Political and Social Science 699, no. 1 (January 2022): 143–55, https://doi.org/10.1177/00027162211070885.

15 Federal Energy Regulatory Commission, "LNG," accessed January 29, 2024, https://www.ferc.gov/natural-gas/lng; Ethan Howland, "FERC Must Regulate Small-Scale LNG Export Projects to Ensure Safety, Methane Oversight, Green Groups Say," Utility Dive, July 25, 2022, https://www.utilitydive.com/news/ferc-small-scale-lng-export-jurisdiction/627989/.

federally required to conduct surveys of behind-the-meter gas infrastructure, behind-the-meter leaks and emissions are not federally reportable or investigated;[16] individual states take varying approaches to regulating behind-the-meter leaks.

Figure 1. Simplified diagram of the fossil gas system, showing where emissions and leaks are reported to EPA and PHMSA, respectively.



16 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Inside Meters and Regulators," September 29, 2020, https://www.federalregister.gov/documents/2020/09/29/2020-21507/pipeline-safety-inside-meters-andregulators.

The Pipeline and Hazardous Materials Safety Administration (PHMSA)

PHMSA, created in 2004, is an agency of the US Department of Transportation and is responsible for the safe transportation of hazardous materials. PHMSA enforces a series of laws that regulate intrastate, transmission, gathering, and distribution fossil gas pipelines, underground gas storage, and liquified fossil gas facilities. PHMSA's jurisdiction extends beyond gas; essentially, PHMSA is the safety regulator for all energy-related pipelines in the United States, a remit which includes hydrogen and carbon dioxide pipelines.[17]

PHMSA's regulations—and its own existence—stem from persistent and deadly fossil gas incidents. The pipeline safety offices that would become PHMSA were created after a 1965 pipeline failure in Natchitoches, Louisiana, killed 17.[18] Minimum safety standards for gas storage were only adopted by PHMSA after the Aliso Canyon disaster in 2015. Three years later, a series of gas distribution pipeline leaks and explosions in Merrimack Valley, Massachusetts, that killed one person, injured 22, and destroyed at least 5 homes led to revised safety mandates.[19] However, the final ruling on safety mandates following the 2018 Merrimack Valley explosions was not issued until 2020—a delay caused by a challenge filed by the AGA, American Petroleum Institute, and the American Public Gas Association.[20]

PHMSA largely operates through a state inspection model, where individual states are certified to carry out pipeline inspection, investigation, and enforcement if they adopt federal regulations and can enforce more stringent or additional regulations if compatible with federal regulations.[21,22] Not all incidents are reportable: PHMSA is only interested in incidents that cause over $129,000 in property damage, lead to death or hospitalization, or cause 3 million cubic feet or more of gas loss.[23] (For scale, 3 million cubic feet of gas is roughly equal

17 US Department of Transportation, "PHMSA: Stakeholder Communications: Hydrogen," accessed January 29, 2024, https://primis.phmsa.dot.gov/comm/hydrogen.htm; Pipeline and Hazardous Materials Safety Administration, "PHMSA Announces New Safety Measures to Protect Americans From Carbon Dioxide Pipeline Failures After Satartia, MS Leak," May 26, 2022, https://www.phmsa.dot.gov/news/phmsa-announces-new-safety-measures-protect-americans-carbon-dioxide-pipeline-failures.

18 State of Louisiana Department of Energy and Natural Resources, "Office of Conservation: Progression of Safety Program in Louisiana," accessed January 30, 2024, https://www.dnr.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=146.

19 RCP Inc., "NTSB Issues Findings and Recommendations from Merrimack Valley Incident – RCP Inc.," November 2019, https://rcp.com/ntsb-issues-findings-and-recommendations-from-merrimack-valley-incident/, https://rcp.com/ntsb-issues-findings-and-recommendations-from-merrimack-valley-incident/.

20 California Public Utilities Commission, "Background on Aliso Canyon and Actions to Date"; Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Safety of Underground Natural Gas Storage Facilities," October 19, 2017, https://www.federalregister.gov/documents/2017/10/19/2017-22553/pipeline-safety-safety-of-underground-natural-gas-storage-facilities.

21 In practice, this means that gas pipeline operators submit incident reports to a state agency—often a utility commission or public service commission—which then reports to PHMSA. The state program managers that manage gas safety reporting are all part of the National Association of Pipeline Safety Representatives (NAPSR). Operator-submitted incident reports from 1970 to present are publicly available on the PHMSA website.

22 Pipeline and Hazardous Materials Safety Administration, "Guidelines for States Participating in the Pipeline Safety Program," December 2017, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/pictures/2018%20State%20Guidelines%20Final%20with%20Appendices%202017-12-31.pdf.

23 Definitions, 49 C.F.R. 191.3, accessed January 29, 2024, https://www.ecfr.gov/current/title-49/part-191/section-191.3.

to the total annual gas usage of 50 homes.[24]) These thresholds are extremely limited—as we show later, states with additional reporting requirements catch many more leaks than PHMSA—and are incongruent with the health and environmental dangers of gas leaks. In some cases, inspections are not even required: Utilities can demonstrate compliance with safety regulations simply by following their own internal protocols.[25]

PHMSA has a number of enforcement mechanisms, including administrative safety orders like temporarily shutting down a pipeline and issuing civil penalties, but pipeline safety advocates note that these procedures occur behind closed doors and involve only PHMSA and the operator.[26] Operator accountability is also often delayed: When it comes to significant civil penalties, it can take over a decade from when PHMSA opens an investigation to when it issues a fine.[27] As the Pipeline Safety Trust notes, **actual assessed fines are often lower than the proposed fine**, but the reasoning behind these reductions is not typically stated clearly in publicly available documents.[28]

24 This figure assumes an "average" home uses 57,200 cubic feet of natural gas per year. According to the Energy Information Administration, the residential sector used 4.99 trillion cubic feet of gas in 2022 (see US Energy Information Administration, "Natural Gas Explained," https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php). The Census Bureau estimates that there are 143 million housing units in the US (see US Census Bureau, "Quick Facts," https://www.census.gov/quickfacts/fact/table/US/VET605221), 61% of which use gas (see US Energy Information Administration, "Today in Energy," March 23, 2023, https://www.eia.gov/todayinenergy/detail.php?id=55940).

25 Transportation of Natural and Other Gas by Pipeline, 49 C.F.R. 192, accessed January 30, 2024, https://www.ecfr.gov/current/title-49/part-192.

26 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety Enforcement Procedures," December 9, 2022, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2022-12/Section-4-Administrative-Enforcement-Processes-12-9-2022.pdf; Paul W. Parfomak, "DOT's Federal Pipeline Safety Program: Background and Issues for Congress," Congressional Research Service, March 31, 2023, https://sgp.fas.org/crs/misc/R44201.pdf; Kate Blystone, "A Call for Transparency in Pipeline Safety Enforcement—Ten Years Later," Pipeline Safety Trust (blog), March 27, 2015, https://pstrust.org/a-call-for-transparency-in-pipeline-safety-enforcement-ten-years-later/; Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety Enforcement Procedures."

27 Blystone, "A Call for Transparency in Pipeline Safety Enforcement - Ten Years Later."

28 Blystone, "A Call for Transparency in Pipeline Safety Enforcement - Ten Years Later."

The Greenhouse Gas Reporting Program (GHGRP)

Separately, the EPA, under the authority of the Clean Air Act (CAA), runs the Greenhouse Gas Reporting Program (GHGRP), which tracks methane emissions from fossil gas facilities among many other greenhouse gas emission sources.[29] The GHGRP largely exists as a monitoring, not a reduction, program; its data is used, for instance, to prepare the United States' greenhouse gas inventories.[30] Increasingly, however, the GHGRP may be used for emissions reductions; for example, it will be used to implement the IRA's proposed fee on methane emissions.[31] Though GHGRP data on gas leaks is an increasingly critical input to climate mitigation programs, its verification and enforcement mechanisms are insufficient to the task of policing methane leaks and emissions.[32]

While the EPA can, on paper, take enforcement measures against "sources that fail to properly report greenhouse gas emissions," it has few mechanisms to verify reported emissions from companies.[33] Several independent studies, summarized in Figure 2 below, suggest that GHGRP underestimates methane leaks from the fossil gas system;[34] researchers who have synthesized existing results estimate that **overall methane emissions in the United States might exceed EPA estimates by up to two times.**[35] These discrepancies occur in part because there is little accountability in EPA's

29 Fossil gas utilities are regulated by both Subpart W (Petroleum and Natural Gas Systems) and Subpart NN (Suppliers of Natural Gas and Natural Gas Liquids). Subpart W includes leaks from compressor stations, transmission pipelines, and storage facilities (see US EPA, "GHGRP Petroleum and Natural Gas Systems," https://www.epa.gov/ghgreporting/ghgrp-petroleum-and-natural-gas-systems), while Subpart NN includes distribution pipelines operated by Local Distribution Companies or any regulated entity that delivers gas (see US EPA, "Suppliers of Natural Gas and Natural Gas Liquids," February 2018, https://www.epa.gov/ghgreporting/ghgrp-petroleum-and-natural-gas-systems). Additionally, Subpart C includes emissions from fossil fuel combustion (see US EPA, "Subpart C – General Stationary Fuel Combustion Sources," https://www.epa.gov/ghgreporting/subpart-c-general-stationary-fuel-combustion-sources).

30 Angela C. Jones, "EPA's Greenhouse Gas Reporting Program," Congressional Research Service, March 20, 2023, https://crs reports.congress.gov/product/pdf/IF/IF11754/6.

31 Jonathan L. Ramseur, "Inflation Reduction Act Methane Emissions Charge: In Brief," Congressional Research Service, August 29, 2022, https://crsreports.congress.gov/product/pdf/R/R47206.

32 Robert Hitt, "A Methane Fee Won't Work If It Doesn't Count All the Methane," The American Prospect, August 16, 2022, https://prospect.org/api/content/cccc75ea-1ccd-11ed-ae77-12274efc5439/.

33 US EPA, "Air Enforcement," September 5, 2023, https://www.epa.gov/enforcement/air-enforcement.

34 Mason Inman, "The Gas Index," December 15, 2020, https://globalenergymonitor.org/wp-content/uploads/2021/01/Gas-Index-report-2020.pdf; Kathryn McKain et al., "Methane Emissions from Natural Gas Infrastructure and Use in the Urban Region of Boston, Massachusetts," Proceedings of the National Academy of Sciences 112, no. 7 (February 17, 2015): 1941–46, https://doi.org/10.1073/pnas.1416261112; Genevieve Plant et al., "Large Fugitive Methane Emissions From Urban Centers along the US East Coast," Geophysical Research Letters 46, no. 14 (July 28, 2019): 8500–8507, https://doi.org/10.1029/2019GL082635; Xinrong Ren et al., "Methane Emissions from the Baltimore-Washington Area Based on Airborne Observations: Comparison to Emissions Inventories," Journal of Geophysical Research: Atmospheres 123, no. 16 (August 27, 2018): 8869–82, https://doi.org/10.1029/2018JD028851; Anna M. Robertson et al., "New Mexico Permian Basin Measured Well Pad Methane Emissions Are a Factor of 5–9 Times Higher Than US EPA Estimates," Environmental Science and Technology 54, no. 21 (November 3, 2020): 13926–34, https://doi.org/10.1021/acs.est.0c02927; Maryann R. Sargent et al., "Majority of US Urban Natural Gas Emissions Unaccounted for in Inventories," Proceedings of the National Academy of Sciences 118, no. 44 (November 2, 2021): e2105804118, https://doi.org/10.1073/pnas.2105804118; Yuzhong Zhang et al., "Quantifying Methane Emissions from the Largest Oil-Producing Basin in the United States from Space," Science Advances 6, no. 17 (April 24, 2020): https://doi.org/10.1126/sciadv.aaz5120.

35 Ramón A. Alvarez et al., "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain," Science 361, no. 6398 (July 13, 2018): 186–88, https://doi.org/10.1126/science.aar7204; Jeffrey S. Rutherford et al., "Closing the Methane Gap in US Oil and Natural Gas Production Emissions Inventories," Nature Communications 12, no. 1 (August 5, 2021): 4715, https://doi.org/10.1038/s41467-021-25017-4.

measurement process. The easiest and cheapest way for companies to comply with the GHGRP is to use the EPA's calculation methodologies. For facilities like compressor stations, storage facilities, or transmission pipelines, this generally means that companies take an inventory of equipment types, multiply the number of different types of equipment by an EPA-provided emission factor (an assumption of how much CH4- and CO2-equivalent emissions are produced by a piece of equipment per hour) and the estimated number of hours the equipment is running.[36] As one article puts it, the only data companies need to provide is their count of different types of equipment; the remaining calculation components can be out-of-date (as with emission factors) or shared such that EPA has limited ability to verify the data (as with hours of operation).[37] This calculation methodology is linked to omissions in covered equipment or a failure to account for anomalous events like operational failures that lead to super-emissions.[38]

Additionally, mobile mapping of distribution system leaks suggests that some distribution systems might have many small and geographically diffuse leaks—leaks that are occurring past customer meters where they are not covered by any federal reporting system—or that the chemical content of leaked fossil gas might diverge from federal or state assumptions, which also means that regulatory assumptions about emissions factors are inaccurate.[39]

36 Calculating GHG Emissions, 40 C.F.R. 98.233, accessed January 29, 2024, https://www.ecfr.gov/current/title-40/part-98/section-98.233.

37 Robert Hitt, "A Methane Fee Won't Work If It Doesn't Count All the Methane," The American Prospect, August 16, 2022, https://prospect.org/api/content/cccc75ea-1ccd-11ed-ae77-12274efc5439/.

38 McKain et al., "Methane Emissions from Natural Gas Infrastructure and Use in the Urban Region of Boston, Massachusetts"; R. Subramanian et al., "Methane Emissions from Natural Gas Compressor Stations in the Transmission and Storage Sector: Measurements and Comparisons with the EPA Greenhouse Gas Reporting Program Protocol," Environmental Science and Technology 49, no. 5 (March 3, 2015): 3252–61, https://doi.org/10.1021/es5060258; Zachary D. Weller, Steven P. Hamburg, and Joseph C. Von Fischer, "A National Estimate of Methane Leakage from Pipeline Mains in Natural Gas Local Distribution Systems," Environmental Science and Technology 54, no. 14 (July 21, 2020): 8958–67, https://doi.org/10.1021/acs.est.0c00437.

39 Brian K. Lamb et al., "Direct and Indirect Measurements and Modeling of Methane Emissions in Indianapolis, Indiana," Environmental Science & Technology 50, no. 16 (August 16, 2016): 8910–17, https://doi.org/10.1021/acs.est.6b01198; Sargent et al., "Majority of US Urban Natural Gas Emissions Unaccounted for in Inventories"; Debra Wunch et al., "Quantifying the Loss of Processed Natural Gas within California's South Coast Air Basin Using Long-Term Measurements of Ethane and Methane," Atmospheric Chemistry and Physics 16, no. 22 (November 15, 2016): 14091–105, https://doi.org/10.5194/acp-16-14091-2016.

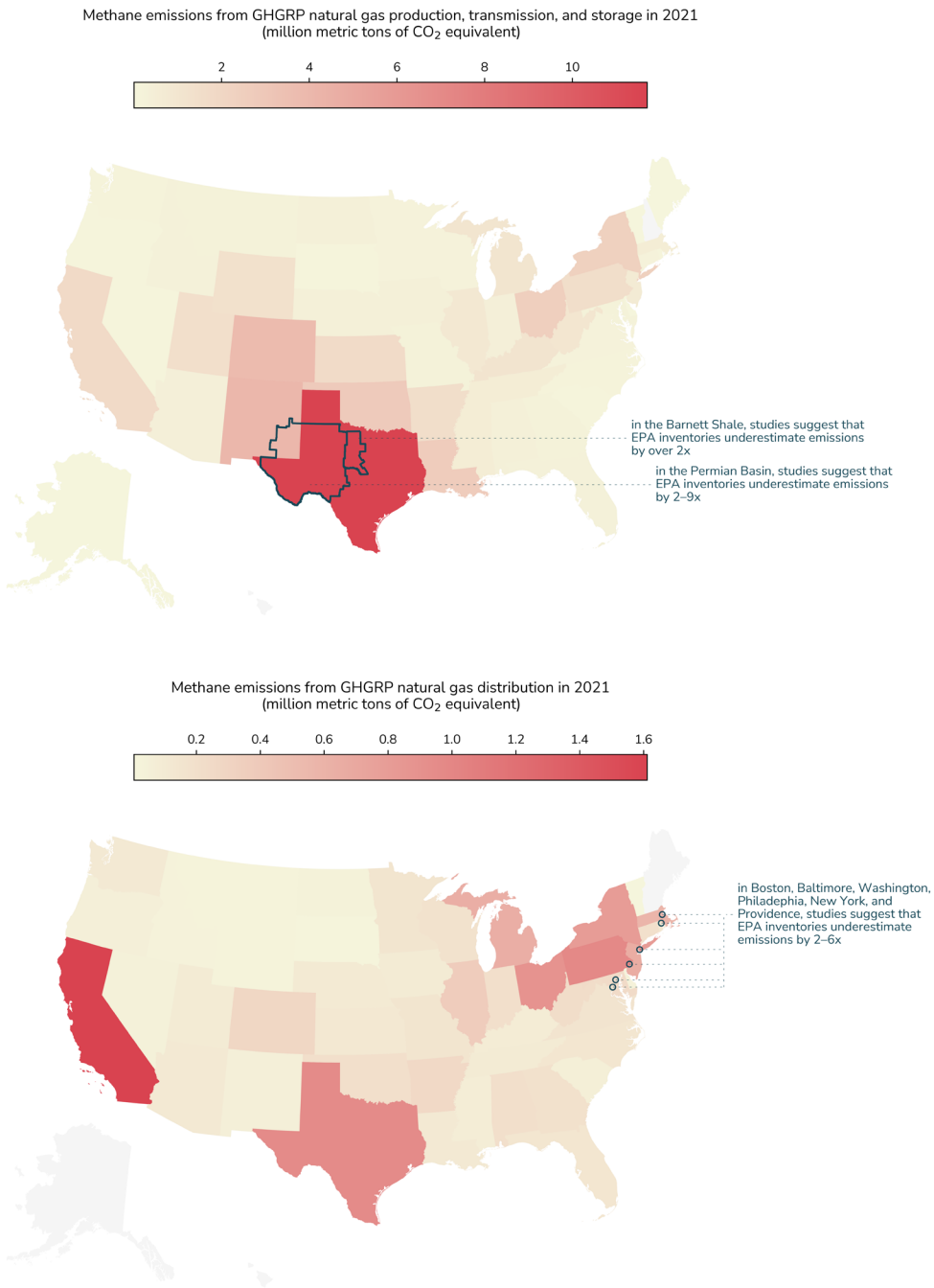


Figure 2. Methane emissions from fossil gas in US states as reported to the GHGRP in 2021, annotated to show where independent studies find higher emissions than reported by EPA.

State-level gas regulation

Like federal regulation, state oversight of methane leaks and emissions is fragmented, commonly distributed among a variety of environmental- and utility-related departments (see Table 1 for examples). State regulation largely exists to comply with federal PHMSA and greenhouse gas regulations and ensure that ratepayers are not billed for leaked gas—meaning that states are primarily focused on monitoring leaks and emissions rather than preventing them.

A department's regulatory focus often depends on its type. Environmental departments, for example, are more likely to regulate methane leaks at sites of extraction (while also maintaining general inventories, or "spill lists", of leak incidents). Utility-related departments, on the other hand, are responsible for oversight of the transmission and distribution of fossil gas. Therefore, utility-related departments are typically responsible for meeting PHMSA reporting obligations. While in many instances environmental agencies report data publicly, utility departments tend to limit public reporting beyond what is shared by PHMSA. Separately, utility-related departments in several states also account for methane by collecting reports from utility companies and setting standards (or thresholds) for "lost" methane or "unaccounted-for-gas."

State	Environmental Departments or Agencies	Utility Departments or Commissions
CA	California Environmental Protection Agency (CalEPA)	California Public Utilities Commission (CPUC)
KS	Kansas Department of Health and Environment (KDHE)	Kansas Corporation Commission (KCC)
MA	Massachusetts Department of Environmental Protection (MassDEP)	Massachusetts Department of Public Utilities (DPU)
NY	New York Department of Environmental Conservation (NYSDEC)	New York Public Service Commission / Department of Public Service (NYSDPS)
PA	Pennsylvania Department of Environment (DEP)	Pennsylvania Public Utility Commission (PUC)

Table 1. Environmental and utility departments for select states.[40]

40 States were selected for analysis based on the availability of gas leak data, recent gas leak events, and novel policy regulations.

Figure 3 summarizes state action on fossil gas leaks and methane reduction based on each state's reported pipeline safety policies and a review of each state's environmental-department and utility-commission webpages.[41] Most states still defer to (inadequate) federal standards, particularly with respect to repairing leaks or monitoring leaks behind customers' meters. While many states require their utilities to report additional leaks (with varying thresholds for reporting) that might not be captured by PHMSA, fewer have repair requirements for those leaks, and very few oversee customer meters or service lines (which are not covered by any federal regulatory regime).

Additionally, **only 8 states have adopted or proposed measures to reduce methane emissions from utility operations.** As Figure 4 shows, when states set their own requirements for leak reporting, they detect many more hazardous leaks than PHMSA does, indicating that federal regulations and data do not capture the extent of the harms of the fossil gas system.

41 National Association of Pipeline Safety Representatives, "Compendium," 2022, http://www.napsr.org/compendium.html.

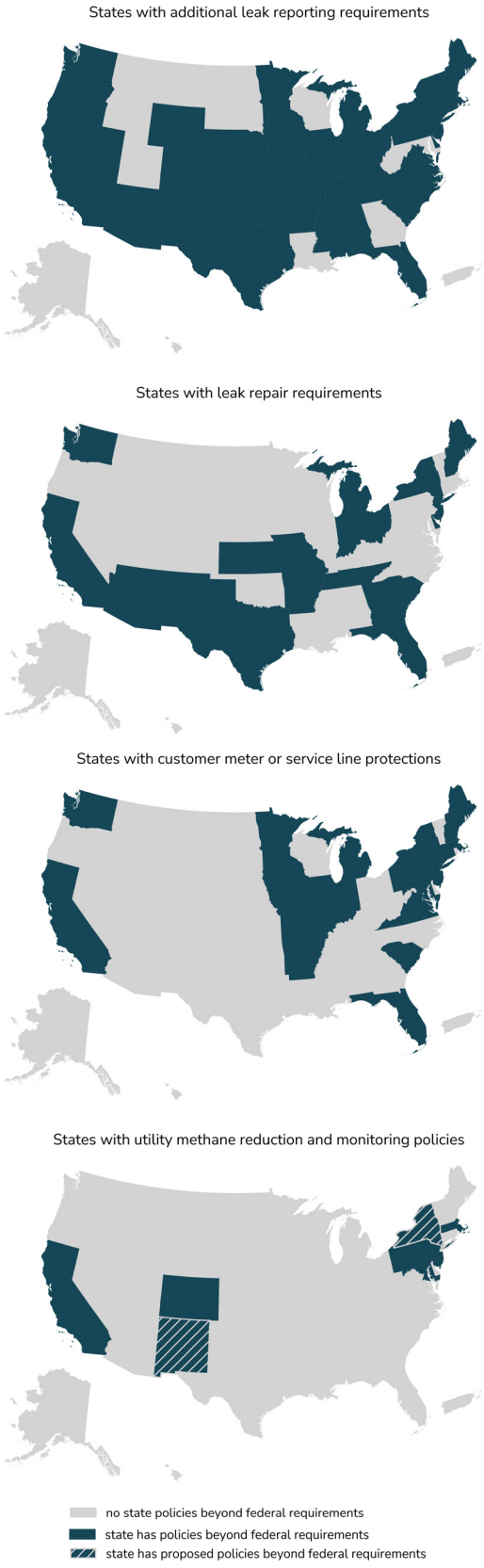
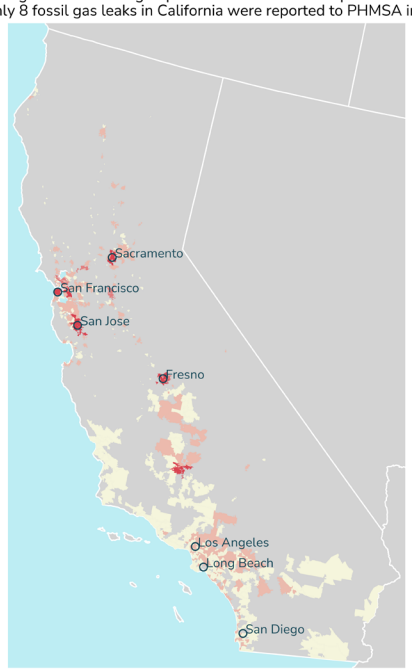


Figure 3. Maps of the US states and Puerto Rico showing states with: additional fossil leak reporting requirements; protections for customer meters or service lines; utility methane reduction and monitoring policies; and leak repair requirements that exceed federal (PHMSA or EPA) requirements.

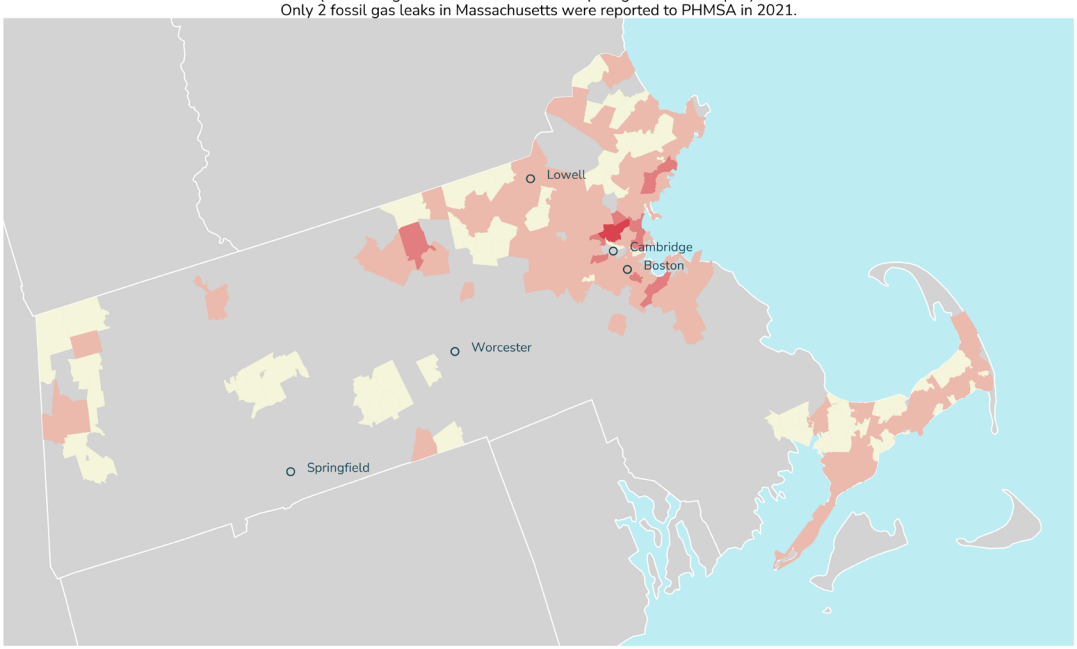
How many more leaks are reported to states that have their own reporting requirements beyond federal regulations?

In 2021, California state-level reporting requirements logged over 6,000 Grade 1 leaks (leaks designated as existing or probable hazards that require immediate action). Only 8 fossil gas leaks in California were reported to PHMSA in 2021.



1-5 6-50 51-100 101 or more Grade 1 leaks reported to the California Public Utilities Commission

In 2021, Massachusetts state-level reporting requirements logged over 3,000 Grade 1 leaks (leaks designated as hazardous and requiring immediate repair). Only 2 fossil gas leaks in Massachusetts were reported to PHMSA in 2021.



1-5 6-50 51-100 101 or more Grade 1 leaks reported to the Massachusetts Department of Public Utilities

Figure 4. Locations of 2021 hazardous leaks as logged by state departments in California and Massachusetts.

Utility departments can have other divisions, typically without enforcement authority, that have small roles in tracking gas leaks. For example, utilities regulated by the Pennsylvania Public Utility Commission (PUC) cannot set rates that recover more than 3% of "unaccounted-for-gas," meaning that at least 97% of the gas that enters a utility's system has to be accounted for by end-users' meters and other meter adjustments.[42] However, no major utility has ever surpassed this 3% threshold since they began filing these reports with the PUC. (The threshold also does not account for leaks inside homes and businesses.) While this rule was neither motivated nor informed by concerns for climate mitigation, the California Public Utilities Commission (CPUC) has implemented a similar policy that is based on both ratepayer and climate interests. Unlike most other states, where there is little to no integration between utility and environmental regulatory departments, California Senate Bill 1371 mandates that the CPUC consult with the California Environmental Protection Agency's Air Resources Board in their work on leak regulation.[43]

At the state level, there is often confusion about how leaks are measured and where data is reported. In several states, discrete departments manage spill lists where, in practice, the reporting of fossil gas leaks is inconsistent. The New York State Department of Environmental Conservation's Spill Incidents Database (SID), for example, is managed by the Department's Division of Environmental Remediation. Since the Oil Spill Act of 1977, the SID has recorded chemical and petroleum spill incidents and is updated nightly. The original intent of the Oil Spill Act is to protect water, including spills occurring in other states;[44] however, it is generally interpreted also to include protection of soil and land.[45] While the regulations do not require fossil gas leaks to be reported to SID (the regulations do mandate the reporting of methanol, a fossil-gas derivative), methane leak incidents are indeed reported to SID, as they are to similar spill lists in other states, like Kansas.[46] This fragmentation underscores the inadequacy of current gas regulation: The appropriate authority for leaks harmful to health and the environment—particularly those that do not meet PHMSA's stringent threshold for reporting—is unclear, and spills can be left underreported.

What an analysis of state fossil gas oversight reveals is that each state regulates the fossil gas industry differently, using discrete metrics, divisions, and agencies. **Similar to the federal context, the separation of different facets and interests—transmission versus extraction, rates versus environment—makes effective state-level regulation almost impossible.** And, as at the federal level, state regulation of gas is not meaningfully motivated by the climate crisis, resulting in ill-conceived and inadequate policy.

42 Pennsylvania Public Utility Commission, "Unaccounted-for-Gas in the Commonwealth of Pennsylvania," February 2012, https://www.puc.pa.gov/transport/gassafe/pdf/UFG_Report_Feb2012.pdf.

43 California Air Resources Board, "Senate Bill 1371 Natural Gas: Leakage Abatement," https://ww2.arb.ca.gov/resources/documents/senate-bill-1371-natural-gas-leakage-abatement, accessed January 29, 2024.

44 Jacob Dweck and Jessica R. Rifkin, "State Oil Spill Liability Laws: Risks for the Unwary," Natural Resources and Environment 9, no. 4 (1995): 36–39, 67–69.

45 James J. Periconi, "Basics of the 'Oil Spill Act,' Article 12 of the New York Navigation Law," Reducing Environmental Risk (blog), December 3, 2016, https://www.periconi.com/blog/2016/12/basics-of-the-oil-spill-act-article-12-of-the-new-york-navigation-law/.

46 New York State Department of Environmental Conservation, "Spill Response & Remediation FAQ—NYDEC," accessed January 29, 2024, https://dec.ny.gov/environmental-protection/site-cleanup/chemical-petroleum-spills/response-remediation-faq.

PART TWO

The Embeddedness of Fossil Fuel Interests in Gas Regulation

The Embeddedness of Fossil Fuel Interests in Gas Regulation

Fossil gas regulation in the United States structurally privileges fossil fuel interests, including utilities, extraction and transmission companies, and lobbyists, while stymieing climate and environmental justice organizations. Fossil fuel industry associations, lobbyists, and companies are positioned to delay and distort fossil gas safety and climate regulation both through court challenges and through technocratic regulatory tools. Meanwhile, both federal and state regulatory agencies are subject to austerity and resource limitations that undermine their enforcement abilities.

Fossil fuel companies' preferred tool for delaying federal climate measures is the courts. For instance, the industry associations American Petroleum Association and GPA Midstream Association successfully delayed PHMSA's efforts to control methane leakage in larger gathering pipelines (which carry fossil gas out of production facilities like wells) by two years, first through direct complaints to PHMSA and then through an appeal filed to the US Court of Appeals when PHMSA denied the associations' request for a rehearing.[47] These organizations' involvement in fossil gas safety policy is institutionalized through their membership in the Department of Transportation's Gas Pipeline Advisory Committee, just over a quarter of whose members are direct representatives of the gas industry.[48]

47 Pipeline and Hazardous Materials Safety Administration, "Fact Sheet: Gathering Pipelines," January 12, 2018, https://primis.phmsa.dot.gov/comm/factsheets/fsgatheringpipelines.htm; Tom Tiernan, "Biden Administration Delays Methane Gathering Line Rules for Some Pipelines," S&P Global, July 11, 2022, https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/natural-gas/071122-biden-administration-delays-methane-gathering-line-rules-for-some-pipelines.

48 Pipeline and Hazardous Materials Safety Administration, "Gas Pipeline Advisory Committee (GPAC)—Committee Roster and Biographies," January 3, 2024, https://www.phmsa.dot.gov/standards-rulemaking/pipeline/gas-pipeline-advisory-committee-gpac-committee-roster-and-biographies.

Fossil gas companies and lobbyists also further their interests through PHMSA's cost-benefit requirement, which stipulates that PHMSA can only issue a standard after determining that the "benefits justify the costs."[49] Rather than treating gas leaks as a critical safety issue, the cost-benefit requirement casts gas leaks as a question of economic efficiency, weighing human lives against corporate expenditures. By contrast, other federal health, safety, and environmental regulation often requires the adoption of the "best available" technology option to limit pollution.[50]

Delays in pipeline safety rulemaking and incomplete mandates are often attributed to the cost-benefit analysis obligation, mirroring the opportunistic use of cost-benefit analysis across federal statutes to limit regulatory protections.[51] The cost-benefit requirement allows well-resourced gas companies, industry associations, and other lobbyists to dispute rulemaking by introducing new assumptions about costs and narrowly defining benefits (see, for example, the American Petroleum Institute's challenge of 2016 gas safety regulations).[52] The cost-benefit requirement itself stems from a 1999 framework drafted by a working group convened by PHMSA, 13 of whose 20 members were direct representatives of gas companies, industry associations, or industry lobbying groups.[53]

While fossil fuel companies mobilize significant resources to oppose safety and climate legislation, **disinvestment in public agencies leaves both federal and state regulators under-resourced and unable to hold operators accountable.** Both PHMSA and state pipeline safety offices, for instance, are routinely understaffed: Congressional reports find that PHMSA has a chronic staffing shortfall due to inspector retirements and departures to pipeline operators, which offer significantly higher wages than federal agencies.[54] This staffing and funding shortfall directly impacts PHMSA's ability to enforce regulations and hold gas operators accountable.

Pennsylvania provides an example of the effects of disinvestment at the state level. The commonwealth's Department of Environmental Protection (DEP) regulates pollutants, including methane, at well sites.

49 Mike Soraghan, "Federal Pipeline Agency Shifts Focus to Cut Methane," E&E News by Politico, January 18, 2022, https://www.eenews.net/articles/federal-pipeline-agency-shifts-focus-to-cut-methane/.

50 US EPA, "Setting Emissions Standards Based on Technology Performance," August 8, 2023, https://www.epa.gov/clean-air-act-overview/setting-emissions-standards-based-technology-performance.

51 Sarah Smith, "Cost-Benefit Analysis Obligations Blamed for Long Delay in Pipeline Safety Rules," S&P Global, April 2, 2019, https://www.spglobal.com/marketintelligence/en/news-insights/trending/637xGrE4T9pCm6VScr9R9g2; Todd Phillips and Sam Berger, "Reckoning With Conservatives' Bad Faith Cost-Benefit Analysis," Center for American Progress, August 14, 2020, https://www.americanprogress.org/article/reckoning-conservatives-bad-faith-cost-benefit-analysis/.

52 ICF International, "Cost and Benefit Impact Analysis of the PHMSA Natural Gas Gathering and Transmission Safety Regulation Proposal," July 1, 2016, https://www.api.org/~/media/files/oil-and-natural-gas/pipeline/2016-icf/icf-phmsa-proposed-regulation-ria-analysis-070516.pdf.

53 The Joint OPS Stakeholder Workgroup, "A Collaborative Framework for Office of Pipeline Safety Cost-Benefit Analyses," September 2, 1999, https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D22353D456AE35CFDB0489D313B543EDD7AA4F25F793?noSaveAs=1.

54 Parfomak, "DOT's Federal Pipeline Safety Program: Background and Issues for Congress."

However, environmental activists and even regulators themselves have pointed to the state's failure to manage the long-established and highly influential energy companies in Pennsylvania.[55] This includes a long fight to include conventional wells in a rule on regulating gas emissions, which was resolved more than 7 years after an EPA mandate.[56] The DEP itself has issued a report that the energy industry has failed to report mandated information.[57] As one person interviewed for this report explained, as hydraulic fracturing was booming, the funding and staffing for the DEP was dramatically cut from 3,100 to 2,400, compromising the organization's ability to regulate the industry.[58] The problem, in military terms, is that there are "not enough boots on the ground."[59]

55 Rachel McDevitt, "Pa. Drillers Abandoned Thousands of Natural Gas Wells in 5 Years, Ignored State Law, Report Says," StateImpact Pennsylvania, January 24, 2023, https://stateimpact.npr.org/pennsylvania/2023/01/24/pa-drillers-abandoned-thousands-of-natural-gas-wells-in-5-years-ignored-state-law-report-says/. David Hess, former head of the DEP, in response to the Rager Mountain gas leak, said: "We have major gas infrastructure built out all over the place but don't have the powers or resources to regulate everything that's going on; this is the wild west. It was just a matter of time before something like the huge Rager Mountain leak happened, and it's just a matter of time before the next big one" (see Nina Lakhani, "'We Don't Feel Safe': US Community in Shock after Record Methane Leak," Guardian, March 6, 2023, https://www.theguardian.com/environment/2023/mar/06/us-methane-gas-leak-fracking-jackson-township-pennsylvania).

56 Rachel McDevitt, "Pennsylvania Emissions Rule for Conventional Oil and Gas Sites Moves Ahead," StateImpact Pennsylvania, November 30, 2022, https://stateimpact.npr.org/pennsylvania/2022/11/30/pennsylvania-emissions-rule-for-conventional-oil-and-gas-sites-moves-ahead/.

57 Pennsylvania Department of Environmental Protection, "Lapsing Statement Report for House Bill 2644," December 29, 2022, https://files.dep.state.pa.us/OilGas/BOGM/BOGMPortalFiles/Governor's_Lapsing_Statement_Report_2022-12-29.pdf.

58 Rachel McDevitt, "Pa. Environmental Protection Head Pitches Permit Reform during Budget Hearing," StateImpact Pennsylvania, March 27, 2023, https://stateimpact.npr.org/pennsylvania/2023/03/27/pa-environmental-protection-head-pitches-permit-reform-during-budget-hearing/.

59 Pennsylvania environmental advocate in discussion with the authors, February 2023.

Grassroots intervention in the gas system

Massachusetts provides a key example of grassroots intervention in the utility system. As enforcers of PHMSA guidelines, utility commissions have considerable regulatory power; they can also receive state legislative mandates that are more stringent. In 2016, Massachusetts passed a bill in response to independent measurements of unreported gas leaks from industry whistleblowers, community groups, and academics that requires more accountability for leakers and comprehensive reporting of gas leaks to the public. The law requires gas operators to track and report leaks both annually and quarterly to the Massachusetts Department of Public Utilities (DPU). A non-profit organization called Home Energy Efficiency Team (HEET) has been geocoding the leak data and publishing maps to highlight the inefficiency and dangerousness of the energy system.

PART THREE

How the Corporate Logic of Utility Regulation Entrenches Polluting Gas Infrastructure

How the Corporate Logic of Utility Regulation Entrenches Polluting Gas Infrastructure

When individual states do take significant steps to regulate leaks, safety, or emissions from fossil gas systems, they often do so by dint of an investor-owned utility (IOU) regulatory process that incentivizes utilities to entrench and extend the lifetime of polluting infrastructure. Though we focus in this section on IOUs, which are often regulated by a utility commission and account for 80% of residential gas customers, gas utilities can also be publicly or cooperatively owned and take directives from an elected board or local government.[60] However, though public gas utilities also face barriers to decarbonization, the IOU regulatory structure inherently prioritizes private-utility profit and fossil fuel expansion over safety and the environment, leaving us with an expanding and hazardous gas system and reinforcing the need for democratized and accountable system of regulating utilities.[61] As Ruhan Nagra, Jeanne Bergman, and Jasmine Graham argue, "the [IOU] regulatory process does not and cannot prevent the harmful financial, environmental justice, and climate impacts of IOUs on the public. The incentive structure built into the regulatory process lies at the heart of this fundamental inability of IOUs to serve the public interest."[62]

60 Homeland Infrastructure Foundation-Level Data, "Natural Gas Service Territories," accessed February 8, 2024, https://hifld-geoplatform.opendata.arcgis.com/maps/natural-gas-service-territories; Eric Mack, "Electric Co-Op and Utility: What's the Difference?," CNET, accessed February 8, 2024, https://www.cnet.com/home/energy-and-utilities/whats-the-difference-between-an-electric-co-op-and-a-utility/.

61 Oscar Serpell et al., "Preparing PGW for a Low-Carbon Future," Kleinman Center for Energy Policy, October 2019, https://kleinmanenergy.upenn.edu/wp-content/uploads/2019/10/KCEP-Future-of-PGW-P5.pdf.

62 Ruhan Nagra, Jeanne Bergman, and Jasmine Graham, "Regulatory Theater: How Investor-Owned Utilities and Captured Oversight Agencies Perpetuate Environmental Racism," CUNY. L. Rev. 25 (2022): 355.

Due to the IOU process, even relatively stringent state-level leak repair requirements fail to create a safe system. This is because investor-owned utilities are structurally incentivized not to repair infrastructure. For example, IOUs are authorized to earn a return from ratepayers funds on capital investments like pipeline replacement but not on operational expenses like leak repair; thus they are incentivized to replace existing pipes even when a repair would be less costly—and are further incentivized to prioritize "easier" repair projects that can leave environmental justice communities behind.[63] These replacements increase the sunk costs in the fossil gas system, extending a reliance on fossil fuels.

When repairs do happen, they are funded by ratepayers and can lead to an increase in gas rates;[64] state utility commissions then balance the need for repairs against the financial impact of the repairs on individual utility customers. A key exception is cases where private utilities are held legally liable for incidents, as in the 2010 PG&E explosion in San Bruno, CA, after which the utility was made to pay for repairs from shareholder funds.[65] **Because reporting, monitoring, and auditing practices are inconsistent and underfunded, and because IOUs have significantly more legal and capital resources than regulators or community groups seeking to hold them accountable, IOUs are infrequently held legally liable for major leaks or explosions.** Under the IOU process, protecting safety and health is a matter of financial negotiation: Utilities have to factor their repair activities into their rate plans, but the pace and scope of repair are limited to avoid steep hikes to rates or reductions to companies' operating profits.[66] Even with utilities' limited repair activities, gas rates are increasing, and the risk that wealthier homeowners will transition away from gas first means that these higher costs are likely to fall on a shrinking base of lower-income and tenant customers.[67]

63 Doris Seavey, "GSEP at the Six Year Mark."

64 Though utilities are not authorized to earn a return on operational costs like repairs, they are authorized to pass those costs on to ratepayers.

65 California Public Advocates Office, "CPUC Investigations into San Bruno Explosion and Gas Pipeline Safety Violations: Fines and Remedies," January 23, 2022, https://web.archive.org/web/20220123213759/https://www.publicadvocates.cpuc.ca.gov/general.aspx?id=2412.

66 New York City Infrastructure Underground Working Group, "Infrastructure Report," June 2014, https://www.nyc.gov/assets/home/downloads/pdf/press-releases/2014/infrastructure_report.pdf.

67 Lucas W. Davis and Catherine Hausman, "Who Will Pay for Legacy Utility Costs?," Journal of the Association of Environmental and Resource Economists 9, no. 6 (November 1, 2022): 1047–85, https://doi.org/10.1086/719793.

Simultaneously, some utilities have reduced their gas operations by offloading their distribution assets to smaller corporations, reflecting a business calculation that the liabilities of these assets outweigh—or will outweigh—the profits.[68] Making profit-based decisions such as these are inherent to IOUs, whose primary fiduciary duty is to shareholders.[69] Offloading undesirable assets to smaller companies leads to an even more overstressed regulatory regime, as regulators become responsible for an increasing number of firms.[70] Structural changes to utilities—including public ownership, which we discuss below—are necessary to ensure that utilities' priorities are public safety, health, and decarbonization rather than maximizing shareholder value.

Does the federal government require fossil gas leak repair?

Federally, regulations on repairing leaks fall under PHMSA's purview, but, historically, PHMSA has not explicitly required the repair of most leaks. A leak only has to be repaired if an operator deems it an "existing or probable hazard to persons or property";[71] even then, there is no defined timeframe for repair, except for "leaks associated with certain metal loss, cracking, and denting defects."[72] Little guidance is given on what an operator should consider a hazard to persons or property, though many types of gas leaks—from an acute leak that could ignite to a long-term leak with deleterious health impacts—are hazardous.[73] **Current federal regulations, however, allow individual operators to choose who and what is worth protecting.** A May 2023 notice of proposed rulemaking from PHMSA suggests the creation of mandatory repair timelines for certain leaks.[74] At least 14 states have adopted their own leak-grading and repair timelines that are more stringent than federal law.[75]

68 Myles McCormick and James Fontanella-Khan, "Enbridge in $14 Billion Deal for Dominion Gas Utilities as US Energy Mix Shifts," September 5, 2023, https://www.ft.com/content/b1f3cedd-6467-4f1d-8154-6a23cbd3fed9; Katherine Blunt, Laura Cooper, and Jimmy Vielkind, "Utilities Pursue Pipeline Sales as Natural-Gas Bans Catch On," Wall Street Journal, April 6, 2023, https://www.wsj.com/articles/utilities-pursue-pipeline-sales-as-natural-gas-bans-catch-on-62a7ddd2; sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem."

69 Niko Lusiani, "Power Struggle: How Shareholder Primacy in the Electrical Utility Sector Is Holding Back an Affordable and Just Energy Transition," Roosevelt Institute, May 2022, https://rooseveltinstitute.org/publications/electric-utilities-shareholder-primacy/; Aneil Kovvali and Joshua C. Macey, "The Corporate Governance of Public Utilities," Coase-Sandor Working Paper Series in Law and Economics 976 (2023), https://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1097&context=law_and_economics_wp.

70 Alperen Afşin Gözlügöl and Wolf-Georg Ringe, "Net-Zero Transition and Divestments of Carbon-Intensive Assets," UC Davis Law Review 56, no. 5 (2023), https://doi.org/10.2139/ssrn.4431314.

71 Gas Distribution Pipeline Integrity Management (IM), 49 C.F.R. 192.P, accessed January 29, 2024, https://www.ecfr.gov/current/title-49/part-192/subpart-P.

72 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Gas Pipeline Leak Detection and Repair," May 2023, https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2023-05/Gas%20Pipeline%20Leak%20Detection%20and%20Repair%20NPRM%20-%20May%202023.pdf.

73 "Natural Gas Used in Homes Contains Hazardous Air Pollutants," Harvard Chan C-CHANGE (blog), June 28, 2022, https://www.hsph.harvard.edu/c-change/news/natural-gas-used-in-homes/.

74 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Gas Pipeline Leak Detection and Repair."

75 National Association of Pipeline Safety Representatives, "Compendium."

PART FOUR

The Contradictions of Status-Quo Gas Regulation and Climate Action

The Contradictions of Status-Quo Gas Regulation and Climate Action

As we have shown, US fossil gas regulation, at both federal and state levels, is too fragmented, beholden to industry interests, and wedded to corporate logics to address harmful methane leaks. **The absence of effective oversight of fossil gas infrastructure puts communities, especially lower-income communities and communities of color, at risk.**

There are some encouraging signs, however. Federally, both PHMSA and the EPA are expanding in scope in response to the specific question of methane leaks. For example, PHMSA's most recent legislative authorization requires operators to begin monitoring methane leaks, signaling an expansion in PHMSA's mandate to include some level of environmental protection.[76]

Similarly, the EPA's GHGRP will be shaped by the implementation of the Inflation Reduction Act (IRA), which proposes a charge on methane emissions calculated based on GHGRP numbers.[77] It remains to be seen whether the IRA will be able to reduce methane emissions through a charge; its success depends both on how the GHGRP chooses to measure methane and how well-resourced and empowered the EPA is to enforce the charge. The public comment period for the EPA's implementation of the IRA, which opened in January 2023, indicates

76 George Hopkins, "The PIPES Act Of 2020: What Regulated Entities Need To Know," JD Supra, February 2, 2021, https://www.jdsupra.com/legalnews/the-pipes-act-of-2020-what-regulated-6543413/.

77 The IRA methane charge only extends to certain facilities (including compressor stations, transmission pipelines, and storage facilities), meaning it excludes fossil gas distribution pipelines altogether (see Jonathan L. Ramseur, "Inflation Reduction Act Methane Emissions Charge: In Brief," Congressional Research Service, August 29, 2022, https://crsreports.congress.gov/product/pdf/R/R47206); US EPA, "Questions Regarding OAR's Implementation of the Inflation Reduction Act."

the contested future of methane measurement under the GHGRP. Comments range from the AGA's push for company-specific emission factors—which would make greenhouse gas reporting even less accountable—to the Climate Justice Alliance and Evergreen Collaborative's recommendations that the EPA invest in direct, independent monitoring of methane emissions.[78] At the same time, the EPA's budget and workforce has steadily shrunk while its responsibilities have grown.[79]

78 American Gas Association, "Comment," Regulations.gov, January 20, 2023, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0875-0035; Climate Justice Alliance, "Comment," Regulations.gov, January 23, 2023, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0875-0069; Evergreen Collaborative, "Comment," Regulations.gov, January 20, 2023, https://www.regulations.gov/comment/EPA-HQ-OAR-2022-0875-0034.

79 Arden Calvert et al., "Resetting the Course of EPA: Increasing Funding to Protect Public Health and the Environment," August 2020, Environmental Protection Network, https://www.environmentalprotectionnetwork.org/wp-content/uploads/2020/08/Increasing-Funding-to-Protect-Public-Health-Environment.pdf.

However, these questions about federal regulators' ability actually to curtail methane emissions obscure an even greater risk. As harmful as methane emissions are, they are only the tip of the iceberg when it comes to greenhouse gas emissions from fossil gas (see Figure 5). The danger is that **the more regulators focus on methane leaks and narrowly defined safety concerns, the less likely they are to pursue the more far-reaching and necessary policy of decommissioning fossil gas infrastructure.** In the absence of required decommissioning, leak monitoring programs may simply lead utilities to invest more in the gas system, contributing to more gas consumption and emissions.

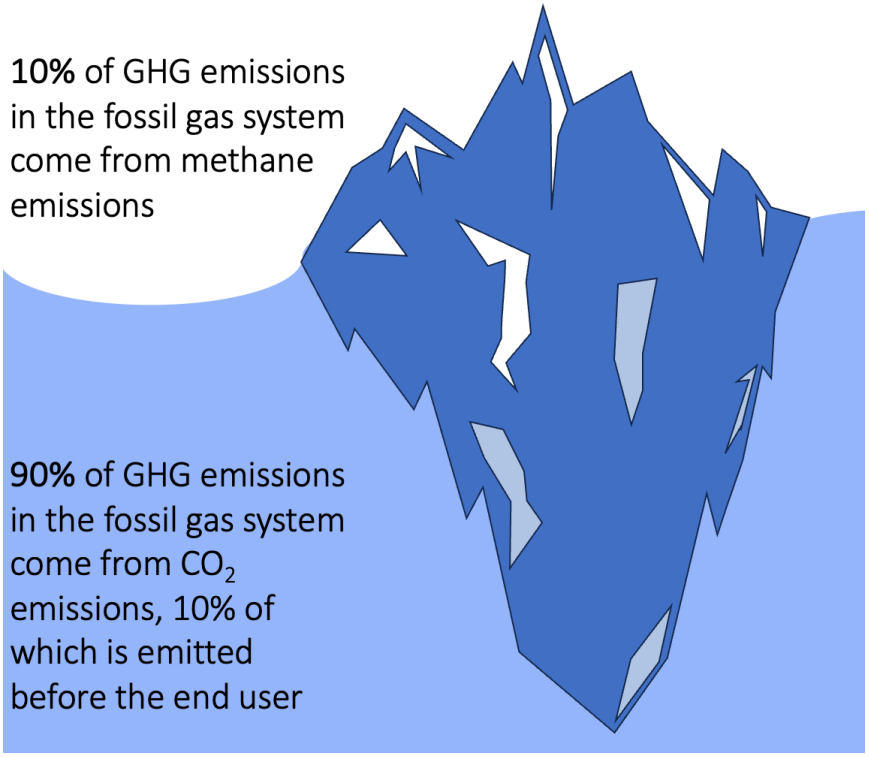


Figure 5.
Methane emissions comprise only 10% of total greenhouse gas emissions.

The gas industry, for its part, presents a future where gas is clean and green. They promote energy transitions that include gas as a key part of the energy supply.[80] In order to market themselves as "green," companies have promoted their ability to self-monitor (mirroring the AGA's attempt to reduce EPA oversight mentioned just above).

The most notable initiative in this vein is the Oil and Gas Methane Partnership 2.0 (OGMP 2.0). Led by the United Nations Environment Program's International Methane Emissions Observatory, OGMP 2.0 comprises 60 companies committed to collecting higher-quality methane emission data.[81] Like federal methane emission reduction schemes, however, internal data improvements and company-commissioned studies are unlikely to reduce gas usage. In fact, they may lead to the *expansion* of the gas system as companies use "repairing" methane leaks as cover to invest further in gas infrastructure.

Similarly, as some companies commit to achieving "net zero" as early as 2025, the scope of these goals is extremely limited and excludes important sources of emissions, such as from end users, extraction, and asset abandonment. For example, EQT Corporation (EQT)—the largest producer of fossil gas in the United States—has declared its ambition to be operationally (near) net-zero by 2025.[82] They plan to achieve this by a combination of technological improvements, including replacement of their gas-powered pneumatic controllers with alternatives powered by electricity or nitrogen, and carbon offsetting, which they have begun by implementing forest management projects on 1,000 acres of state-owned forest land in West Virginia.[83] In addition, they are also planning to pilot marketing their gas as "responsibly sourced natural gas," which is, effectively, an elaborate greenwashing effort through haphazard monitoring tactics.[84] These net-zero goals and other marketing efforts are central to EQT's promotion of liquid fossil gas exports, which they argue is "the largest green initiative on the planet and the world's best weapon to address climate change."[85]

80 Steven Mufson and Timothy Puko, "Big Oil Talks 'Transition' but Perpetuates Petroleum, House Documents Say," Washington Post, December 9, 2022, https://www.washingtonpost.com/climate-environment/2022/12/09/oil-companies-house-documents-climate/.

81 The observatory is funded by the European Commission and the United States Government. The first Oil and Gas Methane Partnership was started in 2014 and led by UNEP's Climate and Clean Air Coalition.

82 EQT, "Operational GHG Emissions," accessed January 29, 2024, https://esg.eqt.com/environmental/operational-ghg-emissions/.

83 EQT, "Pneumatic Device Replacement," n.d., https://www.eqt.com/wp-content/uploads/2022/01/Pneumatic-Device-Replacement-FINAL.pdf; EQT, "EQT And Wheeling Park Commission Launch Forestry Management Program at Oglebay," April 10, 2023, https://www.prnewswire.com/news-releases/eqt-and-wheeling-park-commission-launch-forestry-management-program-at-oglebay-301793114.html.

84 Project Canary, "EQT and Project Canary Partner on Certified RSG Pilot," Project Canary, January 28, 2021, https://www.projectcanary.com/press/eqt-and-project-canary-partner-on-certified-responsibly-sourced-natural-gas-pilot/; Oil Change International and Earthworks, "Certified Disaster: How Project Canary & Gas Certification Are Misleading Gas Markets & Governments," April 2023, https://priceofoil.org/content/uploads/2023/04/certified_disaster_report_FINAL_04_14_2023.pdf.

85 EQT, "Unleashing U.S. LNG," accessed January 29, 2024, https://www.eqt.com/responsibility/unleashing-us-lng/.

In reality, these types of net-zero strategies—especially ones that depend on carbon offsetting—are plagued by speculative assumptions, inadequate accounting methods, and harmful ecological outcomes.[86]

Simply put, both federal and corporate efforts are inadequate to achieve climate goals and wind down gas infrastructure.[87] By promoting repair-and-fix solutions, they further justify the expansion of the oil and gas system. The only path to an energy system that will adapt to and mitigate the climate crisis is eliminating the fossil gas system and ramping up public investment in renewable energy systems.
Simply put, both federal and corporate efforts are inadequate to achieve climate goals and wind down gas infrastructure. By promoting repair-and-fix solutions, they further justify the expansion of the oil and gas system. **The only path to an energy system that will adapt to and mitigate the climate crisis is eliminating the fossil gas system and ramping up public investment in renewable energy systems.**

86 Patrick Greenfield, "Revealed: More than 90% of Rainforest Carbon Offsets by Biggest Certifier Are Worthless, Analysis Shows," The Guardian, January 18, 2023, https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe; Eloise Barry, "Some Companies' Net-Zero Pledges Aren't as Good as They Sound," Time, November 15, 2021, https://time.com/6117635/companies-net-zero-greenwash/; Lauren Waller and Warwick Allen, "Planting Non-Native Trees Accelerates the Release of Carbon Back into the Atmosphere," The Conversation, June 15, 2020, http://theconversation.com/planting-non-native-trees-accelerates-the-release-of-carbon-back-into-the-atmosphere-139841.

87 Mike Coffin, "Absolute Impact 2021," Carbon Tracker Initiative (blog), May 27, 2021, https://carbontracker.org/reports/absolute-impact-2021/.

PART FIVE

Recommendations

Recommendations

	Immediate Actions	Eventual Policy Outcomes
General	Encourage states to be laboratories of energy policy while the federal government (1) adopts more stringent policies for methane leaks and (2) couples those policies with efforts to decommission fossil gas infrastructure and end the use of fossil fuels.	Full decommissioning of the fossil gas system.[88]
Monitoring	Integrate federal efforts to monitor and regulate the gas industry and distinguish safety and climate goals. Focus monitoring efforts on climate mitigation and strategic safety concerns rather than full accounting of the gas system while devoting more resources to decommissioning and electrification. Pursue more aggressive enforcement of leaks.	Train and hire regulators for potentially carbon-intensive industries based on commitment to mitigation to ensure long-term climate goals are achieved.
Ownership	Pursue majority or full federal and state ownership of gas-and-electricity production, transmission, and distribution companies, with mandates for a managed transition.[89] Create, expand, and resource agencies with the capacity to coordinate and manage gas assets for a transition.[90]	Public ownership of gas infrastructure for a managed decommissioning of the gas system.[91]

88 sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem."

89 Johanna Bozuwa, "The Case for Public Ownership of the Fossil Fuel Industry," The Next System Project, April 14, 2020, https://thenextsystem.org/learn/stories/case-public-ownership-fossil-fuel-industry; Johanna Bozuwa et al., "A New Era of Public Power: A Vision for New York Power Authority in Pursuit of Climate Justice," Climate and Community Project, April 2021, //www.climateandcommunity. org/a-new-era-of-public-power.

90 Johanna Bozuwa, "The Case for Public Ownership of the Fossil Fuel Industry."

91 sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem."

	Immediate Actions	Eventual Policy Outcomes
Decommissioning	End subsidies to the gas industry, including new gas hook-ups, RNG development, and investment into hydrogen. Similarly to how PHMSA/PIPES Act obligates PUCs to regulate safety of utility systems, enact a federal mandate for PUCs to get off of gas over the next 15 years.	Ensure that for-profit firms cannot spend money supporting political campaigns or lobbying.[92]
Energy Futures	Resist cooptation of reliability and resilience terms that leverage the development of liquid fossil gas, RNG, and hydrogen.	Focus on building reliable and resilient infrastructure through a combination of centralized options of electrification combined with less centralized options such as geothermal, solar and storage, and reduced energy needs.

92 David Pomerantz, "Getting Politics Out of Utility Bills: How Policymakers Can Protect Customers from Being Forced to Fund Utilities' Political Machines," Energy and Policy Institute, January 2023, https://energyandpolicy.org/wp-content/uploads/2023/01/Getting-Politics-Out-of-Utility-Bills.pdf.

Accountable monitoring: linking gas regulation and decarbonization

Much existing fossil gas regulation does not address the climate crisis or work to decarbonize energy systems. Gas companies prioritize financial returns, thus the monitoring, repairing, and replacing of pipes is predicated on profitability. Although gas companies often cite safety as a reason to continue to invest in the gas system, federal and state gas regulation—largely the product of industry-sponsored lobbying—consistently prioritize companies' bottom line rather than health, safety, and the environment. Examples abound: PHMSA's reliance on cost-benefit analysis, which allows companies to argue against fixing parts of the system; the Pennsylvania PUC's regulation of unaccounted-for gas, which is based on threshold allowances that can billed to ratepayers; and California's PUC similar policy that incorporates allowances for emissions.

In addition, regulatory fragmentation has resulted in an assortment of monitoring methods that yield incommensurable data. For example, certain agencies, such as public utility commissions, use parts per million of methane to measure combustibility, a unit untranslatable into total volume or mass and thus irrelevant for greenhouse gas accounting.

To be effective, fossil gas regulation should instead be centralized and oriented around decarbonization while simultaneously ensuring public health and safety. We recommend the following measures to ensure the fossil gas regulatory system meets these goals:

First, federal and state regulation should be integrated to focus on equitable decarbonization. **At the federal level, this would necessitate combining the expertise of PHMSA and the EPA into a coordinated effort, including linking the PIPES Act directly to decarbonization and to the EPA's GHGRP endeavor.** This change would force regulators to adopt standardized units of measure as well as create a common data set for all federally reported greenhouse gas leaks and emissions. At the state level, this process would entail the integration of environmental and utility regulators and oblige utility departments to enforce environmental regulation beyond the current mandates unique to each organization.

Second, there needs to be a new infrastructure-assessment process that prioritizes decommissioning. The first step would be to switch from cost-benefit analysis to the mandatory use of effective technologies (à la the Clean Air Act, which requires polluting industries to deploy specific hardware to achieve air quality targets). Next, fossil gas companies should be required to account for the full social, environmental, and climate cost of their infrastructure, which also includes the social and environmental cost of climate mitigation and adaptation. These measures would help prioritize and underscore the urgency of decommissioning and facilitate a managed transition away from gas.

There should also be more stringent federal regulation for monitoring that can force state action by lowering the threshold for leak reporting and repair requirements. While individual states should be pursuing more aggressive leak monitoring and repair policies on their own, evolving priorities at the federal level often leave states hesitant to take the initiative: As one federal regulator put it, "sometimes it's easier for a state to wait for us to take action."[93] While states like Massachusetts might serve as important laboratories for new regulations, it is ultimately incumbent upon the federal government to adopt these innovations and put them into practice across the country.

Interviews conducted during our research exposed the inconsistency of norms within government and between regulators and industry. Inside government agencies and departments, there is a division between regulators/enforcement and planning/advising for the purpose of limiting political interference of regulators. However, a "revolving door" between regulators and the oil and gas industry undermines attempts at reducing political interference. As one interviewee framed the problem: "If you were an inspector and you knew that your next job was going to be with 'X' company, why would you beat them up while you're an inspector?"[94] This also points to the prevailing idea that regulation is focused on permitting or allowing for pollution, rather than addressing the climate crisis and transitioning the energy system. **If it is understood that policy advisors should not be speaking to regulators, then it should also be commonplace that regulators should not cultivate close relationships with the industries they are supposed to be policing.**

Third, the goal should *not* be a complete, bottom-up accounting of emissions, which could slow down decommissioning and would likely be overly costly. Instead, more resources should be dedicated to decommissioning the gas system. Based on top-down estimates, which tend to be more accurate but cannot identify particular sources of methane emissions, it is clear that bottom-up reporting is poor partially because companies can report information with little auditing or oversight. Rather, there should be strategic monitoring with a focus on large leaks and easy fixes, and aggressive mandates to decommission pipes and remediate abandoned wells.

93 PHMSA regulator in discussion with authors, January 2023.

94 Pennsylvania environmental advocate, discussion with authors, February 2023.

Public ownership for a safe transition

Working toward a coherent gas regulatory framework that prioritizes decarbonization will also involve some level of repair to existing infrastructure to avoid the deadliest consequences of gas leaks, a process that advocates have called "triage and transition."[95] This "mid-transition" period—as a post-carbon system is phased in and the fossil fuel system is phased out—requires explicit planning to ensure that the declining gas system does not further harm people and the environment.[96]

But as long as utilities are privately owned, they will continue to put the public at risk. In fact, safety risks are built into the regulation of private utilities. For example, utilities tend to replace infrastructure rather than repair, to ensure those costs can be passed directly to consumers; critical repairs are limited because utilities do not pay for repairs themselves; and gas customers—particularly lower-income customers and tenants, who are less able to reduce their reliance on gas—will be left to shoulder the costs and hazards of an increasingly expensive-to-maintain gas system.[97] As long as the gas system is built for profit, it will be unsafe and polluting, with unjust health and economic effects.

A managed transition can decommission gas infrastructure where renewable alternatives are viable and repair gas infrastructure without a regressive cost-recovery structure. But, as isaac sevier argues, it is unreasonable to expect private companies to phase themselves out, decommission their own infrastructure, or perform critical repairs without an expectation of profit.[98]

Thus public ownership—the process of acquiring majority or full government control of companies—is key for the managed decline of gas.[99] For one, most states lack the basic information necessary to understand which parts of the system need repair or decommissioning. Safety reporting on the gas system is piecemeal, and holding utilities accountable is taxing for regulators: In states like Massachusetts, for example, where regulators collect detailed leak information from utilities, getting information from large utilities takes several rounds of communication over a year and a half;[100] regulators have to repeat this costly process for all the private utilities that operate in their state. This process is even more opaque to community members. As a climate justice organizer in New York shared, without litigation, finding "even basic information" on the gas system from the state can be impossible.[101]

95 Mothers Out Front, "What's the 'Triage and Transition' Approach to Gas Leaks?," October 27, 2021, https://www.mothersoutfront.org/news/what-is-triage-and-transition-gas-leaks/.

96 Emily Grubert and Sara Hastings-Simon, "Designing the Mid-Transition: A Review of Medium-Term Challenges for Coordinated Decarbonization in the United States," WIREs Climate Change 13, no. 3 (May 2022): e768, https://doi.org/10.1002/wcc.768.

97 Dan Aas et al., "The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs and Public Health Benefits of Reducing Natural Gas Use," California Energy Commission, April 2020, https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-055-F.pdf.

98 sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem."

99 Bozuwa, "The Case for Public Ownership of the Fossil Fuel Industry"; sevier, "Building Decarbonization Has a Natural Gas Pipeline Problem."

100 For example, see National Grid's 2023 Gas System Enhancement Plan (docket 22-GSEP-03 at the Massachusetts Department of Public Utilities), which required three sets of information requests over about 1.5 years to be approved.

101 New York climate justice organizer, discussion with authors, November 2022.

The energy transition requires a democratically planned, community-responsive approach to scaling up renewable energy provision, decommissioning fossil fuel infrastructure, and ensuring a safe system and just transition for gas workers. Public ownership is necessary for regulators and agencies to have the basic information they need to pursue effective planning, and public ownership of gas utilities should be advanced alongside the creation, expansion, and resourcing of agencies with the capacity to coordinate and manage gas assets.[102]

Public ownership can ensure that management of the gas system is rooted in health, safety, and environmental and economic justice, rather than in maximizing profit. Efforts to require the repair of polluting infrastructure in states like Massachusetts and New York show that private utility regulation is constantly shaped by the profit motive of the regulated entities, leading to an expanding and increasingly unsafe system. **A publicly owned system can be designed to ensure accountability and protect the frontline communities most impacted by unsafe gas operation and gas expansion.** Public ownership can eliminate the convoluted and perverse financial incentives that lead utilities to expand rather than repair their infrastructure and can ensure that rates are set not to secure shareholder value but to maintain a safe, affordable system as gas is fully wound down.

Though necessary, public ownership of gas alone is not sufficient to ensure a managed transition; municipal gas companies, for example, have also worked to entrench the fossil gas system through expansion and speculative investment in hydrogen and RNG.[103] Critically, public ownership of gas utilities must be paired with public ownership of electric utilities, which will ensure that the profits of a decarbonized energy system are also democratized and that gas decommissioning and electrification can be effectively coordinated.[104] Studies of municipal gas system decarbonization warn that the most significant challenge to decarbonization is its misalignment with utility incentives due to a loss of ratepayer revenue.[105] **However, when gas *and* electric utilities are publicly owned, energy-infrastructure decision-making is guided not by the viability and profits of a gas company but the overall viability of a safe and decarbonized energy system.** Furthermore, public gas utilities must be democratized—with elected and accountable leadership—and have strict limits on lobbying activities.[106] The municipal gas company Philadelphia Gas Works (PGW), for instance, has lobbied against gas bans while spending ratepayer money on dues to industry associations like the AGA that work to impede decarbonization.[107]

102 Bozuwa, "The Case for Public Ownership of the Fossil Fuel Industry."

103 Christina Simeone, "Philadelphia Gas Works' LNG Expansion Efforts" (Kleinman Center for Energy Policy, August 2020), https://kleinmanenergy.upenn.edu/wp-content/uploads/2020/08/PGW-LNG-Expansion-Efforts-FINAL-2-1.pdf; Kelly Cofrancisco and Haley Jordan, "PGW Business Diversification Study Kicks Off | Office of Sustainability," City of Philadelphia (blog), September 2, 2020, https://www.phila.gov/2020-09-02-pgw-business-diversification-study-kicks-off/.

104 Bozuwa et al., "A New Era of Public Power: A Vision for New York Power Authority in Pursuit of Climate Justice."

105 Energy and Environmental Economics, "Philadelphia Gas Works Business Diversification Study," December 2021, https://www.phila.gov/media/20211207134817/PGW-Business-Diversification-Study-2021-12.pdf; Serpell et al., "Preparing PGW for a Low-Carbon Future."

106 Jordan G. Teicher, "In Philadelphia, Public Utility Ownership Isn't Enough," Jacobin, February 10, 2022, https://jacobin.com/2022/02/philadelphia-gas-works-public-utility-renewable-energy-climate-action.

107 Bernard Brown, "Fossil Fuel Lobbying Threatens Decarbonization Prospects," Grid Magazine, May 27, 2022, https://gridphilly.com/blog-home/2022/05/27/fossil-fuel-lobbying-threatens-decarbonization-prospects/; Teicher, "In Philadelphia, Public Utility Ownership Isn't Enough"; Jonathan Mingle, "Cities Confront Climate Challenge: How to Move from Gas to Electricity?," Yale E360, April 20, 2021, https://e360.yale.edu/features/cities-confront-climate-challenge-how-to-move-from-gas-to-electricity.

Stopping the publicly funded expansion of the gas system

Transitioning to a just, clean, and safe energy system means not only planning for repair and decommissioning but also stopping the expansion of the gas system. The expansion of gas systems is facilitated not just by the profit incentives of gas companies but also by a range of incentives, subsidies, and favorable laws that directly and indirectly finance fossil fuel expansion.[108] These strategies often stem from one of several misconceptions: that gas is a safe and/or reliable fuel; that it is a clean "bridge fuel" (despite its being not clean, cheap, or necessary);[109] or that gas is the only way to bring networked fuels to colder rural areas that might otherwise use unregulated deliverable heating fuels. **Paired with public ownership, as outlined above, ending the publicly funded expansion of the gas system and offering resilient, place-specific heating options to cold rural areas will enable public investment to serve climate action rather than utility profits.**

Many states subsidize the expansion of gas distribution infrastructure, allowing gas utilities to offer "free" gas line extensions to new customers while the costs are borne by ratepayers.[110] Beyond adding to rising utility bills, gas line extension subsidies mean that gas utilities can make more money—by locking in new customers and expanding their ratepayer base—while customers cover the capital costs. Bills like the HEAT Act in New York State, which passed the NY Senate in June 2023, pair a phaseout of gas line extensions with caps on energy bills to advance a safe and affordable transition off of gas.[111] Similarly, in 2022, the California Public Utilities Commission voted to eliminate subsidies for new gas hookups.[112]

Ending gas line subsidies needs to be linked to place-specific assessments of energy needs. In cold rural areas where heating fuels are essential, gas line extensions have historically been a means of bringing utility infrastructure to communities using propane, wood, or heating oils. Programming and legislation should ensure that these communities have access to affordable, clean,

108 Colin Kinniburgh, "Why You're Still Paying for Someone Else's Gas Line," New York Focus, April 18, 2023, https://nysfocus.com/2023/04/18/heat-act-100-foot-rule-gas.

109 Lorne Stockman, Kelly Trout, and Barb Blumenthal, "Burning the Gas 'Bridge Fuel' Myth: Why Gas Is Not Clean, Cheap, or Necessary," Oil Change International, May 2019, https://priceofoil.org/content/uploads/2019/05/gasBridgeMyth_web-FINAL.pdf.

110 Ken Costello, "Line Extensions for Natural Gas: Regulatory Considerations," National Regulatory Research Institute, February 2013, https://pubs.naruc.org/pub/FA86B6C6-E91D-FF76-882F-04081293B088; Meagan Burton, "The Gas Industry Is Raising Your Rates to Expand Their Polluting System: The NY HEAT Act Will End That," Earthjustice (blog), March 31, 2023, https://earthjustice.org/experts/meagan-burton/the-gas-industry-is-raising-your-rates-to-expand-their-polluting-system-the-ny-heat-act-will-end-that.

111 WE ACT, "State Senate Passes NY HEAT Act as Advocates Demand Assembly Follow Suit to Save New Yorkers Money and Address Climate Crisis," June 7, 2023, https://www.weact.org/2023/06/state-senate-passes-ny-heat-act-as-advocates-demand-assembly-follow-suit-to-save-new-yorkers-money-and-address-climate-crisis/.

112 California Public Utilities Commission, "CPUC Decision Makes California First State in Country to Eliminate Natural Gas Subsidies," September 15, 2022, https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-decision-makes-ca-first-state-in-country-to-eliminate-natural-gas-subsidies.

resilient energy, leveraging public investment in electricity infrastructure and energy storage as well as equipment rebates and incentives for both homeowners and tenants. A decarbonized future is one where rural communities can have access to reliable energy without the need for gas extensions.[113]

Regulatory support for gas system expansion also extends to long-standing and emerging designations of natural gas as a "clean" alternative fuel, which can provide cover for fossil fuel expansion. Natural gas qualifies as an alternative fuel—often alongside electricity, propane, or hydrogen—for many federal transportation programs; some of these, like the National Alternative Fuels Corridors, provide direct grant funding to expand compressed natural gas fueling infrastructure.[114] In parallel, gas utilities use the speculative promises of RNG or "blue hydrogen" to increase natural gas production, or "pink" or "green" hydrogen blended into the gas system to expand gas investment and sometimes even to build new gas plants.[115] RNG in particular is supported by a host of federal and state policies, including transportation fuel standards and IRA subsidies.[116] Federal and state subsidies that use public funds to cover the cost of gas infrastructure, ultimately allowing gas utilities and producers to profit from an unsafe and polluting system, should be reviewed and phased out relative to their contribution to entrenching the gas system.

Beyond challenging gas industry subsidies and incentives, **state and local bans on new gas hookups, coupled with all-electric building codes, can help limit the expansion of a polluting gas system**. As of June 2022, four states had advanced state- or local-level measures that restrict gas use in new buildings.[117] The adoption of gas bans and all-electric new building requirements can curb gas system expansion, avoiding both greenhouse gas emissions and the possibility of more undermaintained, abandoned, or leaking gas infrastructure.

Critically, the efforts of activists and advocates to limit the expansion of fossil fuel infrastructure have constantly been met by aggressive counter-campaigns, misinformation, and front-group creation from the fossil fuel industry.[118] These practices, too, are publicly funded: As the Energy and Policy Institute notes, ratepayer

113 Katie Myers, "Rural America Gets $315 Million for Cleaner, More Affordable Energy," Grist; Lauren Ross, Ariel Drehobl, and Brian Stickles, "The High Cost of Energy in Rural America: Household Energy Burdens and Opportunities for Energy Efficiency," American Council for an Energy-Efficient Economy, July 2018, https://www.aceee.org/sites/default/files/publications/researchreports/u1806.pdf.

114 US Department of Energy, "Alternative Fuels Data Center: Renewable Natural Gas Production," https://afdc.energy.gov/fuels/natural_gas_renewable.html, accessed June 9, 2023.

115 Energy and Policy Institute, "Gas Utilities Push RNG and Hydrogen to Expand Fossil Fuel Infrastructure."

116 John Carey, "While Some Tout 'Renewable Natural Gas' as a Way to Mitigate Climate Change, Others See a False Solution," Proceedings of the National Academy of Sciences 120, no. 28 (July 11, 2023): e2309976120, https://doi.org/10.1073/pnas.2309976120.

117 Tom DiChristopher and Anna Duquiatan, "States That Outlaw Gas Bans Account for 31% of US Residential/Commercial Gas Use," S&P Global, June 9, 2022, https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/states-that-outlaw-gas-bans-account-for-31-of-us-residential-commercial-gas-use-70749584.

118 Brown, "Fossil Fuel Lobbying Threatens Decarbonization Prospects"; Robert Galbraith, Yusra Bitar, and Derek Seidman, "Fueling Obstruction: The Fossil Fuel Networks Undermining Climate Action in New York State," Public Accountability Initiative, November 2, 2022, https://public-accountability.org/wp-content/uploads/2022/11/LittleSisFuelingObstruction_11.02.pdf.

funds are used to pay gas utilities' dues to lobbyist trade organizations like the Edison Electric Institute (EEI) and the American Gas Association (AGA) and to make donations to chambers of commerce, civil society, and non-profit organizations whose primary mission is to support policies favorable to utilities.[119] The Energy and Policy Institute recommends tighter rules that prevent the use of ratepayer funds for clearly defined political activity, mandatory disclosure requirements on political spending, and enforcement regimes to deter companies from breaking rules around using ratepayer funds for political activities.[120] In addition to these needed reforms, public ownership of gas utilities as a parallel strategy can ensure that ratepayer money is used not for political and advertising campaigns but rather to ensure a just and decarbonized energy system.

119 David Anderson, Matt Kasper, and David Pomerantz, "Paying for Utility Politics: How Utility Ratepayers Are Forced to Fund the Edison Electric Institute and Other Political Organizations," Energy and Policy Institute, May 2017, https://energyandpolicy.org/wp-content/uploads/2017/05/Ratepayers-funding-Edison-Electric-Institute-and-other-organizations.pdf; Pomerantz, "Getting Politics Out of Utility Bills: How Policymakers Can Protect Customers from Being Forced to Fund Utilities' Political Machines"; David Anderson et al., "Strings Attached: How Utilities Use Charitable Giving to Influence Politics and Increase Investor Profits," Energy and Policy Institute, December 10, 2019, https://energyandpolicy.org/strings-attached-how-utilities-use-charitable-giving-to-influence-politics-increase-investor-profits/.

120 Pomerantz, "Getting Politics Out of Utility Bills: How Policymakers Can Protect Customers from Being Forced to Fund Utilities' Political Machines."

Planning for the future

Getting off of gas necessitates developing a future energy system that is both reliable and resilient. Indeed, it is these two "r" terms that have long been gas and energy companies' favored self-justification. Fossil gas, for example, has long been advertised as a reliable energy source for homes that is not prone to outages. Electricity companies, meanwhile, have responded by creating huge amounts of capacity: Starting in the 1980s with coal plants, the industry has largely switched to natural gas, which has solidified the energy sector's reliance on fossil gas.

The gas industry has sought to maintain its dominance by continuing to market itself, moreover, as providing a modern and clean fuel.[121] They achieve this by promoting various products: (1) liquid fossil gas, which makes gas into a form that is more easily stored and transported, (2) "renewable" natural gas which comes from non-renewable sources like landfills and concentrated animal feed operations, and (3) "blue" hydrogen that is even more combustible than methane and does not directly mitigate the climate crisis.

Along with the older imperative of reliability, the energy sector has increasingly made use of the term "resilient," often defining it as supporting reliability through planning and coordination to reduce power outages.[122] Seen through a critical lens, the energy sector has mostly promoted reliability and resilience for the purposes of increasing profitability and customer dependency. Moreover, it is important to recognize that a single centralized energy system is not resilient and that pipelines are not a reliable way to deliver energy that is safe for people and the environment.

That is why "reliable" and "resilient" must be defined in the context of a just and sustainable energy transition. While utility companies mix and match various technologies like methane and hydrogen gas, other combinations, such as networked geothermal and distributed solar energy, can support comfortable housing and be even more reliable and resilient than fossil gas systems. For instance, in Massachusetts, HEET has been championing gas utility companies' in piloting efforts to install geothermal in selected neighborhoods since 2017. While geothermal has a long history in providing building heating and cooling needs, this pilot project has been hailed as the first gas-utility deployment of the technology. There are now 13 different states that have gas utilities that have taken some form of action toward the development of a networked geothermal system.[123]

It also might be possible to convert oil and gas extraction sites to geothermal electricity production, which could simultaneously support the communities dependent on those sites and provide revenue for the remediation of the land as well as any communities harmed. What is crucial, however, is that any novel combination of technologies form part of a comprehensive plan to get off gas and

121 Marcellus Shale Coalition, "Pa. Natural Gas to Meet Rising Domestic, Global Demand," July 15, 2021, http://marcelluscoalition.org/2021/07/15/pa-natural-gas-to-meet-rising-domestic-global-demand/.

122 Andy Ott, "Reliability and Resilience: Different Concepts, Common Goals," PJM Inside Lines (blog), December 17, 2018, https://insidelines.pjm.com/reliability-and-resilience-different-concepts-common-goals/.

123 HEET, "Networked Geothermal: The National Picture," April 17, 2023, https://www.heet.org/blog-items/networked-geothermal-the-national-picture.

not just serve as one-off sustainability projects that justify further fossil- and extraction-based operations.

It is also important to plan an energy transition based on the needs and resources of different places, in particular areas where utility-scale electrification is not immediately viable. Any energy transition must center energy *demand* in conversations of reliability and resilience, prioritizing the creation of homes, businesses, and transportation infrastructure that are adapted to and help mitigate the climate crisis.

Lastly, it is critical to transform utility and transmission institutions such as public utility commissions and regional transmission organizations into entities that swiftly and responsibly facilitate a just energy transition. **This means coordinating a renewable energy build-out that is concerned with the people and places where transmission and energy production is sited.**[124] As they do with gas infrastructure, energy companies site electrical infrastructure based on profitability, which has led to strong community resistance to transmission and renewable energy. There needs to be more public attention paid to and investment in the incentivizing of renewable energy resources, especially for those lacking financial resources. Any just transition must also ensure ratepayers in communities hosting large-scale transmission and renewable energy production see reduced utility bills.

124 Johanna Bozuwa and Dustin Mulvaney, "A Progressive Take on Permitting Reform: Principles and Policies to Unleash a Faster, More Equitable Green Transition," Roosevelt Institute, August 22, 2023, https://rooseveltinstitute.org/publications/a-progressive-take-on-permitting-reform/.

Conclusion

Extracting, transporting, and burning fossil gas contributes to the climate crisis, causes deadly explosions, and leads to public health impacts that are only now being uncovered. Regulators' inability to prevent some of the worst consequences of an expanding gas system is a symptom of a fragmented, reactive regulatory system that is insufficiently resourced and heavily influenced by gas companies and industry lobbyists. Although, in most states, even the most basic accounting of the gas system's harms is absent, where data *does* exist it is clear that these harms fall disproportionately on tenants, low-income communities, and people of color. A just energy transition requires that the federal government and individual states pursue several key policies: gas system monitoring for the explicit goal of decarbonization and decommissioning; public ownership of gas systems to ensure that management of the gas system is rooted in health, safety, and climate justice throughout the energy transition; the removal of gas subsidies and the implementation of gas bans; and the use of place-specific technology alternatives that realize a truly reliable and resilient energy system.

Appendix: Figures and Data

Figure 1

The EPA portion of Figure 1 is based on the EPA's "Oil and Gas Industry Overview Diagram."[125]

The PHMSA portion is based on Section 2 of PHMSA's 2023 Notice of Proposed Rulemaking.[126] In particular, the section "Methane Emissions Data—All Natural Gas Pipeline Facilities" specifies that exploration, production, gas processing plants, and some gathering lines are not regulated by PHMSA. (Because other gathering lines are regulated by PHMSA, we include them in the PHMSA scope in Figure 1). The section "4. Liquefied Natural Gas Facilities" specifies that LNG terminals are not currently under PHMSA's scope. Though PHMSA requires operators to conduct surveys of behind-the-meter gas infrastructure, behind-the-meter leaks are not federally reportable or investigated, so all behind-the-meter infrastructure is left out of PHMSA's scope in Figure 1.[127]

Figure 2

The two maps in Figure 2 show 2021 data downloaded from EPA's GHGRP public data.[128] The upper map (production, transmission, and storage) shows only records that belong to subpart W, while the lower map (distribution) shows only records that belong to subpart NN (column "Industry type (subpart)" in the EPA data). Additionally, the data for both maps was filtered to only include NAICS codes that relate to fossil gas (codes 211130, 213111, 213112, 221210, or 486210 in the column "Primary NAICS code" in the EPA data). Data was summed at the state level and plotted. For data that was reported by the EPA at the basin-level for basins that span multiple states, emissions were assumed to be distributed proportionally to the area of the basin within each state.

The figure is additionally annotated with the results from studies in the Barnett Shale, Permian Basin, and Boston, Baltimore, Washington, Philadelphia, New York, and Providence.[129]

125 US EPA, "GHGRP and the Oil and Gas Industry," https://www.epa.gov/ghgreporting/ghgrp-and-oil-and-gas-industry., accessed January 31, 2024

126 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Gas Pipeline Leak Detection and Repair."

127 Pipeline and Hazardous Materials Safety Administration, "Pipeline Safety: Inside Meters and Regulators."

128 US EPA, "Data Sets," Overviews and Factsheets, May 18, 2015, https://www.epa.gov/ghgreporting/data-sets., accessed January 31, 2024

129 David R. Lyon et al., "Constructing a Spatially Resolved Methane Emission Inventory for the Barnett Shale Region," Environmental Science & Technology 49, no. 13 (July 7, 2015): 8147–57, https://doi.org/10.1021/es506359c; McKain et al., "Methane Emissions from Natural Gas Infrastructure and Use in the Urban Region of Boston, Massachusetts"; Plant et al., "Large Fugitive Methane Emissions From Urban Centers Along the U.S. East Coast"; Ren et al., "Methane Emissions From the Baltimore-Washington Area Based on Airborne Observations"; Robertson et al., "New Mexico Permian Basin Measured Well Pad Methane Emissions Are a Factor of 5–9 Times Higher Than US EPA Estimates"; Sargent et al., "Majority of US Urban Natural Gas Emissions Unaccounted for in Inventories"; Weller, Hamburg, and Von Fischer, "A National Estimate of Methane Leakage from Pipeline Mains in Natural Gas Local Distribution Systems"; Zhang et al., "Quantifying Methane Emissions from the Largest Oil-Producing Basin in the United States from Space."

Figure 3

To determine states with additional reporting requirements, states with customer meter protections, and states with repair requirements, we use the National Association of State Pipeline Representatives (NAPSR) compendium table of state pipeline safety initiatives that exceed federal code.[130]

Any state with at least one initiative documented under the following categories is labeled as having additional reporting requirements: "Incident reporting criteria—lower property damage threshold"; "Incident reporting criteria—significant media coverage"; "Incident reporting criteria—bodily injury includes outpatient treatment, specified interruption of gas is 'service failure' and is considered an incident"; "Expanded Incident reporting criteria—includes any pipeline > 100 ppm H2S; any carbon monoxide related events, over pressuring pipeline, fire not caused by operator, transmission shutdown, failure to serve master meter ops, > 5 gallons release of Haz liquid, gathering lines in Class 1 or rural areas"; "Additional reporting rqmts—non-incident including: safety related conditions, 3rd party damage reporting, unplanned interruptions, building evacuations, major main failures, transmission failures, list of master meter operators served, suspicious acts, status of condition of pipe and shared with municipalities served, annual organizational chart, annual report for master meters, report of any unplanned gas ignition, outages at public facilities, security breaches, curtailment plans, LPG systems in public places and serving >10 Units, calculations to determine LAUF gas annually, emergency plans must identify Mutual Assistance Agreements, proximity of pipelines to schools, report on customer meter surveillance program."

Any state with at least one initiative documented for any of the categories below "Meter Location/Protection" is labeled as having customer meter protections.

Any state with at least one initiative documented under the category "Classification/repair rqmts for leaks" is labeled as having repair requirements.

To determine the existence of methane reduction policies, we individually reviewed environmental and utility commission webpages for each state and found existing or proposed programs in California, Colorado, Maryland, Massachusetts, New Jersey, New Mexico, and New York.[131]

130 National Association of Pipeline Safety Representatives, "Compendium."

131 California Air Resources Board, "Methane Research Projects," accessed January 31, 2024, https://ww2.arb.ca.gov/our-work/programs/methane/projects; Environmental Defense Fund, "Colorado Adopts Groundbreaking Methane Measurement Rule," accessed January 31, 2024, https://www.edf.org/media/colorado-adopts-groundbreaking-methane-measurement-rule; International Energy Agency, "(Maryland) Control of Methane Emissions from the Natural Gas Industry—Policies," May 3, 2022, https://www.iea.org/policies/12486-maryland-control-of-methane-emissions-from-the-natural-gas-industry; Massachusetts Department of Environmental Protection, "Reducing Methane (CH4) Emissions from Natural Gas Distribution Mains & Services (310 CMR 7.73)," accessed January 31, 2024, https://www.mass.gov/info-details/reducing-methane-ch4-emissions-from-natural-gas-distribution-mains-services-310-cmr-773; New Jersey Department of Environmental Protection, "Greenhouse Gas Monitoring and Reporting Rule," Greenhouse Gas (blog), accessed January 31, 2024, https://dep.nj.gov/ghg/ghgmr-rule/methane-emission-sources/; New Mexico Environment Department, "New Mexico Methane Strategy," accessed January 31, 2024, https://www.env.nm.gov/new-mexico-methane-strategy/; New York Department of Environmental Conservation, "DEC Announces Proposed Regulations to Reduce Methane Emissions from Oil and Natural Gas Sector," accessed January 31, 2024, https://dec.ny.gov/news/press-releases/2021/4/dec-announces-proposed-regulations-to-reduce-methane-emissions-from-oil-and-natural-gas-sector.

Figure 4

The mapped California data in Figure 4 is sourced from regulatory case documents filed by the three investor-owned gas utilities in California—Pacific Gas & Electric, Southern California Gas, and San Diego Gas & Electric—found by selecting case type "Natural Gas Leak Abatement OIR" or simply specifying "Natural Gas Leak Abatement" in each utility's public case-document search webpage.[132] Distribution leak data can be found in Appendix 7 of each annual report. The data shown represents 2021 annual data for distribution leaks classified as Grade 1, summed at the zip code level (for Southern California Gas and San Diego Gas & Electric) or at the municipality level (for Pacific Gas & Electric). The total number of state-reported leaks is the sum of distribution leaks classified as Grade 1 in 2021.

The mapped Massachusetts data in Figure 4 is sourced from Home Energy Efficiency Team, which cleans and compiles data from individual utilities' regulatory filings with the Massachusetts Department of Public Utilities.[133] The data shown represents 2021 annual data for distribution leaks classified as Grade 1, summed at the zip code level. The total number of state-reported leaks is the sum of distribution leaks classified as Grade 1 in 2021.

For both California and Massachusetts, the total number of PHMSA-reported leaks is the sum of 2021 incidents reported in that state in PHMSA's public natural gas distribution incident data.[134]

Figure 5

Data for Figure 5 is sourced from Figure 4 of the US Department of Energy's report on emissions in the natural gas supply chain.[135]

132 Pacific Gas & Electric, "Regulation," accessed January 31, 2024, https://pgera.azurewebsites.net/Regulation/search; SoCalGas, "Regulatory Search," accessed January 31, 2024, https://www.socalgas.com/regulatory/regulatory-search; San Diego Gas & Electric, "CPUC Proceedings," accessed January 31, 2024, https://www.sdge.com/rates-and-regulations/proceedings.

133 HEET, "HEET Library," accessed January 31, 2024, https://www.heet.org/library.

134 Pipeline and Hazardous Materials Safety Administration, "Distribution, Transmission & Gathering, LNG, and Liquid Accident and Incident Data," accessed January 31, 2024, https://www.phmsa.dot.gov/data-and-statistics/pipeline/distribution-transmission-gathering-lng-and-liquid-accident-and-incident-data.

135 James Bradbury, Zachary Clement, and Adrian Down, "Greenhouse Gas Emissions and Fuel Use within the Natural Gas Supply Chain—Sankey Diagram Methodology," US Department of Energy, Office of Energy Policy and Systems Analysis, July 2015, https://www.energy.gov/policy/articles/fuel-use-and-greenhouse-gas-emissions-natural-gas-system-sankey-diagram-methodology.