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Groundwork Data

Clearing the Air:
How Cities Can Mitigate the Impacts of the Gas System and Accelerate the Shift to Clean Energy

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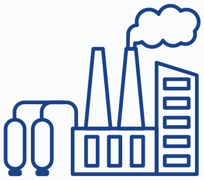
REPORT

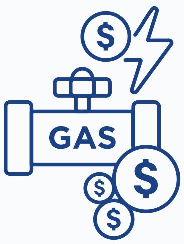
May 2024

Contents

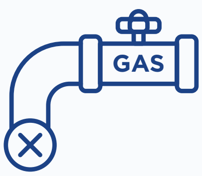
Key Takeaways



Utility-delivered methane is a major source of greenhouse gas emissions in most U.S. cities. To make a major difference in these emissions, cities should not overlook the role of the gas system's physical infrastructure.



The gas system is being disrupted by increasing infrastructure costs, unprecedented competition from electric alternatives, and the need to decarbonize the economy. The combined effect of these forces will result in reduced gas consumption and increasing economic challenges for gas utilities.



For an orderly transition off of gas, cities should focus on three key principles: halting gas system expansion, limiting reinvestment in the gas system, and strategically downsizing the gas distribution system.

While cities do not have the ability to simply turn the gas off, they can support an orderly transition beyond gas by using the authorities they have, their staffing and programmatic capabilities, leading by example with their property portfolios, and advocating and intervening in state regulation.

Introduction

Cities have emerged as leaders in responding to the climate crisis and initiating an equitable transition off of fossil fuels. As of April 2024, more than 400 cities in the U.S. have developed climate action plans that universally recognize the need for a substantial transformation of buildings. Some have undertaken ambitious building energy and emissions standards that regulate emissions from fuels burned on site and those produced during the generation of electricity. However, few if any of these, have considered the specific role of the pipelines that deliver methane gas[1] to these buildings.

Those cities that have set their sights directly on natural (methane) gas have logically directed their efforts to avoid gas in new construction—the place where it is easiest and most cost-effective to decarbonize. Such efforts have faced significant challenges. Notably, Brookline, MA and Berkeley, CA have both faced setbacks in their ambitions to phase out new gas connections. Yet even in these defeats, these early-adopters have catalyzed other climate experiments, like a municipal all-electric pilot program in Massachusetts that allowed Brookline to implement its proposal five years later.

Progress on decarbonizing the building sector has not been easy, especially as cities come up against entrenched gas interests that have enjoyed uninterrupted monopolies for decades.

This white paper aims to deepen city leaders' understanding of the interaction between gas distribution systems and local climate objectives. It specifically addresses critical components of the energy system, focusing not only on emissions, but also on the affordability, reliability, health, safety, and equity implications of the gas transition. City leaders can use this research as a guide to understand the key steps needed for an effective transition and how they can use their powers to help their communities move beyond gas.

The paper is structured into two parts. 'The Gas System and the Energy Transition' examines the historic and present state of the gas system—its construction, funding, regulation, and emissions impact. 'Strategy and Tools for Cities to Move Beyond Gas' presents what is needed to ensure an effective transition beyond gas and examines case studies from a range of cities.

1 This paper will use "methane" or "methane gas" throughout, though it is informally known by many other names, including natural gas, fossil gas, and fracked gas.

Section 1

The Gas System and the Energy Transition

Section 1: The Gas and Pipes System and the Energy Transition

Gas and Pipes in the Context of Customers and Cities

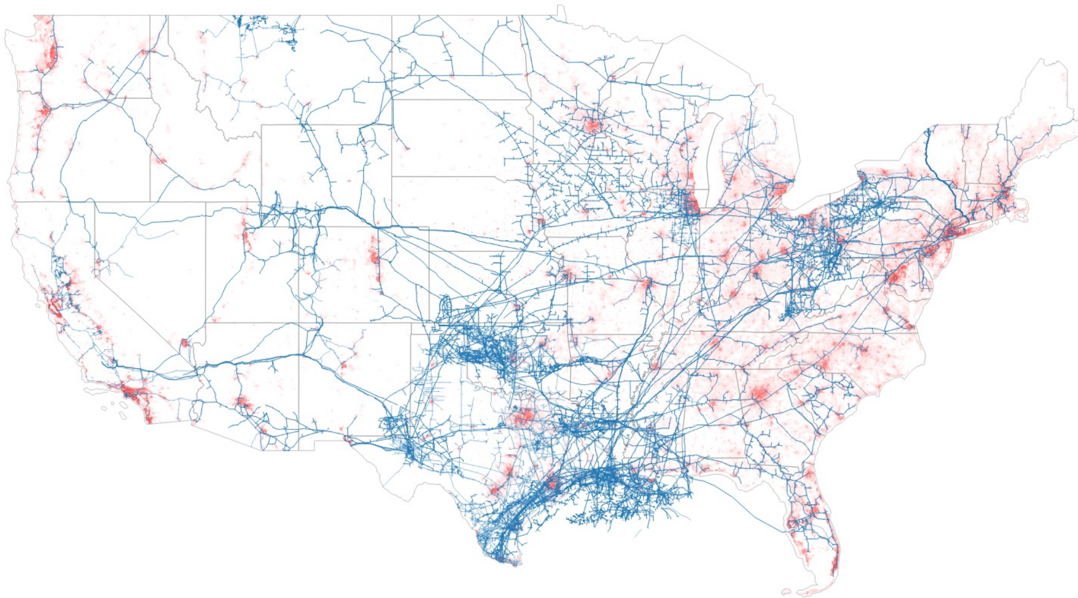


Figure 1.1 Map of inter- and intra-state gas transmission pipelines (Source: EIA) overlaid on a population density map (Source: US Census Bureau).

The story of gas is just as much of a story about the pipes as the fuel itself. Beneath the streets of nearly every American city lies an out-of-sight network of plastic, steel, and cast-iron pipes. These pipes connect to a vast, interstate system of production and transmission that runs across millions of miles in the United States (Figure 1.1).

The gas pipeline network is an expansive and expensive undertaking. In that way, it's similar to how the electric grid has historically operated—transporting energy from a central producer to a diffuse number of customers.[2] Like the electric grid, it also functions by achieving economies of scale sufficient to justify the high cost of infrastructure and transportation. Gas infrastructure has only succeeded in cities because the high cost of building and maintaining a pipeline can be spread across a large number of customers. By contrast, this system makes little sense for supplying a home in a rural area, where a truck delivery of propane may be more affordable.

Consumers pay for the gas and its delivery to the home through separate charges on their bills. The cost of gas supply is typically largely variable—like any consumable product—with its price to customers reflecting seasonal and market dynamics.

A second charge for delivery reflects the cost incurred by the utility across its business to install the pipes, maintain the pipes, and pay back investors. This cost is largely fixed, however customers pay for it mostly through a variable rate that scales with how much gas they use. This means that an efficient home pays less than a non-efficient home, despite the fact that the cost of connecting each home to the gas system is the same. While such disparities occur, regulators have settled on this approach as the most practical.

2 The electric grid is undergoing a transformation, though, where electricity is generated by a smaller number of distributed producers (e.g., rooftop solar) and stored via battery. Such distributed production on the gas system is practically non-existent.

These consumer costs have important implications for cities seeking to transition away from gas. As more households and businesses reduce their gas consumption, the fixed costs of maintaining the gas system will be spread across a shrinking customer base, which without intervention will lead to higher rates for those who remain. This dynamic will be further discussed below.

Nationwide, the delivery and supply charges combine to an estimated $600 per year for the average household. Bills in a colder climate such as the Northeast averaging around $750.[3] Prices were even higher during 2022-2023 due to various disruptions to global energy markets. According to federal surveys, about a fourth of households struggled to pay these bills several months of the year.

The combustion of natural gas releases the least amount of carbon dioxide per unit of energy created—about 30% less than fuel oil, and almost half of coal. Gas also burns cleaner and its displacement of oil and coal has led to a notable improvement in air quality. However, climate goals require a near abandonment of fuel use—not incremental advances. The nature of methane to leak also eliminates much of the climate benefit relative to other fossil fuels.[4] The indoor air quality impacts of leaked and combusted gas is of growing concern.[5]

For cities committed to reducing emissions and safeguarding public health, transitioning off of methane is crucial. But there is no avoiding that most major American cities today run largely on gas, making it critical to understand the history and structure of the gas industry.

Rise of the Modern-Day Gas System in Cities

The modern gas system in the United States dates back to the early 1800s when enterprising inventors, having seen gas lights in London, sought to deploy the new service at home. Gas that flowed through the pipes was not the predominantly-methane "natural" gas of today but a mixture of gases manufactured from coal combusted in the absence of oxygen. The emergence of this technology displaced the use of whale oil and candles for illumination in cities.

A lamplighter in Worcester, Massachusetts - about 1903

Photographed by William Bullard, collection of the Worcester Art Museum

3 U.S. natural gas bills will increase in all regions this winter - U.S. Energy Information Administration (EIA).

4 Sargent, M. R. et al. Majority of US urban natural gas emissions unaccounted for in inventories. Proceedings of the National Academy of Sci ences 118, e2105804118 (2021).

5 Lebel, E. D., et al. Methane and NOx Emissions from Natural Gas Stoves, Cooktops, and Ovens in Residential Homes. Environmental Science and Technology 56, 2529–2539 (2022).

While the gas system of the 19th century served a different purpose than today– for light as opposed to heat, some features have always been the same: notably pipes. Gas companies were dependent on urban density to deliver their product via pipeline, and the existence of gas service, in turn, helped cities meet the growing demand for illumination.

The modern gas utility model has its roots in an important change in the early 1900s—the invention of the light bulb. It pushed the gas industry into a new business model, primarily that of heating the home, but also included cooking, clothes drying, and even refrigeration.

The 20th century brought additional changes that further entrenched the use of gas in cities. First, the development of interstate pipelines that connected the gas-rich fields of the South to the northern industrial cities. In the cities that previously used manufactured gas, a wartime-like mobilization of technicians were called up to swap out the burner tips on every appliance to be compatible with the more energy-dense methane, or "natural" gas. Hundreds of thousands of households were converted in just a few years.

A Brooklyn Union Gas employee converts a gas stove to enable Natural Gas consumption, 1951

Brooklyn Daily Eagle photographs, Brooklyn Public Library, Center for Brooklyn History

> "We bought a company from the South. They were good at it. They had these trucks with lathes and machine shops, and they went from house to house and did the work. They hit Boston of course, which had some of the oldest appliances in the country. And we had to alter every range, every water heater, every single appliance. If we couldn't get to a house on the list, we'd keep trying to get in it, until the end when we'd connect an area. If the houses weren't converted, they were cut off. We had a couple of situations where he had to break in to get the appliances converted. We'd get a permit from the city, and we'd have an officer with us, and we'd go there and make things work.
>
> John Bacon, CEO Boston Gas

As production grew, costs declined over the course of the 20th century, enabling customer growth and expansion into the booming suburbs. (Figure 1.2)

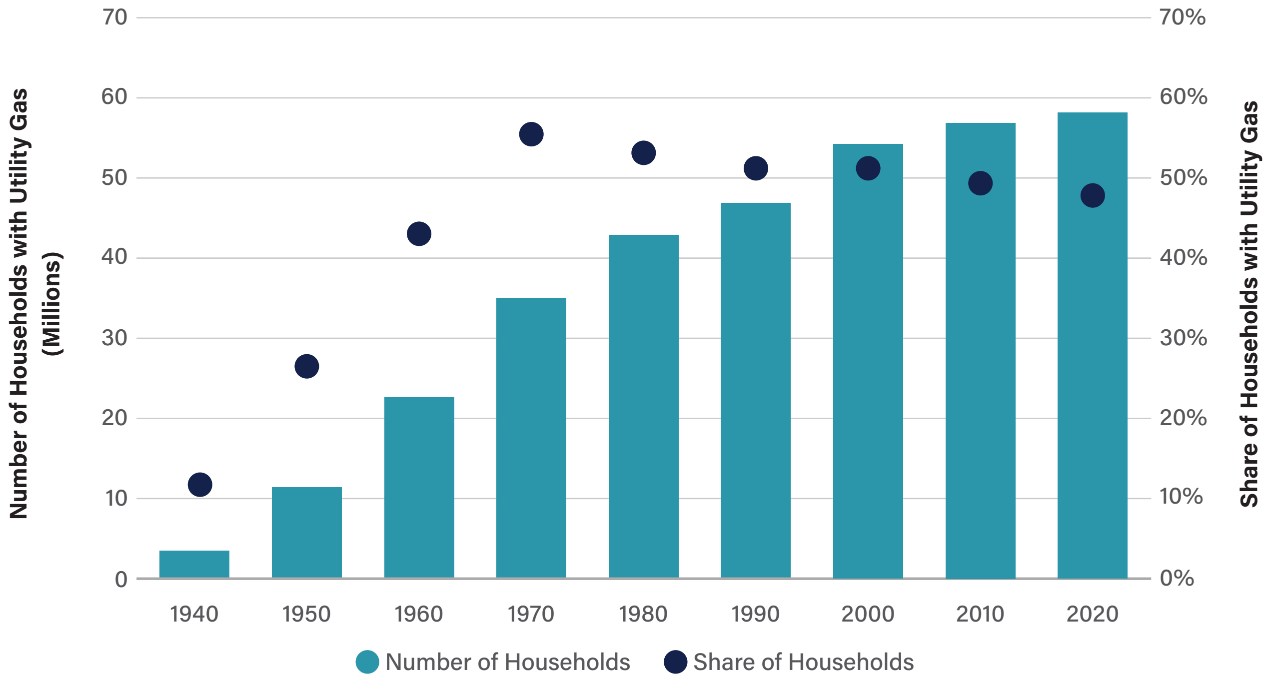


Figure 1.2. Households with gas in the United States. Source: U.S. Census Bureau.[6, 7]

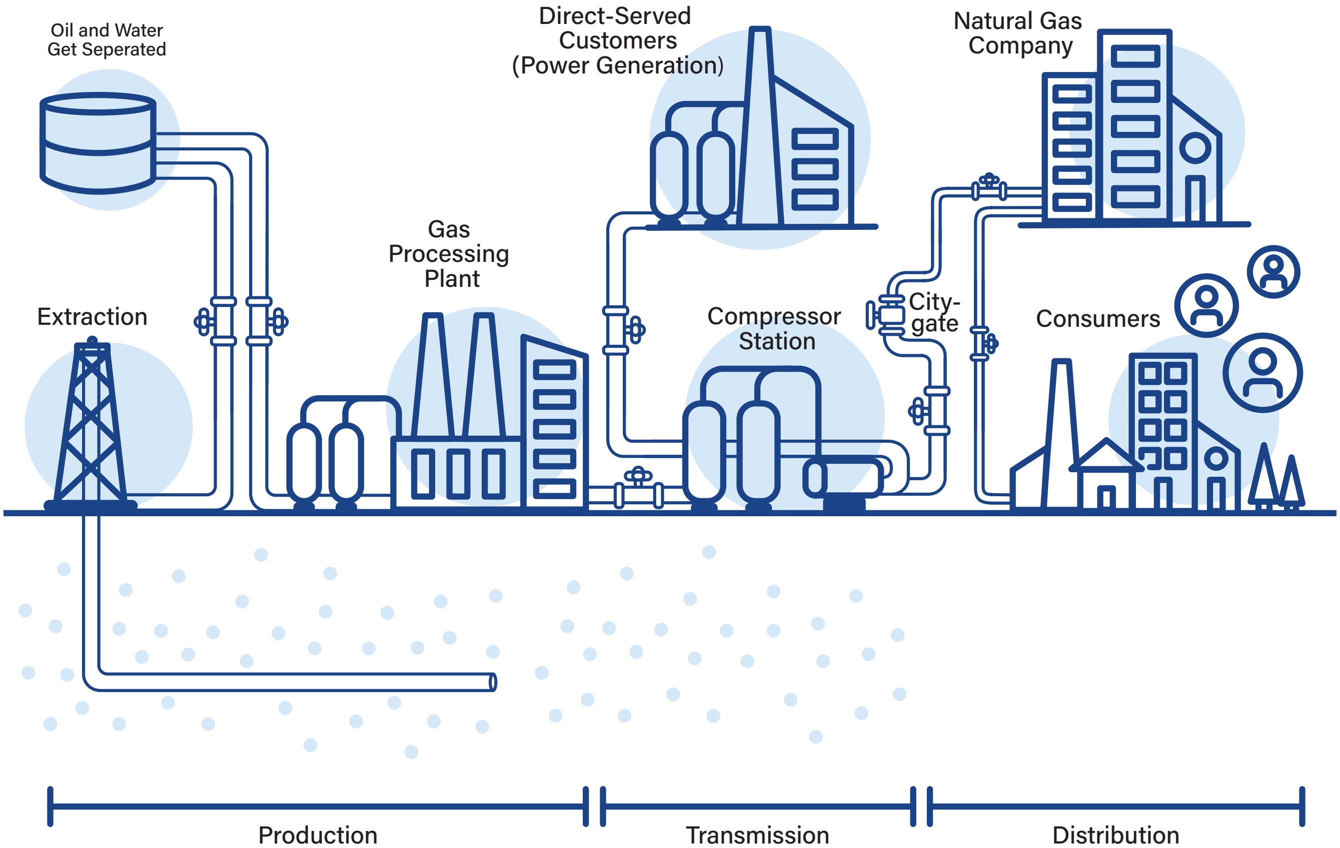
The early days of gas saw a smattering of locally-owned and largely independent companies, many operated as municipal utilities. By the late 20th century, corporate consolidation gobbled up most small operators, with multiple companies merging or being acquired by a larger entity. Trying to be competitive with other fuels to obtain new customers, these companies kept reinvestment low, delaying the modernization of century-old pipes.

New technologies like hydraulic fracturing and horizontal drilling, which unlocked an unprecedented glut in gas and low energy prices, marked the early 21st century. Gas was established as a desired home heating product—coveted for low prices and buttressed with the allure of 'better' cooking with gas. Gas' dominance went unchallenged even as cities were first beginning to understand their role in averting climate change.

The evolution of the gas system over the past two centuries has resulted in a complex and deeply entrenched infrastructure that powers modern America. As cities seek to transition to cleaner, safer, and more sustainable energy sources in the face of the climate crisis, the gas system presents its own challenges.

6 U.S. Census Bureau, Historical Census of Housing Tables: House Heating Fuel.
7 U.S. Census Bureau, American Community Survey Table B25040: House Heating Fuel.

Figure 1.3 Gas System Infrastructure



Gas is extracted from the ground at wells and production sites. From the drilling site, raw natural (fossil) gas is processed to separate out methane from other hydrocarbons—propane and butane—as well as other impurities. The methane is then transported through a network of high-pressure steel pipelines with compressor stations along the way to maintain flow and pressure, as illustrated in Figure 1.3.

Utilities come into the picture at the "city-gate," when the methane is delivered to local distribution companies (LDCs). From the city-gate, regulator stations perform a number of functions for safety, such as lowering the pressure, and adding a strong smell to the naturally odorless gas to help with leak detection. Gas enters the local distribution system and travels through a network of pipes, also called "mains." Individual consumers receive gas from pipes that connect the main to the building and meter. From here gas is distributed through pipes in the buildings to its end use.

Gas Leaks and Leak-Prone Pipe Modernization

From the fossil gas well, to the pipes and equipment transporting it, to its end use, gas is bound to leak. This has three major implications:

- **For our climate:** Methane is a short-lived but potent greenhouse gas, and fugitive methane emissions from fossil systems are estimated to contribute to approximately 5% of greenhouse gas emissions.[8] Much of this occurs during fossil fuel extraction, but older pipeline systems can be significant contributors to local emissions.[9]

8 AR6 Climate Change 2022: Mitigation of Climate Change — IPCC.
9 Sargent, M. R. et al. Majority of US urban natural gas emissions unaccounted for in inventories. Proceedings of the National Academy of Sciences 118, e2105804118 (2021).

- **For our safety:** Methane gas is explosive. Leaks at the gas well can be large, but pose a small risk. Leaks in the city and individual homes on the other hand, can be deadly and destructive. Federal regulation[10] defines the standards for monitoring and ensuring safe operation of production, transmission, and distribution equipment. These rules are typically enforced on utilities by state public utility commissions (PUCs). For pipes and equipment in buildings, the gas code[11] is an industry-designed code that is adopted, sometimes with amendments by states. Municipal inspectional services offices enforce this code when on construction or renovation of gas systems.
- **For our personal and environmental health:** Indoor leaks are relatively common and include a number of carcinogenic compounds.[12] Outdoor leaks have also been linked to tree death.[13]

The management of gas distribution, and "behind-the-meter" or indoor leaks, is most relevant to cities. A century of urban activity above has stressed cast iron pipe below leading to fractures. Joints between these pipes were sealed with moistened fiber. After the wet manufactured gas—which kept the fiber moistened and sealed—was replaced with dry methane gas, these joints dried out and cracked. Methane evolves from regulators, meters, poor connections in building pipes, and during the ignition cycling in gas equipment.

The amount of methane leaked can be considerable. For example, the Boston system is estimated to lose 2.5% of the gas consumed, with a significant portion of those losses evolving from behind-the-meter.[14] No entity, to our knowledge, has presented a plan for addressing these leaks that occur indoors.

10 Largely overseen by the Pipeline and Hazardous Materials Safety Agency (PHSMA)
11 2024 National Fuel Gas Code. American National Standards Institute. ANSI Z223.1/NFPA 54
12 Michanowicz, D. R. et al. Home is Where the Pipeline Ends: Characterization of Volatile Organic Compounds Present in Natural Gas at the Point of the Residential End User. Environ. Sci. Technol. 56, 10258–10268 (2022).
13 Schollaert, C., Ackley, R. C., DeSantis, A., Polka, E. & Scammell, M. K. Natural gas leaks and tree death: A first-look case-control study of urban trees in Chelsea, MA USA. Environmental Pollution 263, 114464 (2020).

A sense of urgency around safety and climate sparked an effort to modernize distribution system pipes to mitigate leaks. Modernization involves replacing old pipe with newer modern pipe—a disruptive labor and materials-intensive process that requires trenching through city streets. In 2005, there were approximately 110,000 miles of high risk cast iron and leak prone pipe.[15] By 2024, that number was cut roughly in half by modernization efforts.

Gas utilities make money for their investors by charging customers a rate of return on such capital projects. The projects and rate of return are regulated by state public utility commissions. For a period of time when other fuels were more competitive, utilities had to balance the impact of such investment on rates with that competition. The recent period of low gas supply costs have allowed utilities to profit from modernization projects while still being financially competitive.

However, studies suggest that such programs have not been effective in reducing emissions. For example, measurements of atmospheric methane fluxes have shown that despite six years of accelerated leak-prone pipe replacement in the Boston metro area, fugitive methane emissions have remained unchanged.[16] Further, utility, state, and municipal inventories likely underestimate actual emissions.

Pipeline modernization projects come at a significant cost with replacement costs easily reaching tens of thousands of dollars per connected building—sometimes enough to pay for the electrification of single family homes. Because such projects lock in infrastructure for decades, pipeline modernization is an increasing challenge for regulators who have to balance cost, climate considerations, safety, reliability, and equity.

Gas Utility Regulation

Several types of utility models exist in the U.S., including investor-owned (the vast number), municipal, and cooperative gas utilities. Investor-owned gas utilities, as natural monopolies, face regulation to ensure safe and affordable service delivery. Each state operates a Public Utility Commission (PUC) or an equivalent legal body tasked with regulating investor-owned gas utilities (the commissioners are either elected by the public or appointed by the governor).[17] Understanding the decisions these regulatory bodies make, what influences them, and how to engage is key for city leaders wishing to make progress on their decarbonization strategies.[18] Despite variations across state law, several core principles universally apply (Table 1). One of the primary responsibilities of these commissions is ensuring the safety and reliability of the gas distribution system and overseeing the finances of the utility with an aim to minimize costs incurred on consumers.

This financial regulation is known as "cost-of-service ratemaking." Cost-of-service ratemaking is a methodology where utilities formally request PUC approval to set rates that cover their operational and capital expenditures. This process grants state commissions the authority to determine which expenses are "just and reasonable" for the utility's efficient operation.

These deliberations occur during rate hearings, which are open to public participation, allowing stakeholders—including city governments—to intervene and present their views. Cities can be powerful advocates as significant gas consumers in this way, but it is important to note they do not possess direct legal authority over the rate-setting. Nevertheless, their involvement can help ensure that the rates set reflect the public interest.

14 Sargent, M. R. et al. Majority of US urban natural gas emissions unaccounted for in inventories. Proceedings of the National Academy of Sciences 118, e2105804118 (2021).

15 PHMSA, Cast and Wrought Iron and Bare Steel Inventories https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/cast-and-wrought-iron-inventory. https://www.phmsa.dot.gov/data-and-statistics/pipeline-replacement/bare-steel-inventory

16 Sargent, M. R. et al. Majority of US urban natural gas emissions unaccounted for in inventories. Proceedings of the National Academy of Sciences 118, e2105804118 (2021).

17 Jessie Ciulla, Dan Cross-Call, Cory Felder, Rachel Gold, and Aaron Schwartz, The People Element: Positioning PUCs for 21st-Century Success, RMI, 2022.

18 Local Government Engagement with Public Utility Commissions Mini Guide, prepared by Kelly Crandall and Jake Duncan, Institute for Market Transformation for the National Council on Electricity Policy, 2019.

In recent years, the responsibility of PUCs has expanded to include direct or partial responsibility for climate goals.[19] This expansion into the oversight of a complex transition is a particularly difficult challenge when considering commissions' own limitations of staffing size. The commissions often have to depend on the information provided by gas utilities to make their decisions, and the information asymmetry can cause gaps in oversight.

For the past several decades, PUCs have by and large lightly regulated the gas industry, choosing to encourage its growth to lower customer costs and reduce reliance on dirtier and less efficient heating sources. With new alternatives and the imperative to eliminate greenhouse gas emissions, PUCs are entering a new paradigm that will require them to take a more active role in regulation. Some utilities may be more collaborative in responding to this change, while others may block progress. Given the goals and placement of cities, municipalities will likely have an elevated role in facilitating more active PUC regulation to the benefit of customers.

Table 1.1 Gas Utility Regulation

Regulatory Area	Federal	State	City
Safety & Reliability	The Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety is responsible for regulating gas transmission pipes.	Most states assume safety authority from PHSMA over gas pipes via public utility commission (PUC) regulation of gas utilities.	Inspectional service departments oversee the implementation of the gas code. Cities coordinate with states and utilities on permitting coordinating pipeline safety projects, and provide first responders to emergencies.
Economic Regulation	The Federal Energy Regulatory Commission (FERC) oversees interstate pipelines, gas energy markets, and related cross-state gas infrastructure.	PUCs are responsible for regulating gas distribution companies' investments, costs, and tariffs. Recent years have seen an increase in direct and implied authority to regulate utility operations with respect to climate and equity.	Cities often grant franchise agreements to gas utilities, giving them the exclusive right to provide gas services within the city's jurisdiction. These agreements typically include terms related to service quality, pricing, infrastructure maintenance, and other regulatory requirements.

19 Transforming Utility Regulation to Achieve Climate Goals

The Future of Gas

The new paradigm is emerging for three key reasons:

- Managing aging gas infrastructure is increasingly costly for ratepayers. Future modernization spending on its own could double gas delivery tariffs in some utility territories.
- The gas system faces unprecedented competition from alternative technologies, including heat pumps, induction stoves, and other electric appliances. These technologies don't necessarily need to cost less upfront or to operate at a lower cost to be beneficial to the customer and disruptive to utility gas' market share. However, they will start to look more advantageous if gas rates rise.
- The imperative to reduce greenhouse gas emissions is catalyzing action at the federal, state, and consumer levels to move customers away from fossil gas.

Figure 1.4 illustrates the implications of these forces. They will place downward pressure on utility gas consumption and customer counts. To maintain financial solvency in a shrinking market, utilities will need to raise rates. Such rate increases will further incentivize customers to leave the system. The era of cheap gas will come to an end in the coming years as many jurisdictions will experience this transition.

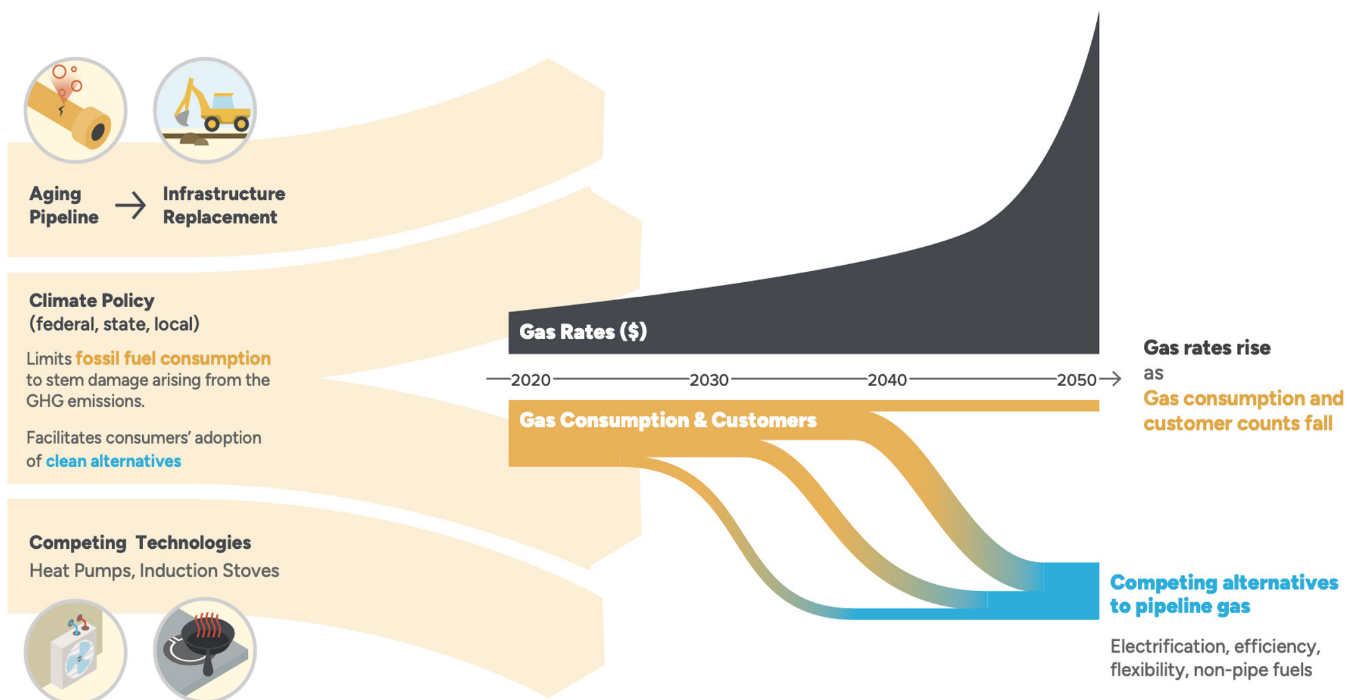


Figure 1.4. Causes and Effects of the Self-reinforcing Negative Feedback Loop on Gas Utilities and Their Ratepayers.[20]

This will have significant consequences for all ratepayers and especially low-income households and renters that face higher barriers to leaving the gas system. The unfortunate reality is that middle and higher income households benefited from gas' expansion into the suburbs, subsidized by all ratepayers. Now these households are likely to depart the gas system at a faster rate, due to new incentives like rebates for electric appliances courtesy of the Inflation Reduction Act. Though many of these electrification benefits may be unavailable to renters who rely on landlords to make improvements.

20 Walsh, M. & Bloomberg, M. *The Future of Gas in New York State.* Building Decarbonization Coalition (2023).

Utility decarbonization proposals will only exacerbate the challenge. First, their proposal to replace fossil methane with alternative gases such as hydrogen and renewable natural gas feature immense scaling challenges and will significantly increase gas supply costs, further incentivizing customers to reduce their gas use. Second, many utilities have acknowledged that gas use needs to decline, but that gas should serve a backup role to partially electrified buildings. This only works if the utility can maintain current customer levels—many customers will find ways to get off of gas to advantage themselves under such an arrangement. Finally, gas utilities emphasize the value of customer choice, but again for the gas system to remain financially viable, customers cannot choose to leave it. For a thorough, critical evaluation of these utility proposals, refer to the Appendix A. Ultimately, these proposals fail to fully grapple with the needs of decarbonization[21] and the future disruption to the gas system.

Recognizing the challenge ahead, 14 states and D.C. have launched formal "Future of Gas" proceedings to seek answers for how gas utilities can comply with emissions reduction mandates and manage the impacts of the transition (see Figure 1.5). These proceedings serve the purpose of anticipating technology advancements, addressing climate change and environmental concerns, ensuring energy security and reliability, promoting customer protection and affordability, engaging stakeholders and public input, and facilitating long-term planning and investment.

Cities have an important role to play in this transition, especially those impacted by leak-prone pipe and large customer shifts. Local governments can play a more proactive part in overhauling the gas system, seeking out opportunities for increased management, finding cost savings, and ensuring equitable outcomes.

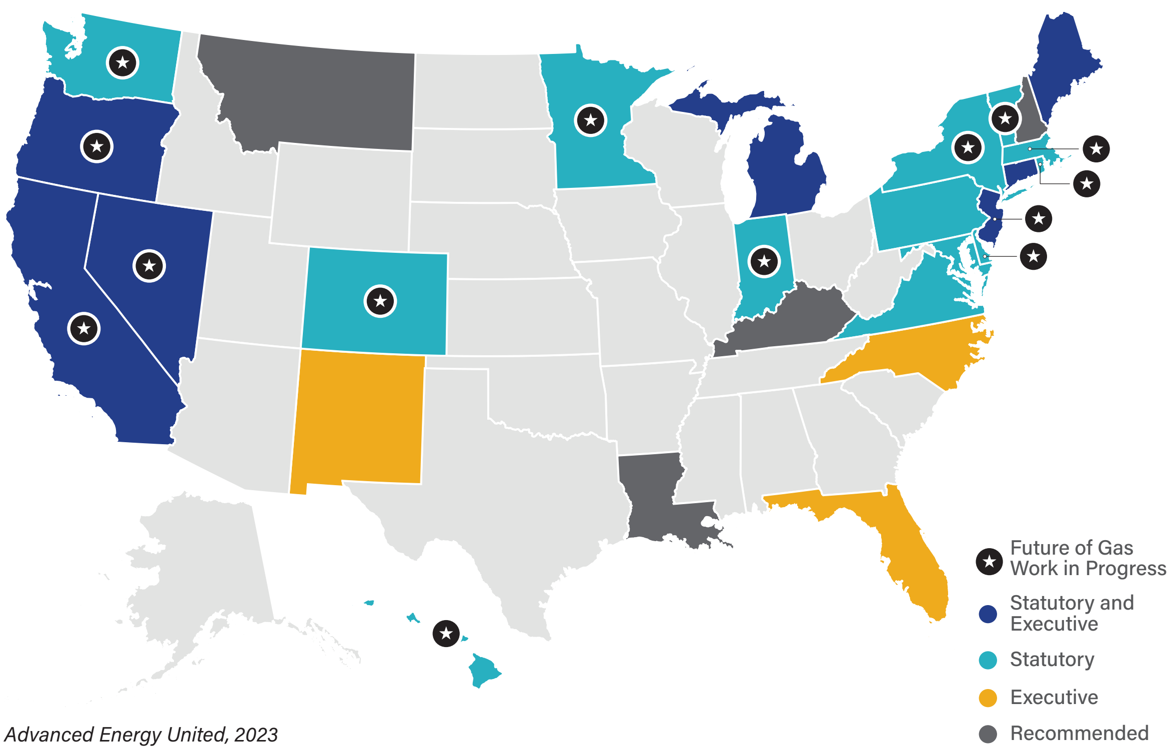


Figure 1.5: States with Economy-Wide Greenhouse Gas Emissions Targets and Future of Gas Work in Progress[22]

21 Renewable natural gas, for example, is largely considered to be a counter-productive decarbonization strategy due to scaling challenge, biomass consumption (which can also be a source of GHGs), methane leaks, and higher value uses of feedstocks.

22 Advanced Energy United.

Section 2

Strategy and Tools for Cities to Move Beyond Gas

Section 2: Strategy and Tools for Cities to Move Beyond Gas

Moving beyond gas may seem daunting, even if it is necessary to meet climate goals. The core challenge of the transition lies in the sprawling and interdependent nature of the gas distribution system and gas-equipment in buildings.

Where a leaky pipe serving a neighborhood is reaching its end of life due to safety concerns, a fair number of the houses in that neighborhood may have recently installed gas equipment. Ending service on that street to avoid the high cost of replacing the pipeline, would strand many assets, some of which may have been subsidized. Replacing that pipeline, but then steadily electrifying homes over time, would eventually strand the gas asset.

Customers, utilities, and regulators are subsequently stuck in situations with significant tradeoffs in terms of cost and effort. The scale and implications of these tradeoffs necessitates increased management of gas infrastructure. State regulators, gas utilities, and electric utilities will play a prominent and driving role, but cities and municipalities can be key players in facilitating and enabling more effective coordination, especially with customers.

This section begins with defining three key pillars of an effective and equitable managed transition beyond gas in Table 2.1. It then examines the tools cities have to implement them in the subsections below.

Table 2.1 - Pillars of a managed transition and municipal authorities

Managed Transition Pillar	Why it Matters	Tools
Halt gas system expansion	New gas pipes and gas-reliant buildings lock customers into fossil fuels for decades, placing them at risk of burdensome future compliance costs. For many building types, all-electric new construction has achieved effective cost parity.[23] The cost of a new gas connection is often subsidized by the utility. If the utility fails to recoup its subsidy from the new connection, ratepayers may be subject to higher costs.	New construction codes Zoning Electric and efficient building incentives and stopping new gas subsidies
Limit reinvestment in the gas system	Reinvestment in gas assets is becoming more expensive, at a time when there are increasing avenues to move beyond gas. Such assets can include pipelines and other distribution infrastructure, as well as furnaces, boilers, and other building appliances.	Emissions goals and regulation Equipment replacement interventions Gas system investment planning
Strategically downsize the gas distribution system	Decarbonization requires a shift away from gas, however an unmanaged exodus of customers threatens the financial and operational viability of the gas system. Long-term planning for the coordinated cessation of service will be needed to manage costs, advance emissions reductions, and ensure operational safety.	Develop scalable alternatives such as coordinated electrification, district energy Future of gas planning that sets timelines for transitioning parts of the system Regulatory financial and risk management of a system in transition.

23 Walsh, Michael J. New Construction and the Future of Gas in Massachusetts. ZeroCarbonMA. February 2024.

Broadly speaking there are eight areas where cities can support each of these pillars to manage the transition beyond gas. Every city varies in its specific powers and state law, and they have to work within their existing legal framework. Cities also have to navigate powers they share with the state, or face limits in areas they lack legislative authority in.

City Powers for Implementing a Managed Transition

1

City Staffing and Programming

Many cities have built up their climate and sustainability planning, programmatic, and staff capacity for over a decade. They have largely focused on understanding a city's climate footprint and working on where they can trim emissions. Cities can expand the mandate of such offices to focus on facilitating the transition beyond gas with staffing and programming aligned with the three pillars of a managed transition. These offices should be able to work across several areas of municipal power such as policy and program development, stakeholder engagement, and cross-jurisdictional policy advocacy as described herein.

Case Study: City of Denver's Climate Action, Sustainability, and Resilience Office

Recognizing the need to meet its ambitious climate and sustainability targets and transition away from fossil gas, Denver, CO has been growing its Climate Action, Sustainability, and Resilience Office. Supported largely by a city climate protection fund, which dedicates more than $40 million to climate action annually, Denver has been able to launch programs like Energize Denver—establishing partial electrification requirements for all existing commercial and multifamily buildings when replacing gas-fired space and water heating and cooling equipment.[24] With a dedicated team of staff focused on implementation, Energize Denver represents the city's proactive stance toward electrification and reducing reliance on gas.

2

Voluntary Leadership

Early action is essential for building awareness and understanding of gas alternatives in new construction and retrofits.

One way to demonstrate leadership is showcasing fossil-free buildings through municipal property, including their public housing portfolio. For financing such projects, cities can educate lenders and rating agencies on the future risks associated with gas-powered buildings to lower financing costs for all-electric construction. Cities can also promote voluntary leadership among universities, cultural institutions, and companies to demonstrate strategies to move beyond gas.

Case Study: *Municipal Building Decarbonization in Saint Paul, Minnesota*

Saint Paul, Minnesota is demonstrating voluntary leadership in reducing emissions from its municipal buildings as part of its ambitious Climate Action & Resilience Plan, which calls for carbon neutrality across all buildings by 2050. While municipal emissions represent only about 2% of the city's carbon footprint, Saint Paul sees greening its own buildings as an essential foundation for engaging private sector and institutional leaders. To finance these voluntary initiatives, Saint Paul is leveraging federal grants, utility incentives, and its own green revolving loan fund. The

24 City of Denver Equipment Replacement Code Changes

city is also exploring new funding and financing strategies enabled by the Inflation Reduction Act, which offers direct pay provisions that could cover 30-40% of clean energy project costs for municipalities. By walking the talk in its own facilities first, Saint Paul is demonstrating the feasibility and benefits of electrification, while also positioning itself as a credible and proactive leader in the broader community-wide transition off fossil fuels. Ultimately, Saint Paul's voluntary municipal building initiatives are jumpstarting momentum and building technical capacity for retrofitting other public and private facilities with cleaner, more efficient technologies.[25]

Data Collection

Improved data collection by cities is a powerful but overlooked tool in managing the transition.

Nearly 50 cities and seven states have developed energy or emissions disclosure and benchmarking ordinances in which large building owners report energy usage and associated emissions.[26] These have helped building owners to understand their climate impact and begin to take action in areas like energy efficiency. However, this type of self-reported data collection can be prone to errors[27] and access to whole-building consumption data from utilities can be limited.

The usefulness of this data is also limited by the fact that it focuses on emissions and not the systems that generate emissions. Cities should take steps to collect data for more actionable information, such as the heating equipment, its age, and other relevant energy information about buildings. For residences, the Home Energy Score program[28] offers a comprehensive framework for data collection for residential buildings.

Such collection can occur via expanded self-reporting in emissions disclosure filings or through the use of existing mechanisms such as property assessment and building permitting. This could include information on the state of building energy equipment (e.g., gas furnace efficiency, heat pumps, heating system age, capacity of solar panels, electric panels), data that will be useful for targeting future interventions.

City planning departments can create energy resource maps that identify areas of potential high energy demand or energy production to support innovative and efficient technologies. These technologies include geothermal, open water, waste heat, and opportunities for networks to share energy resources. Publicly available information of this kind would support developers in identifying gas-free heating strategies.

Case Study: Portland's Home Energy Score

Portland OR, requires single family home sellers to conduct a home energy assessment to obtain a Home Energy Score.[29] It is a metric and report developed by the U.S. Department of Energy to evaluate a building's physical properties and energy performance, including information about the home's heating fuel. Reports are then uploaded to a publicly accessible database.

25 *St. Paul, Minnesota sees city buildings as an opportunity for quick wins on climate plan goals*, Midwest Energy News. January 5, 2024
26 Comparison of U.S. Commercial Building Energy Benchmarking and Transparency Policies, 2023.
27 Flaws found in Boston's BERDO carbon emissions data - Boston Business Journal. 2/12/22.
28 Better Buildings Initiative. Home Energy Score.
29 City of Portland. Home Energy Score. (2022)

Case Study: New York City's Geothermal Potential Map

By leveraging their permitting, land use, and property assessment databases, cities can develop granular profiles of their building stock and energy infrastructure. New York City developed a comprehensive geothermal potential map that assesses the feasibility of installing different types of geothermal systems across all five boroughs. The map was created through a detailed analysis of building thermal loads, available outdoor space for drilling, and the potential ground thermal capacity accessible at each lot. Now building owners, developers, and policymakers have more data to assess the potential for geothermal across the city. Beyond the specific findings, New York City's approach to data collection and mapping demonstrates the important role that cities can play in facilitating the transition away from gas.

4

Building Codes and Code Enforcement

Building codes are rules that specify how buildings should be built and changed. More specifically, building energy codes influence how much energy is consumed by a building, while gas and electric codes specify the practices that ensure energy is delivered to buildings in a safe and reliable manner.

Codes are most influential in new construction, but can also influence intervention points such as major renovations, points of sale, and equipment replacement. City inspector offices enforce the code through permitting and inspections.

States typically set these codes by adopting and amending model codes, the majority of which are created by the International Code Council (ICC). This hierarchy is largely set by federal law.[30] Cities typically have significant authority over enforcement of building codes, but are only able to adopt codes in a handful of states. Despite this, cities may influence the code through participation in state-level adoption processes or ICC's code development cycles. At the state level, cities can submit amendments to the code adoption body for consideration and participate in code hearings in support of electrification. City involvement in ICC code development processes, such as through committee membership, offers a unique opportunity to support the advancement of electrification aspects within the model code that align with decarbonization commitments.

Some states (MA, IL, RI, CA, VT, NY) have adopted stretch energy codes that cities can opt into to go above and beyond the requirements of the base code. Recent iterations of these codes have favored electrification by setting more stringent performance ratings and requiring new buildings to be prewired for electrification. Adopting stretch codes is a practical step for cities that have the option available to them.

Case Study: Brookline's Attempted Building Code Reform

Cities face an uphill battle in more ambitious uses of building codes. They have run up against what is allowed or preempted by state law. For example, the town of Brookline, Massachusetts has twice tried banning fossil fuel infrastructure in new buildings, in 2019 and 2021. The 2019 ordinance attempted to use the town's building code enforcement mechanisms, while the 2021 ordinance focused on the town's zoning authority.[31] The state's attorney general deemed both unlawful, on

30 The federal government grants code adoption powers to the state, but states can allow local governments to adopt codes if they choose. For energy codes, federal law requires that states review the new ones that come out, but there is not a lot of enforcement on the follow-through.

31 "Brookline Tries Again For A Fossil-Free Future | WBUR News." June 3, 2021

the grounds that they were preempted by state law. That doesn't mean Brookline's ordinances had no effect. They influenced a pilot program enacted by the Massachusetts Legislature to allow 10-municipalities to pilot fossil fuel free building code. Brookline was accepted into the program and as of the writing of this report (spring 2024) has begun implementation.

5

Zoning Codes

Zoning is a power granted to municipalities to regulate land use and development across areas of a city. Zoning powers can vary greatly, but broadly aim to ensure that new development is beneficially integrated into the city landscape. For example, zoning is becoming an important tool for managing climate adaptation to sea level rise and increased flooding.

Like building codes, zoning could be used to incentivize electrification. For example, zoning codes might allow an all-electric building to build higher and at greater density. More ambitiously, zoning codes could drive low-carbon heating networks or districts. City powers here vary, with larger cities typically having more delegated authority and staff capacity to influence new construction. There is also the risk that aggressive use of zoning codes could face the same preemption obstacles that cities face trying to act via building codes.

Case Study: Baltimore's Zoning Incentives for Green Building and Sustainability

Baltimore, MD exemplifies how a city can use its zoning authority to incentivize building decarbonization as part of its broader climate action efforts. The city's new green Baltimore Zoning Regulations promote the adoption of clean energy technologies and clean building practices in the Downtown Towson District. It encourages new developments in the District to be designed to either LEED or the National Green Buildings Standards, though compliance is not mandatory.[32] However, developers must provide preliminary information to a design review panel regarding sustainability parameters, signaling the city's expectation that projects will strive for high performance. By integrating sustainability incentives into the zoning code, rather than the building code, Baltimore navigates preemption issues while still influencing building design. Zoning grants Baltimore flexibility to include language that encourages, without mandating, consideration of electric technologies. It's an approach that other cities, especially those in states with strong preemption laws, could emulate.

6

Property, Health, Safety, and Air Quality Powers

Cities often have various oversight powers over property, health, air quality, water, and public safety. The degree of powers vary widely with larger cities typically having more delegated oversight of these areas.

Notably, city air pollution control powers have led to the development of energy benchmarking and emissions disclosure ordinances[33] largely focused on existing buildings. The first generation of these involved regulating buildings over a certain size—often the disproportionately largest sources of emissions in a city. Operators of larger buildings reported emissions from their energy sources (gas, electric, steam, delivered fuels).

32 Green Zoning: Using Local Zoning to Achieve Community Energy Efficiency and Resiliency - Northeast Energy Efficiency Partnerships, 2019.

33 Annotated Model Ordinance Language for a Policy to Improve the Performance of Existing Buildings. (2018). City Energy: A Joint Project of NRDC & IMT

As of April 2024, eight local governments and another four states plus DC have built on these to establish performance standards in which building operators would have to reduce emissions over time to align with a city's climate targets. These ordinances are generally flexible, providing avenues for compliance via alternative compliance payments.[34] Traditionally they have failed to directly address gas use (instead grouping electricity, steam, and gas into one bucket), allowing for early compliance through the purchasing of renewable energy certificates (RECs). This risks deferring important decisions on gas infrastructure. Future iterations can emphasize a transition off gas at key intervention points.

There are another 125 cities and counties across the country that have adopted policies that require or encourage the move off fossil fuels to all-electric homes and buildings. These policy solutions include the building code amendments and building performance standards mentioned here, as well as stakeholder engagement processes that prioritize the needs of low-income and historically marginalized communities.

Case Studies: Berkeley and New York City Approaches to Regulating Gas in New Construction
There are a few examples of cities using these powers to regulate gas in new construction. For new buildings, the City of Berkeley, California adopted an ordinance[35] explicitly prohibiting the hook up of new gas services under the City's Health and Safety code in 2019. It was the nation's first test case of a so-called "gas ban". In March 2024 Berkeley agreed to repeal its ordinance as part of a settlement to end litigation. The federal Ninth Circuit Court held that the ban was preempted by the Energy Policy & Conservation Act, overturning a ruling by the district court that argued otherwise.

In New York City, Local Law 154 (2021) took another approach, but faces similiar challenges. The city used an air emissions standard to block new buildings from combusting a fuel greater than a specified carbon intensity. It phases in over several years while allowing some exemptions for several commercial building classes and industrial facilities. New York state, meanwhile, has begun to implement its All Electric Buildings Act. Both city and state laws face lawsuits that claim the Energy Policy and Conservation Act preempt them.[36]

7

Utility Regulatory Engagement
Cities have an important role to play in advocating for the public interest in state utility regulatory proceedings. By intervening in key dockets before the public utility commission, cities can push for decisions that align with climate goals and protect ratepayers from the long-term risks of gas.

When gas utilities seek approval to expand their distribution systems to serve new customers, cities can argue that such investments are counter to climate goals and not in the best interest of ratepayers. Building out new gas infrastructure locks in fossil fuel dependence for decades to come and risks saddling ratepayers with excess costs as gas users shrink. Instead, cities can make the case for non-pipeline alternatives, such as geothermal systems or high-efficiency heat pumps, that provide reliable heating without the carbon emissions.

34 Alternative compliance payments can connect to building size, can be on an absolute energy or GHG basis, can taper depending on the level of improvement a building achieves by the end of a performance period, or can correspond with the property's assessed value. The payment amount must be high enough to create an incentive to comply by meeting the standards rather than making the payment. EPA BPS Overview for State and Local Decision Makers:
35 Ch. 12.80 Prohibition of Natural Gas Infrastructure in New Buildings | Berkeley Municipal Code
36 February 2024 Updates to the Climate Case Charts | Sabin Center for Climate Change Law (columbia.edu)

Another key opportunity for intervention is in state proceedings related to the future of gas and heat.[37] As states grapple with how to decarbonize their building sectors, cities can provide testimony and comment. By sharing their own experiences and data on electrification, cities help build the case for strong electrification policy. Cities can also play the role of consumer advocate, arguing for provisions that protect low-income ratepayers.

Finally, cities should closely scrutinize gas utility integrated resource plans (IRPs) where they exist. These relatively new planning proceedings lay out utilities' long-term projections for gas demand, infrastructure investments, and revenue needs over the coming decades. Cities can challenge overly optimistic assumptions about new customer growth and argue that utilities are underestimating the pace of electrification. They can also push for gas IRPs to include more robust consideration of non-pipeline alternatives and scenarios for strategic decommissioning of gas assets. By poking holes in utility projections and highlighting the risks of continued gas investment, cities can build pressure for a change of course.

A summary of engagement opportunities that cities could utilize along with arguments they might make and examples to reference is included in Appendix C: Regulatory Filings and Engagement Opportunities.

Case Study: Equity-driven Coalition of Minnesota Cities to Participate in Utility Planning
In Minnesota, the City of Minneapolis spearheaded an initiative to influence Xcel Energy's Upper Midwest Integrated Resource Plan with a focus on equity and climate action. Minneapolis aimed to shape the utility's strategies in alignment with its climate commitments and racial equity objectives. Traditionally dominated by industry insiders, utility resource plans lack broad community participation, neglecting the perspectives of marginalized communities disproportionately affected by energy-related injustices. To address this, the city collaborated with partners to facilitate workshops for local governments, resulting in a coalition of 38 cities and counties advocating for equitable utility planning.[38] This coalition emphasized the importance of considering local government carbon reduction and energy goals in utility planning, aligning diverse interests towards a common objective. Such initiatives reflect a trend toward broader participation in utility regulation, and the consideration of equity and climate considerations in commission decision-making.

Case Study: City of Eugene's Input into Oregon's Utility Sector Emissions Reduction Plan
The City of Eugene submitted comments to the Oregon Public Utility Commission (OPUC) in October of 2020 regarding the draft work plan for Executive Order 20-04, which establishes science-based greenhouse gas emissions reduction goals from state agencies and commissions, including the state's investor-owned utility sector. Eugene highlighted two specific areas for additional input: actions related to the natural gas sector and engagement efforts with impacted communities. They emphasized the importance of reducing natural gas usage in alignment with local climate goals and urged collaboration between the OPUC and local governments. Additionally, they proposed strategies to accelerate energy efficiency, explore non-pipe approaches, promote electrification, and slow the expansion of natural gas infrastructure. The City underscored the significance of engaging impacted communities and suggested establishing a committee to provide input and enhance capacity-building efforts.[39] Cities could learn from

37 Building Decarbonization Coalition. Future of Gas Proceedings in the U.S. (rev. Mar. 2024).
38 In Pursuit of Equitable Clean Energy: The Power of Coalitions for Utility Regulatory Transformation, Institute for Market Transformation, 2021.
39 Oregon Public Utilities Commission Executive Order 20-04 DRAFT Work Plan - City of Eugene Comments

Eugene's example by actively engaging with utility regulators, providing detailed input on regulatory plans, and fostering collaborative relationships to drive progress toward an efficient and equitable gas transition.

8

Franchise Agreements

Another important tool for cities to influence the future of their gas systems and accelerate the transition to cleaner alternatives is franchise agreements. Franchise agreements are contracts negotiated between a city and a utility that grant the utility the right to use public spaces to deliver energy services to local residents and businesses, in exchange for certain conditions and fees. These agreements are periodically renegotiated, typically every 10-20 years, giving cities a window of opportunity to reassess their energy priorities and push for reforms.

Historically, franchise agreements have focused primarily on issues like service reliability, infrastructure maintenance, and the utility's use of public rights-of-way. However, as more cities set ambitious climate goals and seek to phase out fossil fuels, there is growing interest in using franchise agreements as a tool to drive utility alignments with decarbonization objectives. Cities could seek to include provisions in future franchise agreements that:

- Require the utility to develop a detailed plan for gas system decommissioning and transition to clean energy alternatives, with specific timelines and milestones.
- Set limits on utility spending for gas system expansion or repairs, and require the utility to prioritize non-pipeline alternatives and electrification investments.
- Establish a mechanism for the city and utility to jointly plan for neighborhood-scale building electrification and gas system pruning.
- Create incentives or requirements for the utility to support energy efficiency, heat pump deployment, and building retrofit programs, particularly for low-income residents.
- Allow for the creation of a city-administered decarbonization fund, financed by the utility, to support local clean energy projects and workforce development.[40]

Embedding such provisions in franchise agreements creates a legal framework and financial incentives for utilities to actively participate in the energy transition. Additionally, the negotiation process allows for community engagement, enabling city leaders to gather input on energy priorities and concerns. However, challenges exist, including state limitations on franchise agreement scope and utility resistance to restrictions impacting legacy gas infrastructure investment and profitability, potentially affecting ratepayers.

Despite these challenges, franchise agreements are becoming a critical focus for cities navigating the transition away from gas. By prioritizing decarbonization in negotiations, cities can accelerate the shift to clean energy, foster resilience, and promote equity in their energy systems.

40 Equitable Funding Mechanisms for Climate Action in Minneapolis paper

Case Study: Ann Arbor Sustainable Heating Franchise

In March 2023, the Ann Arbor City Council passed a resolution directing the City Administrator to begin negotiations with DTE Energy and other interested providers to facilitate a transition of heating services to renewable, sustainable, and cleaner energy sources.

The city has a unique opportunity to negotiate with DTE because its current franchise expires in 2027. During negotiations, Ann Arbor aims to secure commitments from its heating utility to develop detailed plans for gas system decommissioning, prioritize non-pipeline alternatives and electrification investments, support neighborhood-scale energy planning, and assist low-income residents with building retrofits.

Ann Arbor's approach is notable for centering the franchise agreement as a key leverage point for advancing building decarbonization and energy democracy. By proactively engaging residents and stakeholders to identify priorities for the new franchise, the city is building a strong public mandate for a swift and equitable transition off of fossil gas. If successful, Ann Arbor's Sustainable Heating Franchise negotiation could provide a powerful model for other cities looking to transform their relationships with gas utilities and accelerate the shift to clean heating solutions.

Summary of Tools

Table 2.2 below summarizes how various city levers can be applied to advance the three key gas transition strategies—halting expansion, limiting reinvestment, and strategically downsizing the gas system. It provides a menu of options for cities to consider, adapt, and combine based on their unique circumstances and policy windows. While not every power will be feasible everywhere, the table illustrates the potential for a multi-pronged, mutually reinforcing approach.

Table 2.2: City Levers for Advancing Gas Transition Strategies

<table>
<tr><th>City Tool</th><th>Halt Gas System Expansion</th><th>Limit Reinvestment in the Gas System</th><th>Strategically Downsize the Gas System</th></tr>
<tr><td rowspan="2">City Staffing and Programming</td><td colspan="3">Create a program or staff position with the responsibility of advancing the goals of this table</td></tr>
<tr><td>Aggregate case studies of successful gas-free construction</td><td>Develop resources to assist building electrification</td><td>Facilitate neighborhood-scale electrification planning</td></tr>
<tr><td rowspan="2">Voluntary Leadership</td><td>Avoid gas in new municipal buildings</td><td>Lead by example with municipal electrification retrofits</td><td>Partner with large property owners (universities, hospitals, office parks) on district-scale electrification pilots</td></tr>
<tr><td colspan="3">Work with convening organizations and private sector groups to promote voluntary action and share ideas</td></tr>
<tr><td>Data Collection</td><td>Track energy systems of any gas-based new construction to identify opportunities for future electric retrofits</td><td>Track building energy assets through property assessment, scorecarding, and permitting for targeting future interventions</td><td>Develop alternative thermal energy resource maps (ground source, water source, waste heat) to support the transition to innovative, efficient heating technologies</td></tr>
<tr><td rowspan="2">Building Codes and Code Enforcement</td><td>Adopt most aggressive building codes available, stretch codes that go above and beyond base code requirements</td><td colspan="2">Use inspectional service powers to provide resources and permit expedition for electric retrofits</td></tr>
<tr><td colspan="3">Participate in state code development process to advance gas-free building codes that align with decarbonization commitments</td></tr>
<tr><td rowspan="2">Zoning Codes and Coordination with Utilities</td><td>Offer development bonuses for gas-free new construction</td><td>Promote low carbon district energy systems in new developments</td><td>Create "electrification zones" with special incentives and streamlined permitting for fossil-fuel-free development</td></tr>
<tr><td colspan="3">Require developers to assess the implications of projected future gas rates on customer energy costs and the potential cost of a future electrification retrofit</td></tr>
</table>

<table>
<tr><th>City Tool</th><th>Halt Gas System Expansion</th><th>Limit Reinvestment in the Gas System</th><th>Strategically Downsize the Gas System</th></tr>
<tr><td rowspan="2">Property, Health and Safety</td><td>Where successful implementation pathways exist (e.g., NYC) use health and safety authority (e.g., air quality) to reduce new gas construction</td><td colspan="2">Promulgate building performance standards that focus on reducing site emissions and emphasize a transition off gas at key intervention points</td></tr>
<tr><td colspan="3">Conduct stakeholder engagement processes that prioritize the needs of low-income and historically marginalized communities</td></tr>
<tr><td>Engage in Utility Regulatory Proceedings</td><td>Advocate for state public utility commissions to evaluate pipeline extension policies and subsidies.</td><td>Advocate to PUCs for:
• Strategic decommissioning
• Increased electrification and efficiency subsidies, eliminate gas subsidies
• Electrification-friendly heat pump rates</td><td>• Advocate for policy that requires:
> more regulatory oversight and management of the gas transition,
> state PUCs to evaluate pipeline extension policies and subsidies, and
> utility IRPs to include electrification & decommissioning scenarios.
• Intervene in rate cases at the PUC to limit investment in gas infrastructure
• Support legislation and regulatory reforms to enable zonal electrification and gas pruning</td></tr>
<tr><td>Franchise Agreements</td><td colspan="3">Embed provisions that mandate gas system decommissioning, prioritize electrification, support energy efficiency, and establish decarbonization funds within utility franchise agreements to foster alignment with city decarbonization goals</td></tr>
</table>

Conclusion

Imagine a future where cities deploy these tools in a gas transition.

In 2024, the City of Zurich in Switzerland will turn off the gas in a northern quarter of the city. The milestone is a result of a decades-long effort by their municipal gas utility, which saw a few delays, to transition existing buildings from the gas system to a district heating system. Learning from this experience, Zurich is now embarking on an effort to shift the entire city off of gas to align with climate targets.

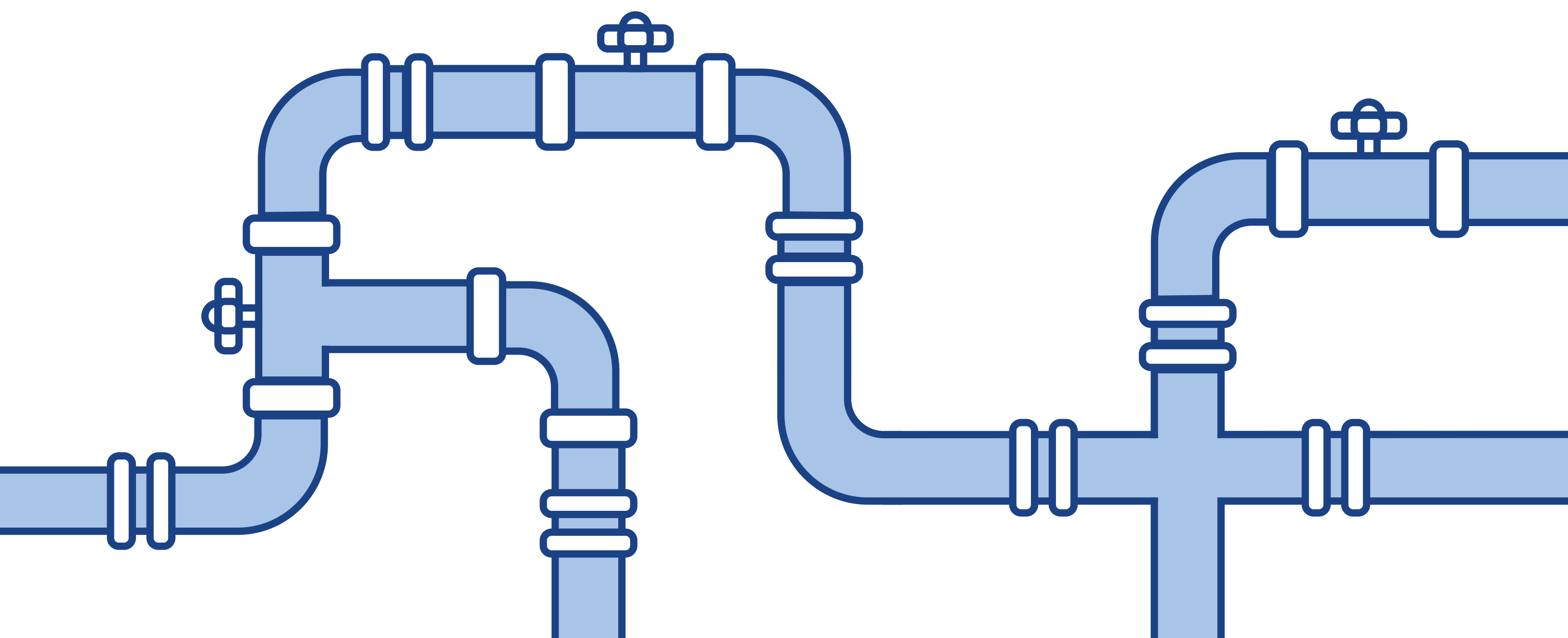
This new phase will be more ambitious, but will be guided by locational needs and resources: the city is ensuring that residents and businesses have something to transition to. This includes various types of district systems that leverage waste heat, bioenergy, groundwater, and lakewater as well as well defined strategies for small buildings better served by individual systems. Energy customers are being directed to a new solution that meets their needs.

While American cities may lack some of the autonomy and authority of Swiss cities, their history—particularly that of using gas networks to grow and then ambitiously transitioning from manufactured to natural gas—reflects a similar scale of action and effort.

This can be seen in the democratic ambition of two cities on both sides of the continent that sought to go beyond gas in new construction. Both Brookline, MA and Berkeley, CA crafted innovative policies suited to their location. Berkeley was challenged and ultimately felled by the nature of the American court system. Brookline tried, failed, tried again, and failed again before the Massachusetts Legislature took note of their local democratic desire to serve as an exemplar. As a result, 10 cities in Massachusetts now stand on a firm legal ground to move beyond gas.

As this paper has illustrated, the gas system, once a central feature to the growth of cities is now becoming a vestige, challenged by increasing costs, unprecedented competition and climate goals. Managing the implications will require efforts to stop its growth, cut back on reinvestment, and, like Zurich, downsize the system in a coordinated way.

While they don't have the power to turn off gas, American cities are experts and well suited to stand up alternatives for their constituents and avenues for them to transition to those alternatives. Doing so requires using the powers they have strategically while advocating for more active management of the gas system to ensure reliability, affordability, and equitable outcomes.



Appendices

Appendix A:

Utility Proposals

Several strategies have emerged from utilities for how they might reduce emissions from gas combustion. From exploring the feasibility of alternative gases to considering the role of the gas system as a backup resource of preserving customer choice in energy supply, these proposals highlight the complex trade-offs inherent in the transition away from fossil fuels. A critical examination reveals that these utility decarbonization proposals may actually exacerbate the challenge at hand.

Utility Proposal #1: Replace Fossil Gas with Alternative Gases

Proposed alternative gases include hydrogen and methane which are not derived from fossil fuels.

Hydrogen can be made via a number of pathways. While discussion of these pathways is beyond the scope of the report, all require substantial energy inputs. Today most hydrogen is produced using fossil methane. To deliver emissions reductions, hydrogen must be produced using energy inputs that avoid generating emissions. For example, hydrogen produced by electrolysis should ensure that carbon-free electricity is used to minimize emissions.[41] The U.S. Department of the Treasury is setting requirements for hydrogen production to be eligible for the 45V Tax Credit established by the Inflation Reduction Act.[42]

The potential for hydrogen in cities may be limited. Hydrogen can only be blended up to small fractions of 5-10% in existing pipeline systems before changes to delivery and end-use equipment are needed. There are concerns about the compatibility of hydrogen with cast iron pipe, including those that are behind-the-meter and therefore outside the management scope of utilities. Dedicated hydrogen networks in urban areas may be challenging to deploy due to infrastructure investment needs.

Alternative sources of methane include biomethane[43] produced from organic wastes or synthetic methane produced from hydrogen and captured carbon dioxide. The use of biomethane may seem alluring to cities that also have to manage methane-producing food waste and wastewater sludge. Indeed, a project in Chicago has garnered attention for turning food waste into biomethane that is then injected into the local gas distribution system.[44] However, such projects face three key challenges:

1. **Cost:** Alternative methane is expensive to produce. Fossil gas supply (city gate) prices typically hover around $5 per MMBtu. Pipeline-quality biomethane costs at least $20 per MMBtu due to the intensive processing needs.[45] When renewable methane gas, commonly referred to as renewable 'natural' gas (RNG), projects are implemented, their economics are justified by lucrative federal subsidies for transportation uses only.
2. **Competing uses:** Biomethane and its precursors can be used for other higher-value strategies. Specifically, electricity and heat can be directly generated from it without the expensive step of purifying the gas for pipelines.
3. **Scalability:** Most cities produce a limited amount of organic waste. An examination of Boston's organic waste found that if it were used to produce biomethane, it would only meet 5% of the city's gas demand.[46] Extra-urban sources also face scalability challenges.

41 Ricks, Wilson, Qingyu Xu, and Jesse D. Jenkins. "Minimizing Emissions from Grid-Based Hydrogen Production in the United States." *Environmental Research Letters* 18, no. 1 (January 2023): 014025.
42 Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election To Treat Clean Hydrogen Production Facilities as Energy Property (2023).
43 Also called renewable natural gas or RNG
44 Jay, Corli "Auburn Gresham Getting a Renewable Natural Gas Facility.", Crain's Chicago Business, May 19, 2022.
45 ICF. "Potential of Renewable Natural Gas in New York State." NYSERDA, April 1, 2022.
46 Castigliego, Joshua R., Adam Pollack, Cutler J. Cleveland, and Michael J. Walsh. "Evaluating Emissions Reductions from Zero Waste Strategies under Dynamic Conditions: A Case Study from Boston." *Waste Management* 126 (May 1, 2021): 170–79.

Appendix A (cont.):

Ultimately, cities should view proposals to blend alternative gases or develop RNG projects with strong skepticism. The emissions reductions associated with these strategies can be dubious, and such projects should not serve as an excuse to avoid electrification where it is practical.

Utility Proposal #2: The Gas System as a Backup or Peaking Resource

Many gas utilities have started to recognize the potential disruption of electric alternatives and the central role of electrification in achieving climate goals. However, they also advocate for maintaining the gas system to support backup or peak heating needs. This arrangement typically involves the installation of a heat pump alongside gas equipment and the use of a control system to optimize when either is used. The goal of such an arrangement is to avoid higher levels of electricity demand that may challenge distribution systems and renewable generation.

There is some benefit of this strategy, especially in the near term, as efforts to upgrade the distribution grid and scale renewables are nascent. However, in the long-term, it faces significant challenges. As noted above, alternative gases face significant cost and scaling challenges even when partial electrification reduces the demand for gas.

More concerningly, maintaining the gas distribution system at low levels of consumption is tenuous because the cost to deliver each unit of energy increases dramatically. Here, full electrification and tank fuels begin to look more advantageous for customers. Maintaining low-usage gas distribution systems would thus need to require strategies for keeping customers on and using the system.

Hybrid strategies may be useful steps for decarbonizing buildings that face near-term barriers to electrification. However, cities should ultimately look for opportunities to move buildings beyond gas when practical. This includes and should focus on opportunities to avoid reinvestment in the gas system. Such opportunities may arise in low-to-medium-density residential neighborhoods where the cost of pipeline modernization projects are similar to building electrification or in specific opportunities to electrify larger buildings.

Utility Proposal #3: Give Customers a Choice in How They Decarbonize

Finally, gas utilities argue that it is important to preserve customer choice in energy supply. In most jurisdictions, they have a mandated obligation to serve[47, 48] and view their customers as their reason to exist.

The flip side of this is that customers have a growing number of choices and incentives[49] to pursue those choices.

Ultimately, these proposals all fall short in fully addressing the imperatives of decarbonization and fail to adequately anticipate the disruptive shifts looming on the horizon for the gas system.

47 The nature of the *obligation to serve* varies by jurisdiction. Notably, the Governor of New York has proposed eliminating the obligation to serve in her 2024 State of the State Address. A review of the obligation to serve in Massachusetts found that there is substantial flexibility in both the law and utility regulatory precedence that may allow Massachusetts' Department of Public Utilities to terminate service under its mandate (see The Obligation to Serve in Massachusetts from the Institute for Policy Integrity).

48 Bagdanov, K. G. Decarbonizing the Obligation to Serve. Building Decarbonization Coalition. (2024).

49 State and Federal (Inflation Reduction Act) subsidies.

Appendix B:

Notable Attempted "Gas Bans"

In recent years, various cities across the country have attempted to enact restrictions on the use of gas in new construction as part of broader efforts to combat climate change. These measures, often referred to as "gas bans," aim to promote electrification and transition away from fossil fuel dependency in buildings. However, the implementation and legal challenges surrounding these initiatives have been complex and varied. Table 2.2 provides an overview of notable attempts to enact "gas bans" in different cities, detailing the laws or ordinances, their approach, current status, and any legal challenges they have faced.

Table B: Major Attempts to Electrify New Construction.

City	Law & Approach	Status
New York City	*Local Law 154 (2021)* uses an air emissions standard to require new buildings from combusting a fuel greater than a specified carbon intensity (25 kg CO2/MMBtu) lower than common fuels. Law is phased in over several years. Several commercial building classes and some industrial facilities are exempted. Further NY State's All-Electric Building Act has similar outcomes on a slower timeline.	Implementation in process. NYC's law is currently being challenged in the NY Southern District Court,[50] while the State All-Electric Buildings act is being challenged in the Northern District. Both challenges cite the federal Energy Policy and Conservation Act as preempting such requirements.
Brookline, MA	Brookline Town Meeting passed separate ordinances in 2019[51] and 2021 banning fossil fuel infrastructure in buildings. The 2019 ordinance attempted to use the Town's building code enforcement mechanisms, while the 2021 ordinance attempted to use the Town's zoning authority.[52]	Both Town Meeting ordinances were deemed unlawful[53, 54] by the State's Attorney General who noted that the state's building and gas codes preempted the Town's authority. Subsequently, the Massachusetts Legislature enacted an 10-municipality fossil fuel free pilot program which has allowed Brookline to implement its original intent starting in 2024.
Berkeley, CA	In 2019, the City of Berkeley adopted an ordinance[55] explicitly prohibiting the hook up of new gas services under the City's Health and Services code.	In March 2024 Berkeley had agreed to repeal its ordinance as part of a settlement to end litigation after the federal Ninth Circuit Court held that the ban was preempted by the Energy Policy & Conservation Act after the District court argued that it was not preempted.

50 February 2024 Updates to the Climate Case Charts | Sabin Center for Climate Change Law (columbia.edu)
51 ARTICLE-21-as-voted-per-Town-Clerk (brooklinema.gov)
52 "Brookline Tries Again For A Fossil-Free Future | WBUR News." June 3, 2021
53 Brookline-9752S_DIS_final (brooklinema.gov)
54 Brookline-Art-25-and-Art-26_DIS_final_Fall-TM2020_0225-2022_fossil-fuel (brooklinema.gov)
55 Ch. 12.80 Prohibition of Natural Gas Infrastructure in New Buildings | Berkeley Municipal Code

Appendix C:

Regulatory Filings and Engagement Opportunities

Below is a table summarizing the types of regulatory proceedings cities could engage in and the arguments they might make, along with examples. These examples illustrate the range of proceedings where cities can intervene to push gas utilities to align with climate goals, protect ratepayers, and support an equitable transition to electrification. By engaging proactively and strategically, cities can drive meaningful change in the regulatory arena.

Table C: Opportunities for Engagement in Gas Utility Regulatory Proceedings for Climate Alignment and Equitable Transition

Proceeding Type	Description	Key Arguments	Examples/Case Studies
Gas Infrastructure Plans/Line Extension Applications	Utility requests approval to expand gas distribution system to new areas	• Challenge need for expansion • Inconsistent with climate goals • Stranded asset risk for ratepayers • Non-pipeline alternatives available	• Washington UTC opened a docket to reevaluate and reduce line extension allowances • New York PSC approved ConEd to implement non-pipes solutions including gas efficiency, heating electrification, and RNG projects
Gas Integrated Resource Plans (IRP)	Gas utilities' long-term plans outlining utility investments, demand projections, and plans for meeting projected demand through a mix of supply- and demand-side resources	• Scrutinize demand projections, challenge growth assumptions • Assess GHG impacts of proposed gas investments, consistency with climate targets • Advocate for inclusion of electrification, efficiency, and demand response as key resource strategies • Push for transparency around methane leakage and plans for leak-prone pipe replacement • Advocate for strategic decommissioning	• Minnesota PUC initiated a process to develop gas IRPs to establish requirements within 18 months, in coordination with ongoing the "Future of Gas" proceeding and Natural Gas Innovation Act • Massachusetts DPU issued an order requiring gas utilities to evaluate non-pipeline alternatives in resource plans • California PUC issued an order requiring consideration of demand-side resources and consistency with state GHG targets in utility plans
Future of Gas	Proceedings that evaluate the utility role in decarbonization and meeting set emissions targets and may include: decommissioning gas infrastructure for targeted electrification, rate adjustments reflecting asset life, recalculating subsidies supporting gas system expansion, integrating gas and electric planning processes, and assessing the social, economic, and environmental impacts on affected workers and communities	• Aggressive emissions reductions needed • Identify opportunities for strategic decommissioning • Advocate for targeted electrification programs and sustainable heating projects (district geothermal, etc.) • Widespread electrification is critical and can be beneficial • Managed transition off gas is necessary • Advocate for equity provisions and ratepayer protections • Reallocate subsidies for gas infrastructure for decarbonization initiatives	• The Illinois Commerce Commission initiated a Future of Gas proceeding in March of 2024, aimed at exploring decarbonization of the gas system to align with the state's 100% clean energy goal. • DC PSC initiated a proceeding in 2020 following the AltaGas and Washington Gas Light Company merger, when the utilities' climate business plans fell short of expectations, leading advocates to demand an evidentiary proceeding to address the future of gas in DC

Appendix C (cont.)

Regulatory Filings and Engagement Opportunities

Table C: Opportunities for Engagement in Gas Utility Regulatory Proceedings for Climate Alignment and Equitable Transition

Proceeding Type	Description	Key Arguments	Examples/Case Studies
Rate Cases	Utility requests approval to change customer rates and recover investments	• Question prudence of gas investments • Advocate for electrification programs • Push for equity and affordability	• Oregon PUC denied all three of the state gas utilities' rate plans, citing GHG risks and unrealistic demand forecasts
Depreciation Studies	Analyses of gas asset lifetimes and depreciation rates	• Shorten asset life assumptions • Align depreciation with climate goals • Avoid expanding gas investments	• Legislation in Colorado directs the CO Energy Office to conduct a gas investment depreciation study to evaluate stranded asset risks and their projected rate impact
Energy Efficiency Proceedings	Proceedings related to energy efficiency programs and initiatives	• Allow gas utilities to invest in electrification/fuel switching • Phase out gas energy efficiency programs • Decouple utility profits from gas sales	• In PG&E's triennial energy efficiency plan for 2024-2027, PUC staff filed a proposal to phase out EE incentives for gas over the next decade

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