Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

POLICY BRIEF

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Gas Utilities and the Race to End Climate Change

To comply with the Global Warming Solutions Act's greenhouse gas emission reduction targets, Massachusetts must cut emissions from gas sold by utilities by 69 percent over the next 30 years. In Massachusetts, and elsewhere around the country, gas utilities' current compensation structure rewards these companies for building more pipelines and signing up new customers, creating incentives that place profits at odds with climate goals. Commissioned by Massachusetts Gas Leaks Allies—a coalition of over 20 nonprofits, researchers, and experts—this Applied Economics Clinic policy brief explains: how Massachusetts gas utilities currently receive compensation; the contradictions between utilities' current incentives and the Commonwealth's legally mandated emission reductions; and a potential solution to align gas utilities business interests with their shared responsibility to reduce Massachusetts emissions: performance based incentives.

Summary

Massachusetts gas utilities currently earn revenue by adding new customers or investing in new infrastructure. This practice can place their revenues and profits at odds with the Commonwealth's climate goals, entail unnecessary costs for customers, and create financial risk for both ratepayers and the gas utilities themselves.

Performance-based incentives link gas utility compensation to customer services provided by the utility rather than to their expenditures, making it possible for Massachusetts to reduce gas demand and associated greenhouse gas emissions while simultaneously continuing to provide a return to gas utility investors.

Background

In 2008, Massachusetts passed two cornerstone climate laws. The Green Communities Act (GCA) required electric and gas utilities to implement all cost-effective energy efficiency measures. The Global Warming Solutions Act (GWSA) enacted statewide greenhouse gas emissions limits that require annual carbon dioxide (CO_2) emissions to be reduced to 20 percent of 1990 levels by 2050.

The GCA's energy efficiency mandate required utilities to sell less energy per customer, leading to an important change in the structure of utility compensation: Instead of basing gas and electric distributors' revenues on how much energy they sell, energy sales are now "decoupled" from revenues. Decoupled utility revenues are not unique to Massachusetts: 24 states and the District of Columbia have decoupled electric or gas utility revenues, or both.

In Massachusetts, a 2008 Department of Public Utilities (DPU) order adopted revenue decoupling to reward utilities based on their total capital expenditures. Fuel and maintenance costs are passed along to the consumer directly, without any revenue to the utility. The cost of new infrastructure, however, is charged to the customer along with a rate of return for the utility's shareholders and bondholders (Table 1).

Table 1. How do gas utilities make money?

Utility Services		Revenue for Utility?	Effect of GWSA (Reduced Emissions) on Utility Profits
Supply	Fuel	No	None
Distribution	Maintenance	No	None
	New Pipelines and Equipment	Yes	Revenues Fall

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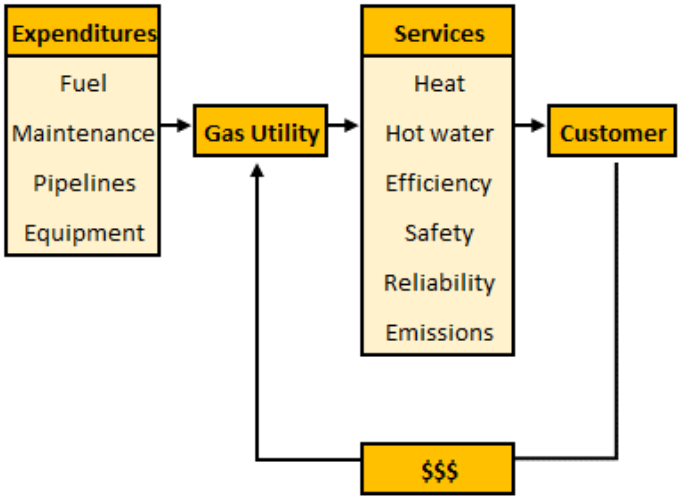
Massachusetts utilities receive a fixed level of compensation each year based on their planned expenditures and a rate of return to shareholders and bondholders; planned expenditures are updated and approved periodically by the DPU. Massachusetts gas distributors receive a fixed level of compensation per customer: If the number of customers grows, their compensation grows without needing DPU approval.

Overall, customers pay for fuel, maintenance, pipeline and equipment, and a return to the utility's investors and bondholders ("expenditures" in Figure 1), while receiving services that produce emissions—including the delivery of gas for heat and hot water.

Figure 1. How the Massachusetts gas system works



Revenue decoupling provided an incentive for utilities to implement energy efficiency programs that shave energy use by a few percent each year. At the same time, it also created a strong motivation for utilities to build new infrastructure, increase capital investments, and maximize their shareholders' returns. Beyond their legal obligation to provide customers with efficiency measures, Massachusetts gas utilities have little incentive to reduce greenhouse gas emissions.

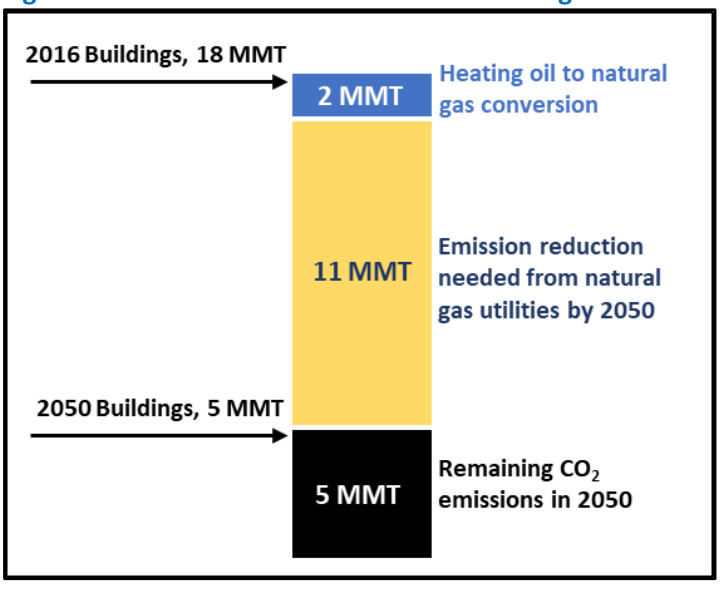
Gas Utilities and Climate Change

According to the Massachusetts Greenhouse Gas Inventory, in 2016, gas burned in homes and businesses accounted for 19 percent of total statewide emissions. The true value is likely higher, as the Inventory methodology underestimates the amount of methane from leaked gas. Gas leaks are an important source of methane emissions (which are many times more powerful than CO_2 emissions) and a relatively common phenomenon in the Commonwealth due to its aging gas infrastructure.[1]

The Massachusetts 2015 *Clean Energy and Climate Plan* calls for emissions from buildings' heat and hot water to shrink from 18 million metric tons (MMT) in 2016 down to 5 MMT in 2050 to achieve the Commonwealth's 80 percent reduction target. Converting all current heating oil use to gas would lower emissions by just 2 MMT.[2] The remaining emission reduction—11 MMT—can only be achieved by reducing gas use (see Figure 2).[3]

Massachusetts gas utilities have 30 years to cut their CO_2 emissions by two-thirds: from 18 MMT (assuming all fuel oil use is converted to gas) down to 5 MMT.

Figure 2. Massachusetts 2016 emissions from gas use



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Current Incentives for Gas Utilities

Massachusetts gas utilities are compensated for updating existing and building new infrastructure. The more money spent on new pipelines and other equipment, the higher their revenues. Also, utility gas infrastructure in Massachusetts is old and in poor condition. Combined, these two factors have resulted in a situation where 26 percent of Massachusetts gas pipes are scheduled to be replaced in the next 20-25 years,[4] and gas companies will spend over $9 billion on gas main replacement.[5] These values do not include the September 2018 Columbia Gas explosions and subsequent rebuilding of the gas distribution system in Massachusetts' Merrimack Valley.

For gas utilities to keep revenues and profits steady (or increase them), they must build more infrastructure, update existing infrastructure, and/or add gas customers. Providing incentives for utilities to continue to expand Massachusetts' demand for gas:

(1) Entails unnecessary costs for consumers that place unequal burdens on households—socially vulnerable communities and low-income households pay a larger share of their income in energy costs[6] and stand to lose the most from increased rates and bills resulting from new gas infrastructure;

(2) Puts these companies' business interests at odds with their role as participants in achieving emissions reductions and in the Commonwealth's compliance with GWSA—put starkly, Massachusetts gas distributors cannot both comply with GWSA and keep their revenues and profits steady under the current compensation system; and

(3) Creates financial risk for customers and gas utilities in the form of stranded assets—new gas infrastructure is at risk of being rendered uncompetitive well before its intended lifespan. These kinds of "stranded assets" can saddle ratepayers and investors with the cost of early decommissioning.

Performance-Based Incentives

There are alternatives to gas utilities' current incentive structure. By tying compensation to some metric other than capital expenditure, Massachusetts could reduce gas demand while still providing a return for the gas distribution companies that will continue to provide services for many years to come. Performance based incentives (PBIs) compensate utilities for the services they provide instead of their capital expenditures. Table 2 outlines some of the ways that PBIs could work.

Table 2. Examples of PBIs for gas utilities

PBI	How incentive could be measured
Environmental Goals	Tons CO_2 reduced per year/per customer
Safety	Reduced incidence, duration and/or severity of leaks
	Reduced public safety incidents, including injuries and fatalities
	Emergency response time to safety incidents
	Reduced work-related safety incidents, including injuries and fatalities
Customer satisfaction	Reduced customer complaints
	Service installation and termination speed
	Call center answer speed
	Reduced missed appointments
Energy Costs	Reduction in customer energy costs

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Massachusetts utilities are compensated for their performance in the provision of energy efficiency programs (Table 3). PBIs for energy efficiency are an established practice used in states around the nation.

A change to a PBI compensation system for both electric and gas distribution (unrelated to efficiency program administration) is underway in several states (see Table 4). In Rhode Island, National Grid will receive PBIs to control energy costs, provide customers with energy choices, and build a clean, flexible grid. In New York and California, utilities receive PBIs to assist in reaching clean energy and climate goals.

Table 3. Energy efficiency PBIs in Massachusetts

PBI Component	How it Works
Savings	Utilities are paid for energy efficiency savings, based on total benefits above a threshold
Value	Utilities are paid for low-cost provision of energy efficiency savings, based on total net benefits above a threshold
Renter	Utilities are paid for delivering energy efficiency savings to renters, based on their expected savings-per-renter and the number of actual renters participating in efficiency programs
Active Demand	Utilities are paid for active demand savings, based on total benefits above a threshold

Table 4. Gas utility performance-based incentives in other states

State	How their performance-based incentives work
Rhode Island	With the goals of controlling costs, providing customers with energy choices and building a clean, flexible grid, Rhode Island's National Grid will receive performance-based incentives starting in 2019 for: (1) Procurement of long-term renewable electricity contracts for retail customers; (2) Reliability and customer service; (3) Capital efficiency for electric distribution investments; and (4) Achieving objectives aligned with state policy goals.
New York	Electric utilities receive performance incentives for achieving the Reforming the Energy Vision (REV) program objectives. Each utility proposes its own metrics and incentive levels for approval from the New York Public Service Commission.
California	SDG&E receives performance incentives for its reliability and Southern California Gas receives performance incentives related to its wholesale gas procurement costs.
	Gas utilities receive performance incentives for as much as $10 per million BTU for their use of methane from existing activities related to landfills, animal waste, and agriculture.
Hawaii	In April 2018, Hawaii Governor David Ige signed a bill directing the Public Utilities Commission to implement performance-based regulation by 2020 that breaks the link between utility revenues and capital investments.
Michigan	The Michigan Public Service Commission's 2018 electric distribution planning initiative on grid modernization may provide a foundation for future performance-based regulation in the state.

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Table 5 presents an illustrative example of Massachusetts gas utilities' potential revenues under an emission-reduction based PBI. Under the current incentive structure, gas utilities compensation grows with the size of the buildout of pipelines and other infrastructure. At a 10 percent rate of return, spending $1.5 billion dollars on new infrastructure means $150 million to shareholders and bondholders, while no buildout means no additional revenue.

Under an emission-based PBI, gas utilities could be compensated for every ton of CO_2 not emitted. In Table 4, the "Large" pipeline buildout doesn't avoid any emissions, and utilities receive no return. The "Medium" buildout reduces potential emissions by 0.5 million metric tons (compared to the Large buildout). The utility receives $100 per each avoided ton of CO_2, for a total of $50 million in return. The "Small" buildout avoids 1.0 million metric tons of CO_2, and the utility receives $100 million. And with no buildout of new utility gas infrastructure, 1.5 million metric tons of CO_2 are avoided, and the utility receives $150 million.

Realigning utility revenues in this way could allow gas distributors to hold revenues steady while simultaneously reducing gas demand and greenhouse gas emissions in the Commonwealth—the kind of solution needed in the race to end climate change.

Table 5. Illustrative examples of gas utility revenues under the current and PBI structures

	New Pipeline Buildout			MA Gas System CO_2			
	Size	Cost	Rate of Return	Gas Emissions (million metric tons)	Avoided Emissions (million metric tons)	Return on Emissions Reductions	Utility Revenue
Current Massachusetts Incentive Structure	Large	$1.5 B	10%	2.0	0.0	$0/ton	**$150 M**
	Medium	$1.0 B	10%	1.5	0.5	$0/ton	**$100 M**
	Small	$0.5 B	10%	1.0	1.0	$0/ton	**$50 M**
	None	$0	10%	0.5	1.5	$0/ton	**$0**
Emission Reduction Performance-Based Incentive	Large	$1.5 B	0%	2.0	0.0	$100/ton	**$0**
	Medium	$1.0 B	0%	1.5	0.5	$100/ton	**$50 M**
	Small	$0.5 B	0%	1.0	1.0	$100/ton	**$100 M**
	None	$0	0%	0.5	1.5	$100/ton	**$150 M**

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Notes

[1] HEET, 2019.
[2] Heating oil emissions converted to btu-equivalent utility gas emissions using the ratio of their pounds of CO2 per btu emission rates per EIA.
[3] Lopez, Comings, Stanton and Tavares, (Forthcoming).
[4] Based on the total number of miles of leak-prone pipes scheduled to be replaced—per each utility's gas system enhancement plan (GSEP)—divided by the total number of miles of pipes across all gas utilities.
[5] The sum of the total pipe replacement costs across all utilities, as taken from their GSEP plans.
[6] ACEEE, 2016.

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