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

POLICY BRIEF

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Fixing Massachusetts' Gas Leaks Pays for Itself

The gas leaked from old and damaged pipes is expensive: Massachusetts gas utility customers spend over $11 million every year to buy gas that is leaked into the atmosphere before it can be delivered to homes and businesses. Many leaks that are not considered potential explosion risks (called "Grade 3") cost more (in lost gas) to leave unfixed than to repair. Commissioned by Massachusetts Gas Leaks Allies—a coalition of over 20 nonprofits, researchers, and experts—this Applied Economics Clinic policy brief estimates the payback period for repair of two categories of Grade 3 leaks: Significant Environmental Impact (SEI) leaks, for which lost gas pays for repairs in just 1 year; and all other (non-SEI) Grade 3 leaks, with a payback period of 10 years.

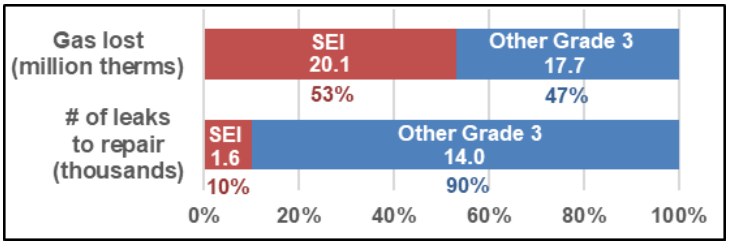
Massachusetts Gas Leaks

According to the Massachusetts Department of Public Utilities (DPU), repairing gas leaks cost the state's gas utility customers $65 million in 2017, or about $3,740 per leak.

In 2016 Massachusetts became the first state in the nation to enact a law requiring that these leaks of "Significant Environmental Impact" (SEI) be repaired.[1] (Before this law, gas utilities in the Commonwealth were only mandated to repair leaks with the potential to cause explosions.) In 2017, research by HEET and Gas Safety Inc. to develop a method to identify SEIs showed that the 10 percent of leaks defined as SEI emit a little more than half of all the gas lost (by volume). A recent report by HEET documents the progress of the new SEI identification protocol used in the field to identify and repair SEI leaks.[2]

This policy brief estimates the payback period for repairing two volume-based categories of non-explosion-hazard gas leaks (called "Grade 3" leaks): **(1) SEI leaks:** The top 10 percent of Grade 3 leaks, which is responsible for approximately 53 percent of lost gas (see Figure 1), and **(2) Other Grade 3 leaks:** The bottom 90 percent of Grade 3 leaks, which is responsible for 47 percent of lost gas.

Figure 1. Number of Grade 3 leaks and amount of gas lost

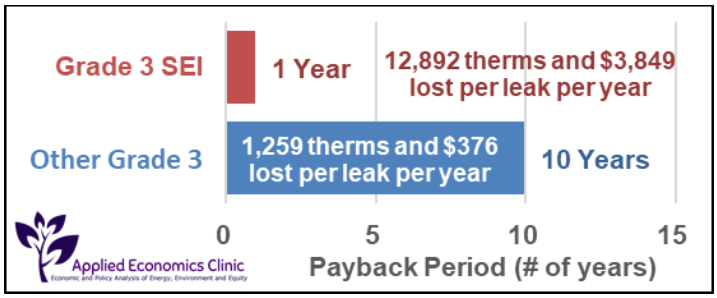


Gas Leak Repair Payback Period

In 2017, gas lost before reaching Massachusetts gas utility customers cost $11.3 million. While the average cost to fix a Grade 3 leak is approximately the same ($3,740) regardless of the leak volume, the cost of lost gas is not. Large volume SEI leaks cost $3,850 a year in lost gas, on average, while smaller Grade 3 leaks cost $380.

This ten-to-one difference in the cost of leaked gas means that SEI leaks pay for their own repairs ten times faster than other Grade 3 leaks. Gas saved from smaller leaks pays for repairs in 10 years, while gas saved from large SEI leaks pays for repairs in just 1 year (see Figure 2). (Using EIA's more conservative estimate of the share of gas lost in transmission to Massachusetts increases these payback periods by 40 percent: repairing SEI leaks pays for itself in 1.4 years instead of 1.0 years.)

Figure 2. Payback period for Grade 3 leaks



Leaks left unrepaired waste gas and money for utility customers since gas companies pass the cost of wasted gas onto customers in gas prices. Fixing SEIs pays for itself in about 1 year, while fixing smaller leaks pays for itself in 10 to 14 years. Across all of Massachusetts' Grade 3 leaks, on average, the payback period is 5 to 7 years.

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Methodology

Payback period: Gas leak payback period (or return on investment) is the cost to repair a leak divided by the annual cost of gas lost in a given leak volume category.

Estimating the cost of repairs for Massachusetts leaks: DPU 2018 *Report to the Legislature on the Prevalence of Natural Gas Leaks in the Natural Gas System* presents 17,624 leaks repaired for a cost of $65,975,894 in 2017.

Total gas leaked from Massachusetts distribution systems: estimated as EIA's 2017 total state gas consumption multiplied by the share of gas lost in distribution: 2.7 percent of gas lost in transmission and distribution (per McKain et al. 2015) of which 30 percent is lost through distribution systems (per Hendrick et al. 2016).

Cost of lost gas: EIA 2017 Henry Hub Gas Spot Price.

SEI share of leaks and share of lost gas: 2019 HEET report, *Natural Gas Leaks of Significant Environmental Impact (SEI): Report of the 2018 SEI Field Trial*.

Table 1. Data and assumptions

Measure	Value	Source
2017 MA gas consumption (mcf/yr)	449,463,000	EIA 2017
Gas lost in transmission and distribution	2.7%	McKain et al. 2015
Gas lost through distribution system	30%	Hendrick et al. 2016
Marginal cost of gas/million btu	$2.99	EIA 2017 Henry Hub
Marginal cost of gas/therm	$0.30	AEC calculation
Number of unrepaired Grade 3 gas leaks (end of 2017)	15,587	DPU 2018 Report
2017 Number of Repaired Leaks (all grades total)	17,624	DPU 2018 Report
2017 Cost of Repairs (all grades total)	$65,975,894	DPU 2018 Report
% of total gas lost through superemitters	50%	HEET 2019, p.9
% of leaks that are superemitters	7%	HEET 2019, p.9
Share of SEI leaks in Grade 3	10%	HEET 2019, p. 13, 21

Notes

[1] The 191st General Court of the Commonwealth of Massachusetts, 2019.

[2] HEET, 2019. AEC assisted with calculations for HEET's report—this brief updates those calculations to reflect 2017 data.

Works Cited

HEET. March 2019. Natural Gas Leaks of Significant Environmental Impact (SEI): Report of the 2018 SEI Field Trial. Available online: https://heetma.org/wp-content/uploads/2019/04/HEET-Report-of-the-2018-SEI-Field-Trial.pdf.

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