

Distribution System Condition

This document describes the gas distribution system status quo at the end of 2018.

More than half, or 51 percent, of all Massachusetts homes and businesses count on gas for heating, which also represents fully half of all gas consumption in the Northeast. The remainder is primarily used for electricity generation.

The three interstate pipelines or trunk lines operating in Massachusetts are:

- Algonquin, owned by Enbridge—enters the state from Rhode Island and serves customers from Salem to Weymouth.
- Tennessee Gas, owned by Kinder Morgan—enters the state from New York and crosses Massachusetts, serving Springfield and the north shore.
- Portland Natural Gas Transmission System and Maritimes and Northeast Pipeline operate jointly—enter Massachusetts from New Hampshire near Dracut and serves north shore customers.¹



Map of transmission lines serving Massachusetts²

¹ Northeast Gas Association, State of the Industry Report, June 2017, https://www.northeastgas.org/pdf/state_industry_report.pdf, accessed July 22, 2019

² US DOE Energy Information Agency, <https://www.eia.gov/state/maps.php>, accessed July 22, 2019

The local distribution companies purchase from any one of these pipelines via state-approved long-term contracts or through one-year contracts or spot buys.³ The utilities deliver gas downstream through distribution pipes to 275 cities and towns in the Commonwealth.

LDC	Berkshire	Columbia	Eversource	Liberty	National Grid	Unitil	Total
Cities and towns	20	61	56	6	120	6	275
Customers	39,700	317,600	295,200	55,300	902,000	15,900	1,625,000

Local Distribution Companies that serve Massachusetts.⁴

Likewise, four municipal gas and electric light companies and one privately owned utility provide gas distribution service:

- Blackstone Gas Company, 1,800 gas customers
- Holyoke Gas & Electric, 10,000 gas customers
- Middleborough Gas & Electric, 5,200 gas customers
- Wakefield Municipal Gas & Light, 6,500 gas customers
- Westfield Municipal Gas & Light, 10,000 gas customers

Utility gas service is available in part or all of 275 of Massachusetts' 351 cities and towns, or 78 percent of Bay State communities. Utility gas service is not available on the Islands (Martha's Vineyard and Nantucket); in rural communities in westernmost counties (Berkshire, Franklin, Hampden, Hampshire, Worcester); and on the lower Cape (Wellfleet, Truro, Provincetown). As can be seen in the map on page x, the location of pipeline infrastructure largely determines the availability of local service.

³ Massachusetts DPU 2015 Annual Report, <https://www.mass.gov/files/documents/2017/08/30/dpu-annual-report-2015.pdf>, accessed July 22, 2019

⁴ Northeast Gas Association, 2017 State of the Industry Report: Natural Gas in Massachusetts, June 2017, https://www.northeastgas.org/pdf/state_industry_report.pdf, accessed July 22, 2019

Gas Infrastructure Data and Statistics

Comparison of Massachusetts gas distribution conditions, based on PHMSA data,⁵ with those nationally helps explain the baseline condition of the Massachusetts gas system.⁶ The age of the distribution system and materials used make it particularly risky.

As of the end of 2018, Massachusetts operators had 21,715 miles of gas mains or 1.7 percent of gas main inventory and 1,336,690 gas service lines or 1.6 percent of gas service lines nationally.

Much of the original gas system was constructed of cast iron and bare steel mains, along with bare steel and cast iron service lines. Pipes installed before 1970 are now considered to have used substandard materials prone to fail.

Unprotected Steel Pipes

Massachusetts has 1,146 miles of unprotected bare steel pipe, or 5.3% of the total miles of Massachusetts gas mains, twice what the national percentage 2.6%. Bare steel service lines total 147,064, 12 percent of the state total, compared to 2.1 percent nationally.

Additionally in Massachusetts there are 105,361 service lines of unknown material that are most likely bare steel. Together, Massachusetts likely has 252,425 likely bare steel pipe service lines, or 19 percent compared to 5 percent nationally.

Cast Iron

Massachusetts has 2,926 miles of cast or wrought iron gas mains in the system, 14 percent of all gas mains in the state, compared with two percent nationally. As a percentage of all the cast iron mains in the country, Massachusetts has over 13 percent. 1,373 cast or wrought iron services represent 20 percent of all cast iron or wrought iron services lines nationally.

⁵ Gas Distribution, Gas Gathering, Gas Transmission, Hazardous Liquids, Liquefied Natural Gas (LNG), and Underground Natural Gas Storage (UNGS) Annual Report Data, Updated Thursday, March 7, 2019 <https://www.phmsa.dot.gov/data-and-statistics/pipeline/gas-distribution-gas-gathering-gas-transmission-hazardous-liquids>, accessed July 17, 2019

⁶ Office of Energy Policy and Systems Analysis, US Department of Energy, Natural Gas Infrastructure Modernization Programs at Local Distribution Companies: Key Issues and Considerations, January 2017, <https://www.energy.gov/sites/prod/files/2017/01/f34/Natural%20Gas%20Infrastructure%20Modernization%20Programs%20at%20Local%20Distribution%20Companies--Key%20Issues%20and%20Considerations.pdf>, accessed July 17, 2019.

Cast iron pipe under eight inches in diameter, also known as small diameter cast iron, is highly susceptible to failure. Massachusetts has 2,455 miles of main or 13 percent of all small diameter cast iron in the country.

Age of System

Fifteen percent of gas mains in Massachusetts, or 3,161 miles were installed before 1940, compared to four percent nationally. For 671 miles of main or an additional three percent, there is no known decade of installation, leading to the presumption that these mains were also installed before 1940. Nationally, only seven percent of gas mains were installed prior to 1940. Summing the known and unknown decades gives Massachusetts 3,832 miles or 18 percent of the system total, compared to 10 percent nationally.

Service lines built prior to 1940 in Massachusetts total 108,893, eight percent, compared to 1.4 percent nationally. Service lines with no known date of installation total 104,267 , or (7.7% 2018) eight percent of the Massachusetts system compared with eight percent nationally. Again, the presumption is that these lines were installed pre-1940, totalling 213,160 or 16 percent (15.8% 2018) of the Massachusetts system compared to nine percent nationally.

Installed Base Leak Data⁷

Massachusetts eliminated 13,005 leaks in 2018 or 2.4 percent of all leaks eliminated nationally. 7,952 of these leaks were categorized hazardous, about 61 percent of the total leaks fixed or four percent of hazardous leaks nationally. Non-hazardous leaks eliminated totaled 5,503 and constituted 1.2 percent of nonhazardous leaks fixed nationwide.

All data below is for 2018 unless otherwise noted.

Causes of Leaks

Corrosion on gas mains was the cause of 1,714 leaks, where 777 were hazardous, or 21% of all Massachusetts hazardous leaks. Massachusetts hazardous leaks due to main corrosion were 21% of the national total in 2018.

⁷ SqueakyLeaks.org <https://heetma.org/gas-leaks/gas-leak-maps/>, accessed July 17, 2019

Corrosion on gas service lines caused 2535 leaks, 1,809 of which were hazardous, or 23% of all Massachusetts hazardous leaks. These leaks were 6% of all hazardous leaks in corroded service lines nationally.

Nonhuman natural forces caused 714 leaks on gas mains where 578 or 81% were hazardous. 43% of all main leaks from natural forces nationally were deemed hazardous.

Natural forces caused 171 service line leaks where 106 or 62% were hazardous. 43% of all natural force service leaks nationally were deemed hazardous.

Excavation caused 183 leaks on gas mains where 175 or 95% were hazardous. Nationally, 90% percent of leaks caused by excavation on mains were deemed hazardous.

Excavation caused 823 service line leaks, where 809 were classified as hazardous, 11% of Massachusetts hazardous leaks. Nationally, 27% of all hazardous leaks on service lines were due to excavation.

Other outside forces caused 22 leaks on gas mains, where 14 were deemed hazardous.

Other outside forces caused 80 service line leaks, where 71 were deemed hazardous.

Pipe weld or joint failure caused 735 main leaks where 223 or 30% were hazardous leaks. Nationally, 28% of pipe weld or joint failure main leaks were deemed hazardous.

Pipe weld or joint failure caused 587 service line leaks where 405 or 69% were hazardous. Nationally, 32% of pipe weld or joint failure leaks were deemed hazardous.

Equipment failure caused 423 leaks on gas mains where 145 or 34% were hazardous. Nationally, 24% of main leaks due to equipment failure were deemed hazardous.

Incorrect operation caused 43 leaks on gas mains where 14 were deemed hazardous.

Incorrect operation caused 113 leaks on services where 39 were deemed hazardous.

Leaks from other causes totaled 6,536 or 50% of all Massachusetts leaks eliminated. Of these, 2,296 or 35% were hazardous. Nationally, 40% of leaks due to all other causes were deemed hazardous.

Other Cause was listed as the source of leaks on gas mains 49% of the time in Massachusetts compared with 13% nationally.

On service lines, Other Cause was recorded for 543 leaks, where 287 or 53%, were Massachusetts hazardous leaks. Nationally, 37% of all Other Cause hazardous leaks were deemed hazardous.

Leaks scheduled for repair at the end of 2018 totalled 2,383

Excavation Damage

Massachusetts had 900 excavation damages by apparent root cause, (369,081 total excavation tickets MA) resulting in 1006 excavation caused leaks.

All operators had 81,218 leaks caused by excavation damage by apparent root cause from 31,283,894 excavation tickets.

Excavation damage from all operators caused 81,218 leaks where 74,743 were hazardous.

Excess Flow Valves

This shows better than national performance on EFV and manual shutoff valves at each service line

Massachusetts operators EFV $434,634 / 1,348,782 = 32\%$

All operators EFV $13,777,755 / 69,323,246 = 19.9\%$

Massachusetts services with manual shut off $763,539 / 1,348,782 = 57\%$

All operators with manual shutoff $7,731,390 / 69,323,246 = 11\%$