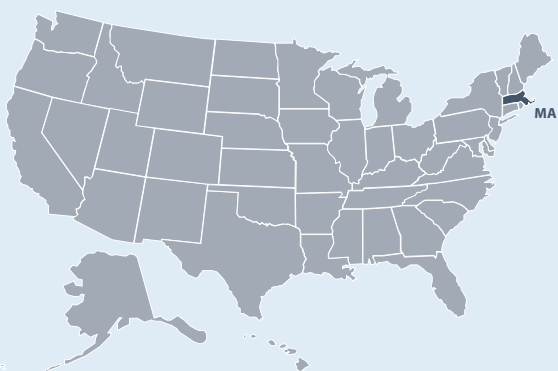




State of Massachusetts ENERGY SECTOR RISK PROFILE



Massachusetts State Facts



POPULATION

6.90 M



HOUSING UNITS

2.91 M



BUSINESS ESTABLISHMENTS

0.18 M

ENERGY EMPLOYMENT: 70,147 jobs
PUBLIC UTILITY COMMISSION: MA Department of Public Utilities
STATE ENERGY OFFICE: MA Department of Energy Resources
EMERGENCY MANAGEMENT AGENCY: MA Emergency Management Agency
AVERAGE ELECTRICITY TARIFF: 18.50 cents/kWh
ENERGY EXPENDITURES: \$3,381/capita
ENERGY CONSUMPTION PER CAPITA: 208 MMBtu (45th highest of 50 states and Washington, D.C.)
GDP: \$569.5 billion

Data from 2020 or most recent year available. For more information, see the Data Sources document.

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 85,100 GWh

COAL: 0 MSTN

NATURAL GAS: 424 Bcf

MOTOR GASOLINE: 55,100 Mbbbl

DISTILLATE FUEL: 21,500 Mbbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 483 plants, 21.5 TWh, 14.6 GW total capacity

Coal: 0 plants

Hydro: 30 plants, 1.0 TWh, 0.3 GW total capacity

Natural Gas: 44 plants, 15.4 TWh, 8.3 GW total capacity

Nuclear: 0 plants

Petroleum: 27 plants, 0.1 TWh, 2.9 GW total capacity

Wind & Solar: 354 plants, 1.4 TWh, 1.0 GW total capacity

Other sources: 28 plants, 1.5 TWh, 2.2 GW total capacity

COAL: 0 MSTN

NATURAL GAS: 0 Bcf

CRUDE OIL: 0 Mbbbl

ETHANOL: 0 Mbbbl

Data from EIA (2018, 2019).

This State Energy Risk Profile examines the relative magnitude of the risks that the state of Massachusetts’s energy infrastructure routinely encounters in comparison with the probable impacts. Natural and man-made hazards with the potential to cause disruption of the energy infrastructure are identified. Certain natural and adversarial threats, such as cybersecurity, electromagnetic pulse, geomagnetic disturbance, pandemics, or impacts caused by infrastructure interdependencies, are ill-suited to location-based probabilistic risk assessment as they may not adhere to geographic boundaries, have limited occurrence, or have limited historic data. Cybersecurity and other threats not included in these profiles are ever present and should be included in state energy security planning. A complete list of data sources and national level comparisons can be found in the Data Sources document.

Massachusetts Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Flooding** at \$26 million per year (leading cause nationwide at \$12 billion per year).
- Massachusetts had 35 Major Disaster Declarations, 4 Emergency Declarations, and 0 Fire Management Assistance Declarations for 5 events between 2013 and 2019.
- Massachusetts registered 9% fewer Heating Degree Days and 55% greater Cooling Degree Days than average in 2019.
- There are 2 Fusion Centers in Massachusetts. The Primary Fusion Center is located in Maynard.

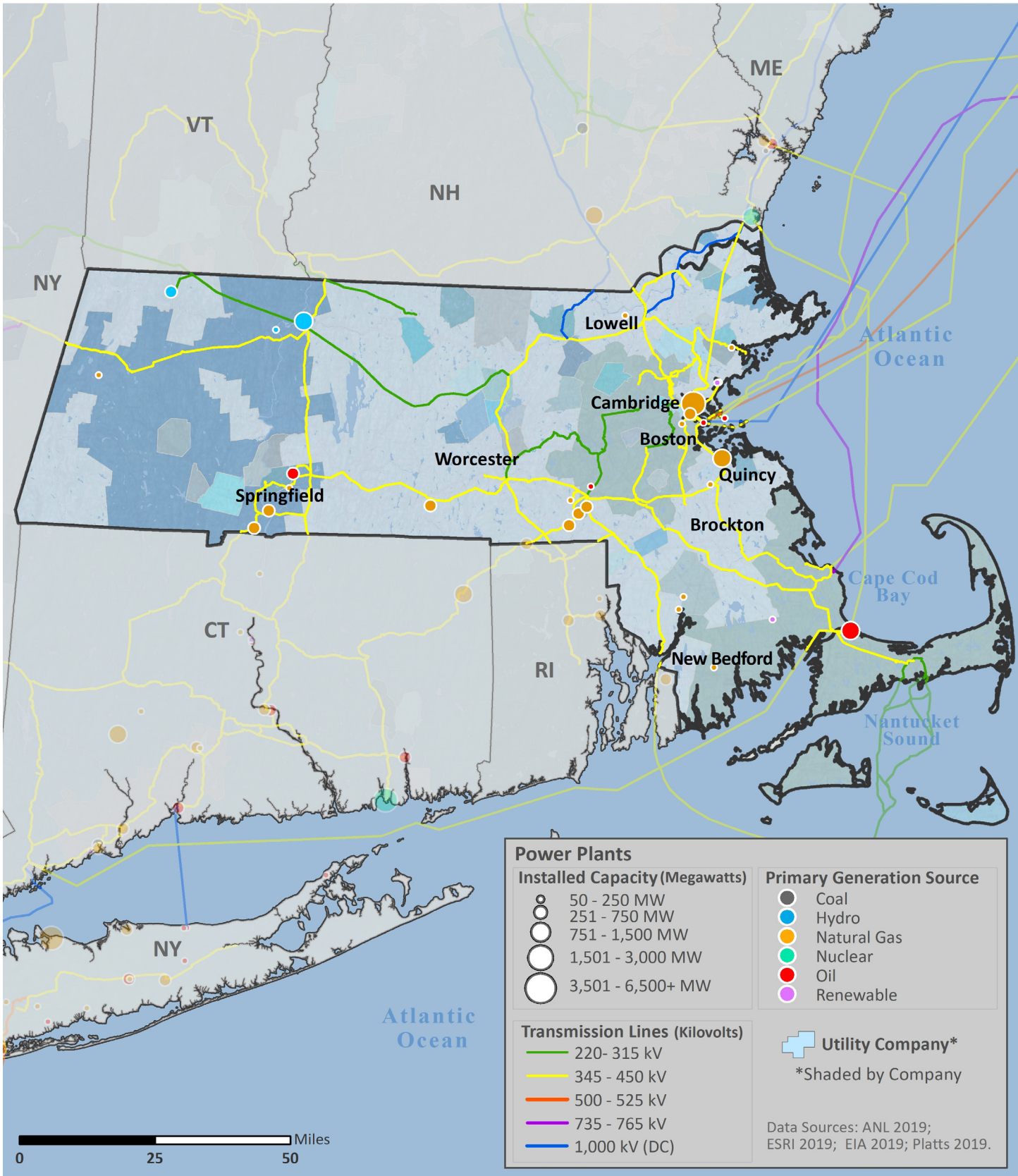
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	2	\$0
Earthquake (≥ 3.5 M)	0	\$0
Extreme Heat	1	\$0
Flood	21	\$26
Hurricane	1	\$4
Landslide	<1	\$0
Thunderstorm & Lightning	45	\$5
Tornado	2	\$25
Wildfire	<1	\$0
Winter Storm & Extreme Cold	21	\$2

Data Sources: NOAA and USGS



ELECTRIC









Electric Infrastructure

- Massachusetts has 56 electric utilities:
 - 3 Investor owned
 - 0 Cooperative
 - 40 Municipal
 - 13 Other utilities
- Plant retirements scheduled by 2025: 7 electric generating units totaling 728 MW of installed capacity.

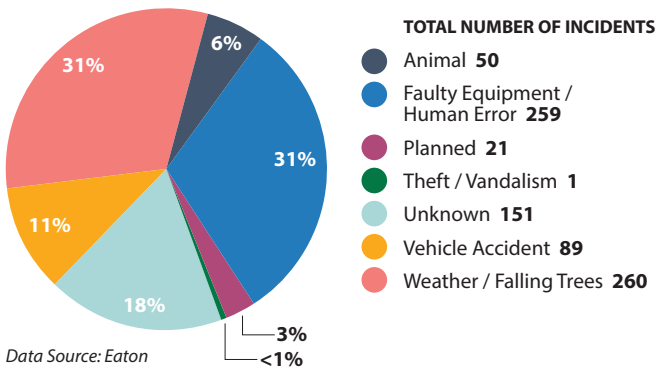
- In 2018, the average Massachusetts electric customer experienced 1.6 service interruptions that lasted an average of 13.6 hours.
- In Massachusetts, between 2008 and 2017:
 - The greatest number of electric outages occurred in **October** (5th for outages nationwide)
 - The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 442,314 customers on average

Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	87%	38%
Commercial 	13%	49%
Industrial 	<1%	13%
Transportation 	<1%	<1%

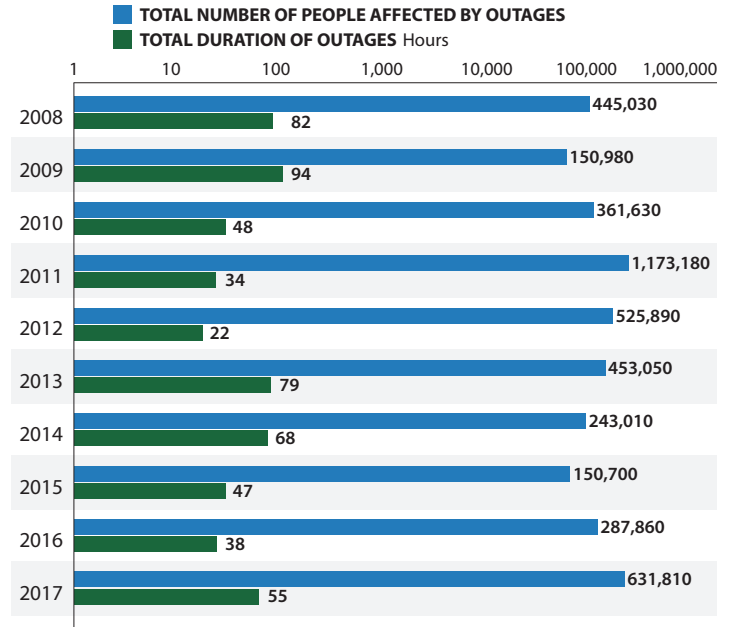
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



Data Source: Eaton

Electric Utility Outage Data, 2008 – 2017

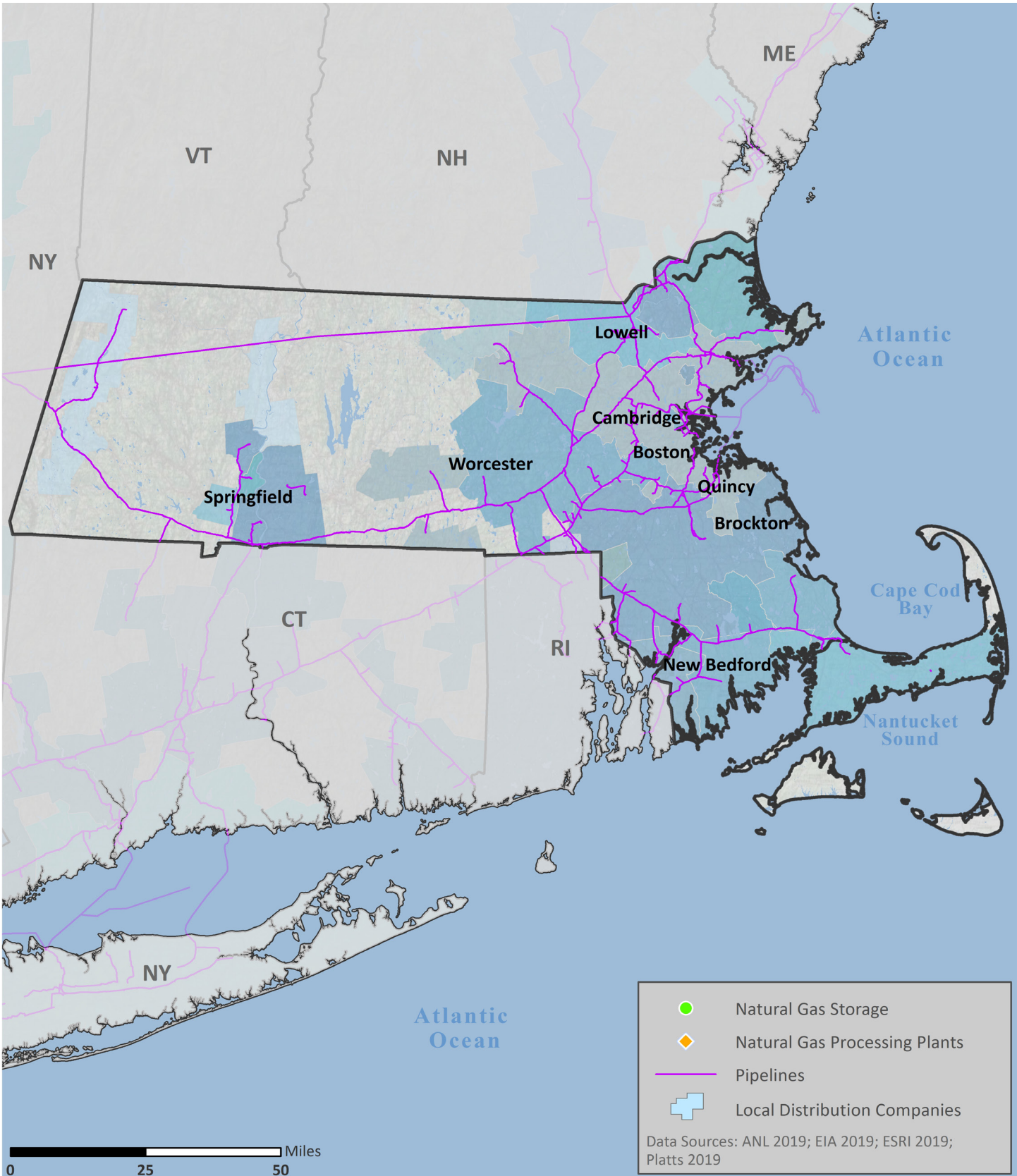


Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton



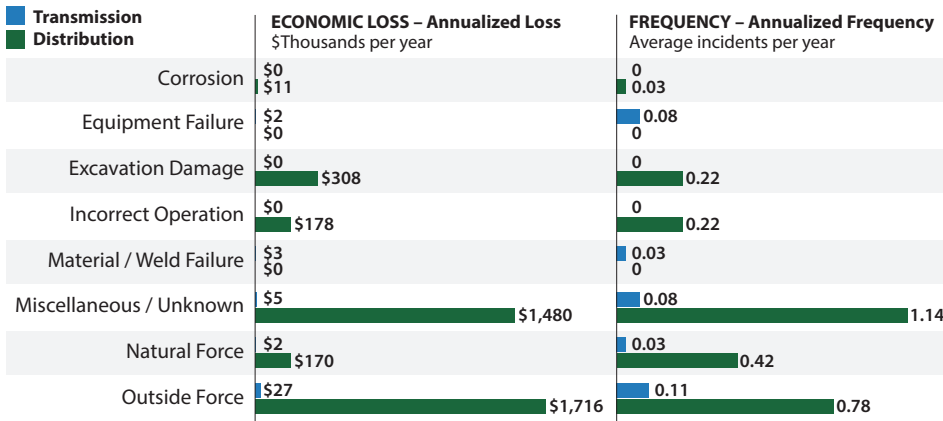


NATURAL GAS



Natural Gas Transport

Top Events Affecting Natural Gas Transmission and Distribution, 1984 – 2019

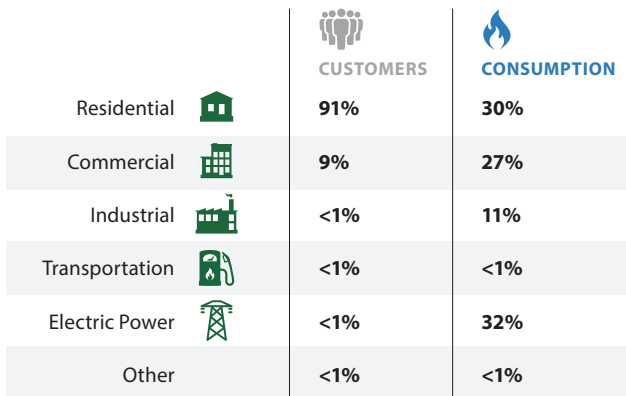


Data Source: DOT PHMSA

- As of 2018, Massachusetts had:
 - 1,130 miles of natural gas transmission pipelines
 - 21,714 miles of natural gas distribution pipelines
- 59% of Massachusetts’s natural gas transmission system and 27% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Massachusetts’s natural gas supply was most impacted by:
 - **Outside Forces** when transported by transmission pipelines (3rd leading cause nationwide at \$20.65M per year)
 - **Outside Forces** when transported by distribution pipelines (leading cause nationwide at \$76.59M per year)

Natural Gas Processing and Liquefied Natural Gas

Natural Gas Customers and Consumption by Sector, 2018



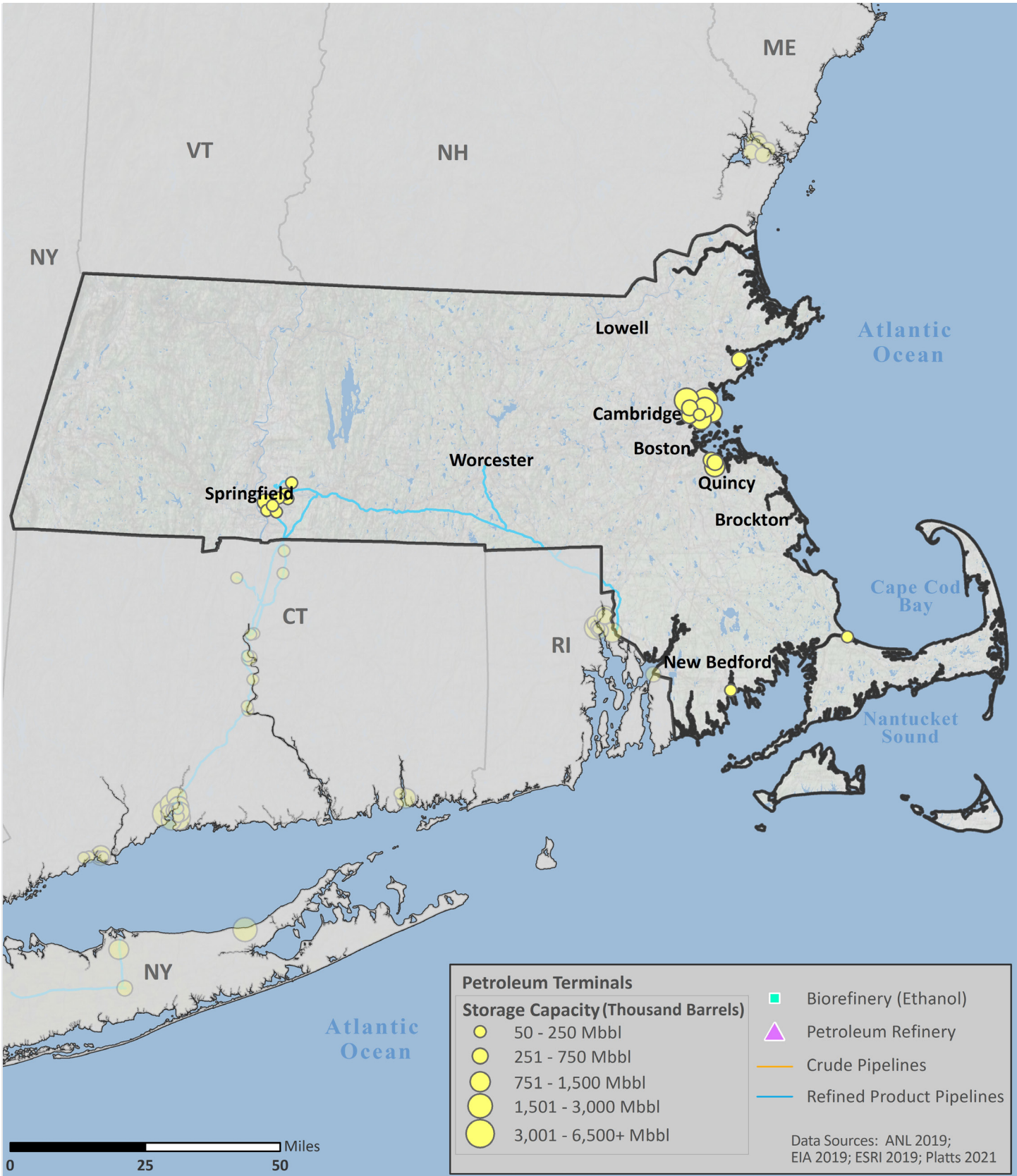
Data Source: EIA

- Massachusetts has 0 natural gas processing facilities.
- Massachusetts has 19 liquefied natural gas (LNG) facilities with a total storage capacity of 3,934,115 barrels.



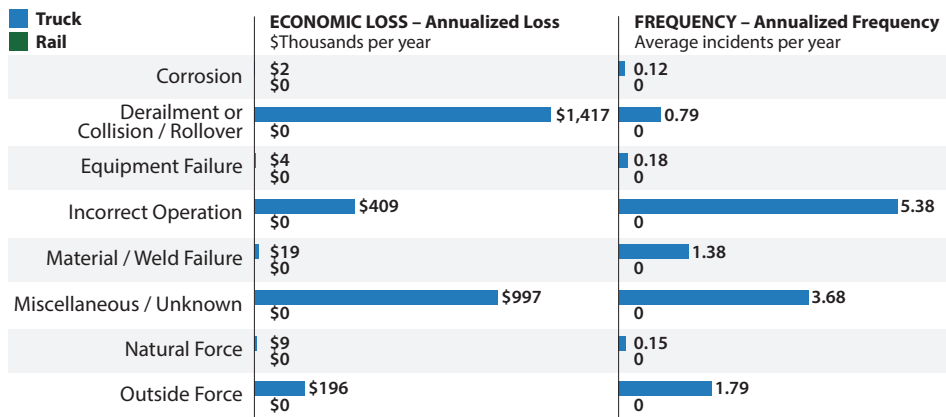


PETROLEUM



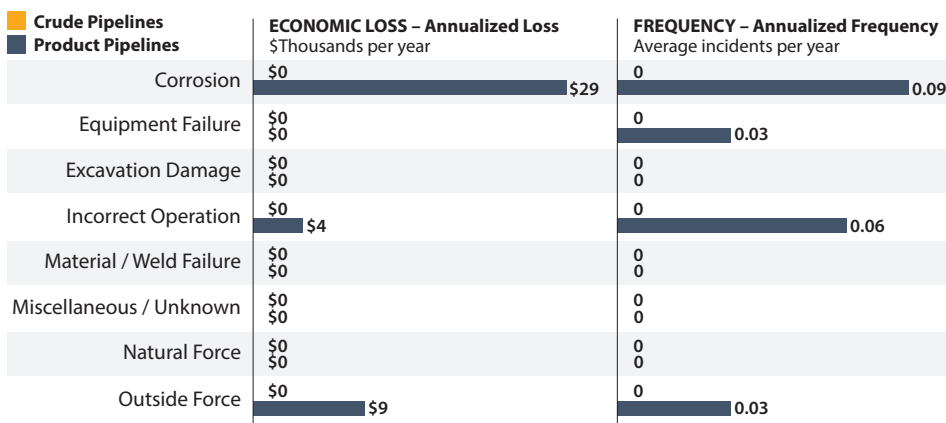
Petroleum Transport

Top Events Affecting Petroleum Transport by Truck and Rail, 1986 – 2019



Data Source: DOT PHMSA

Top Events Affecting Crude Oil and Refined Product Pipelines, 1986 – 2019



Data Source: DOT PHMSA

- As of 2018, Massachusetts had:
 - 0 miles of crude oil pipelines
 - 22 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 91% of Massachusetts’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Massachusetts’s petroleum supply was most impacted by:
 - **Derailments, Collisions, or Rollovers** when transported by truck (8th leading cause nationwide at \$0.07M per year)
 - **Corrosion** when transported by rail (8th leading cause nationwide at \$0.01M per year)
 - **Corrosion** when transported by product pipelines (2nd leading cause nationwide at \$15.20M per year)
- Disruptions in other states may impact supply.

Petroleum Refineries

- There are no operating petroleum refineries in Massachusetts.

