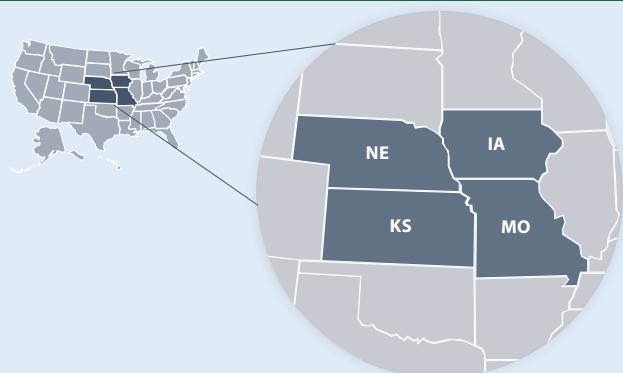




FEMA Region 7 ENERGY SECTOR RISK PROFILE



Region 7 Facts



POPULATION

14.12 M



HOUSING UNITS

6.34 M



BUSINESS ESTABLISHMENTS

0.37 M

ENERGY EMPLOYMENT: 154,806 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 9.74 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,870/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 372 MMBtu

GDP: \$800.9 billion

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

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 206,260 GWh

COAL: 85,500 MSTN

NATURAL GAS: 1,189 Bcf

MOTOR GASOLINE: 155,900 Mbbl

DISTILLATE FUEL: 105,400 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 717 plants, 228.1 TWh, 61.3 GW total capacity

Coal: 39 plants, 115.5 TWh, 25.8 GW total capacity

Hydro: 20 plants, 4.4 TWh, 1.0 GW total capacity

Natural Gas: 178 plants, 19.7 TWh, 18.0 GW total capacity

Nuclear: 4 plants, 30.6 TWh, 4.0 GW total capacity

Petroleum: 239 plants, 0.4 TWh, 3.2 GW total capacity

Wind & Solar: 214 plants, 56.7 TWh, 19.3 GW total capacity

Other sources: 23 plants, 0.8 TWh, 0.7 GW total capacity

COAL: 200 MSTN

NATURAL GAS: 180 Bcf

CRUDE OIL: 35,000 Mbbl

ETHANOL: 168,400 Mbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 7's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 7 includes Iowa, Kansas, Missouri, and Nebraska.

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.

Region 7 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Tornadoes** at \$468 million per year (4th leading cause nationwide at \$2 billion per year).
- Region 7 had 1,167 Major Disaster Declarations, 107 Emergency Declarations, and 14 Fire Management Assistance Declarations for 55 events between 2013 and 2019.
- The FEMA Region 7 office is located in Kansas City, MO.

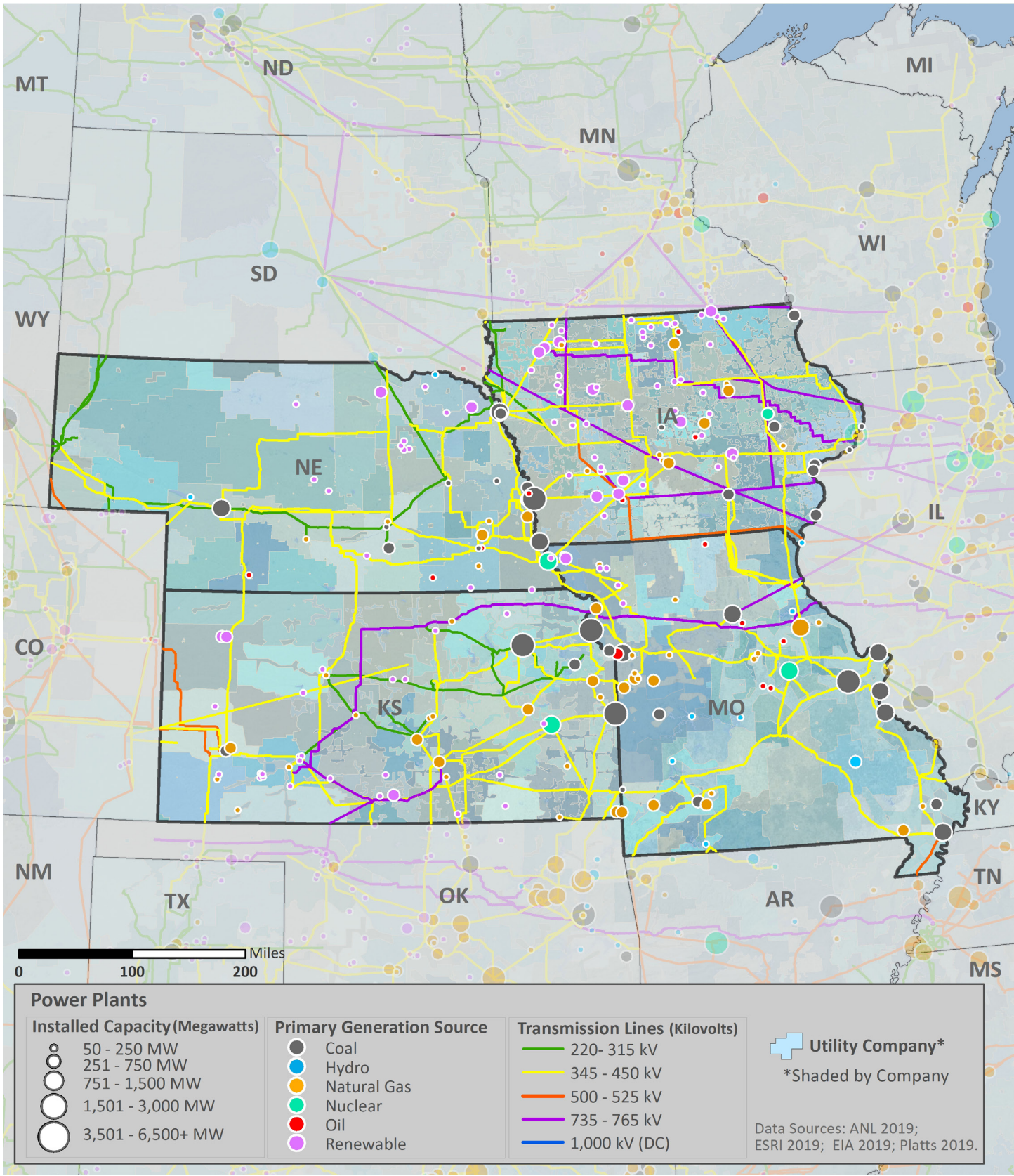
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	35	\$23
Earthquake (≥ 3.5 M)	7	\$0
Extreme Heat	25	\$2
Flood	233	\$212
Hurricane	0	\$0
Landslide	<1	\$0
Thunderstorm & Lightning	677	\$109
Tornado	108	\$468
Wildfire	7	\$8
Winter Storm & Extreme Cold	139	\$35

Data Sources: NOAA and USGS



ELECTRIC









Electric Infrastructure

- Region 7 has 604 electric utilities:
 - 10 Investor owned
 - 116 Cooperative
 - 440 Municipal
 - 38 Other utilities
- Plant retirements scheduled by 2025: 26 electric generating units totaling 2,799 MW of installed capacity.

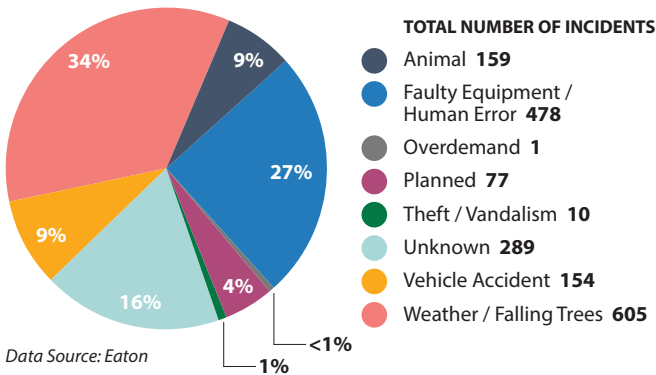
- In 2018, the average Region 7 electric customer experienced 1 service interruption that lasted an average of 2.5 hours.
- Between 2008 and 2017:
 - In Region 7, the greatest number of electric outages occurred in **June** (2nd for outages nationwide)
 - The leading cause of electric outages in Region 7 was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 538,523 customers on average

Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	85%	37%
Commercial 	14%	34%
Industrial 	1%	29%
Transportation 	<1%	<1%

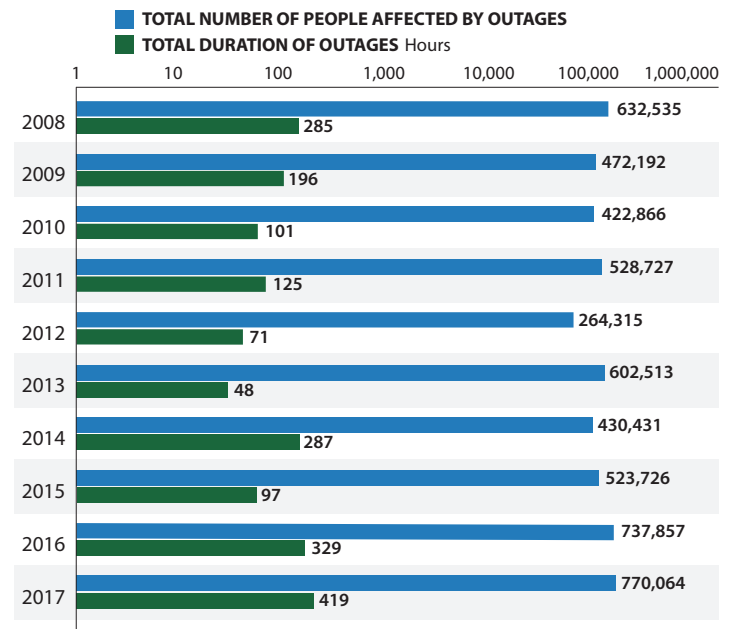
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



Data Source: Eaton

Electric Utility Outage Data, 2008 – 2017

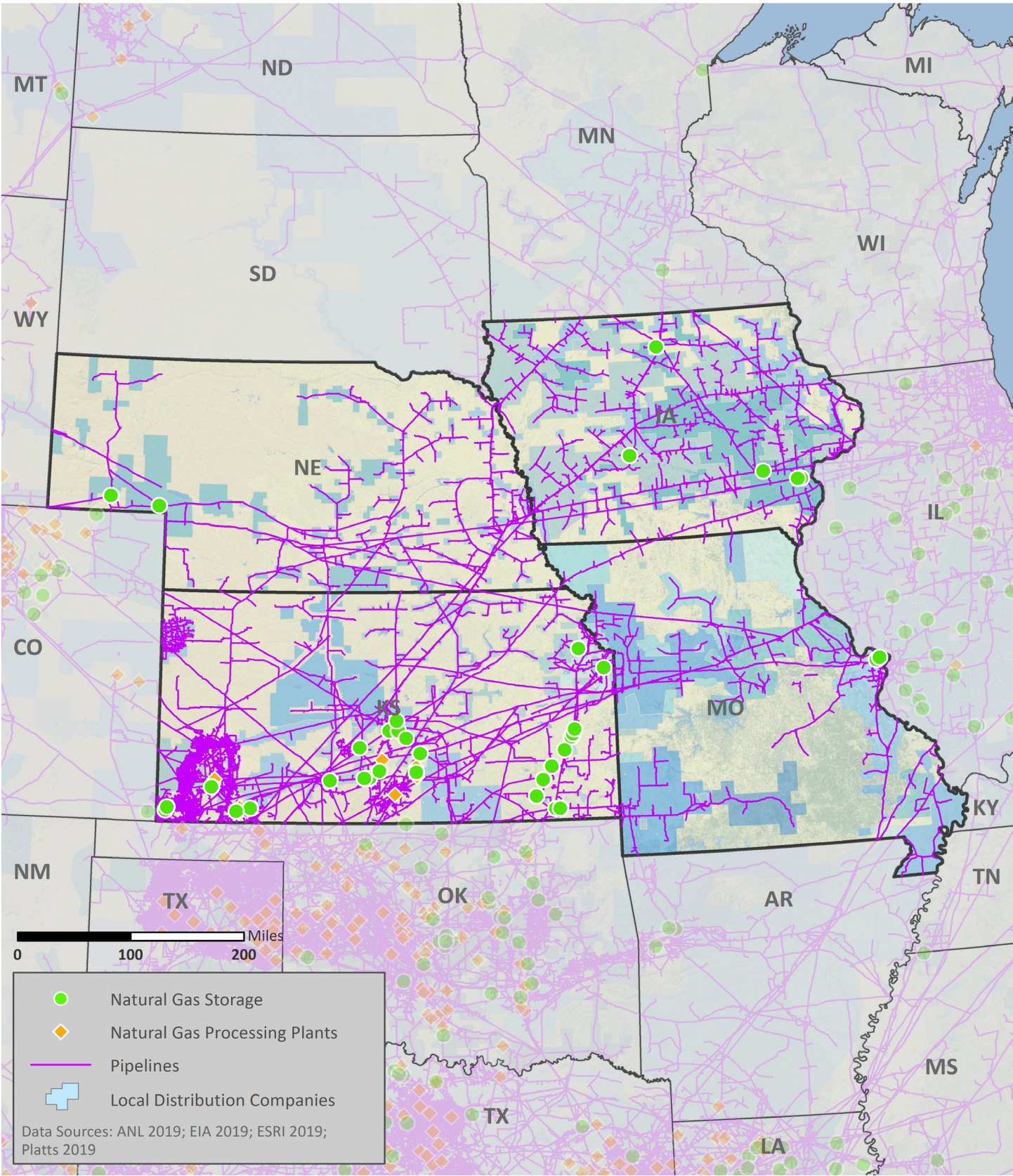


Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton



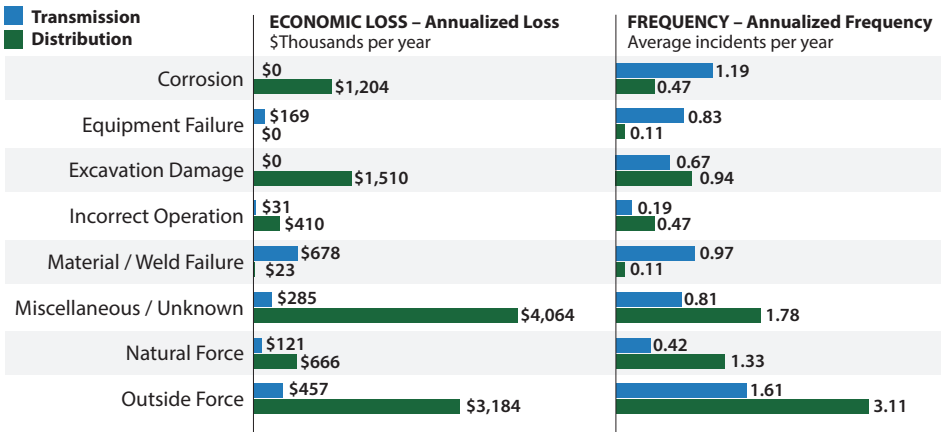


NATURAL GAS



Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Region 7 had:
 - 32,486 miles of natural gas transmission pipelines
 - 82,808 miles of natural gas distribution pipelines
- 68% of Region 7’s natural gas transmission system and 37% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 7’s natural gas supply was most impacted by:
 - **Material Failures** when transported by transmission pipelines (leading cause nationwide at \$28.43M per year)
 - **Miscellaneous or Unknown** events when transported by distribution pipelines (2nd leading cause nationwide at \$67.89M per year)

Natural Gas Processing and Liquefied Natural Gas

Natural Gas Customers and Consumption by Sector, 2018

	CUSTOMERS	CONSUMPTION
Residential	91%	20%
Commercial	8%	15%
Industrial	<1%	54%
Transportation	<1%	<1%
Electric Power	<1%	11%
Other	<1%	<1%

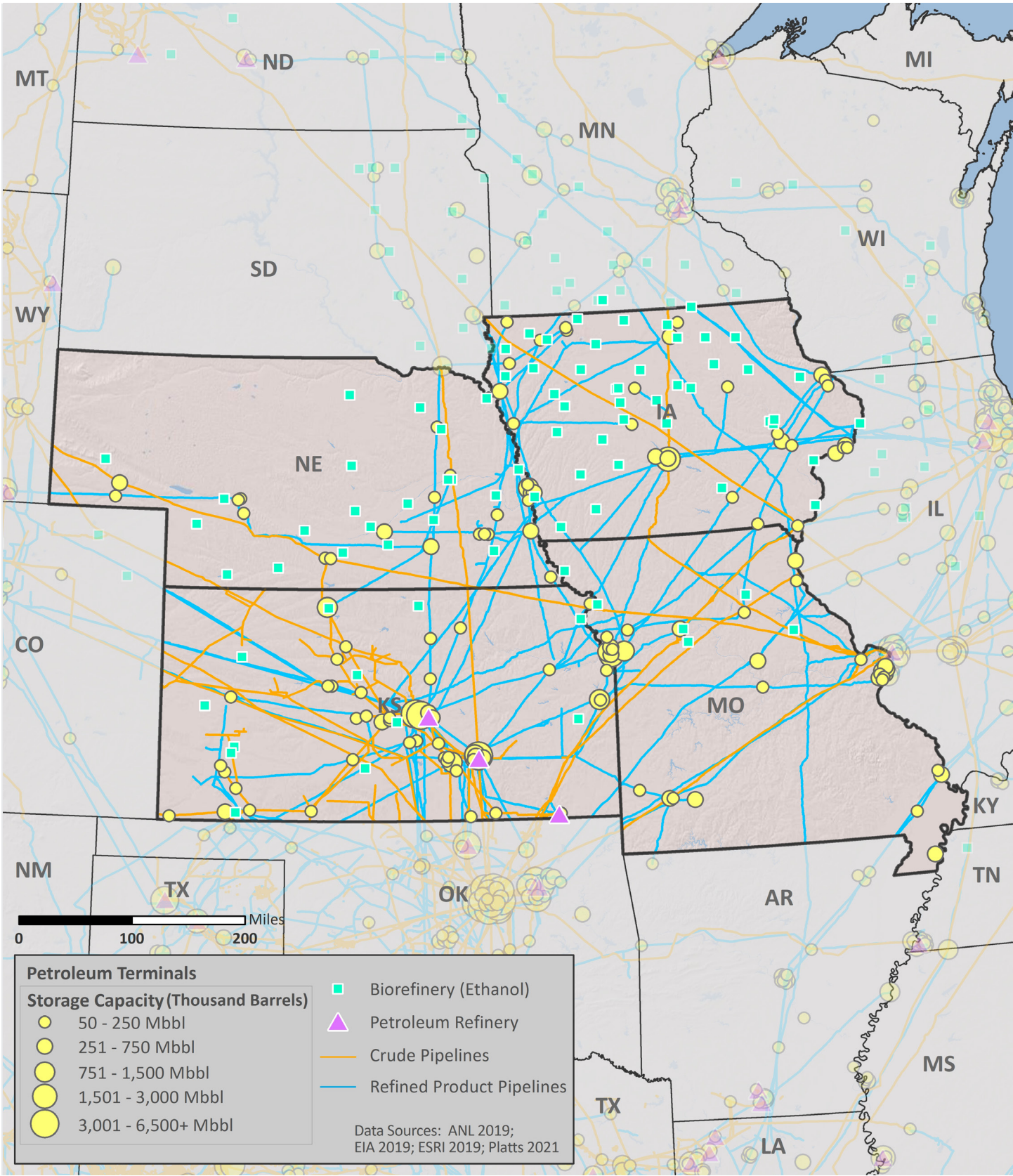
Data Source: EIA

- Region 7 has 6 natural gas processing facilities.
- Region 7 has 7 liquefied natural gas (LNG) facilities with a total storage capacity of 1,415,590 barrels.



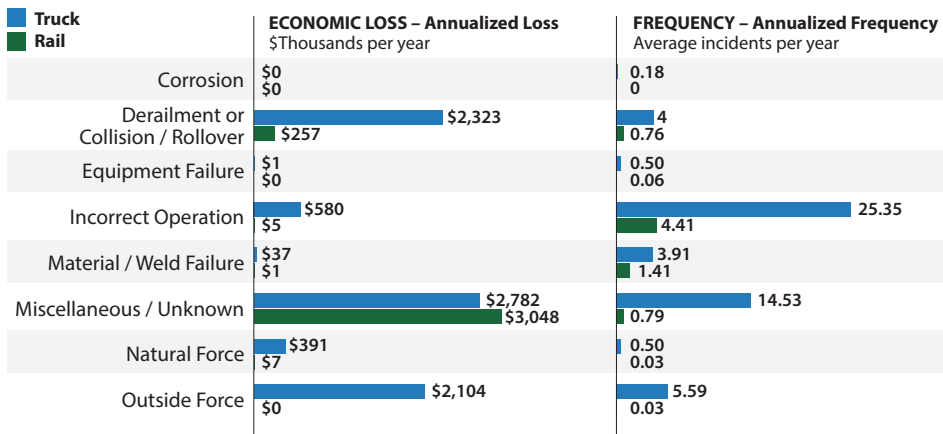


PETROLEUM



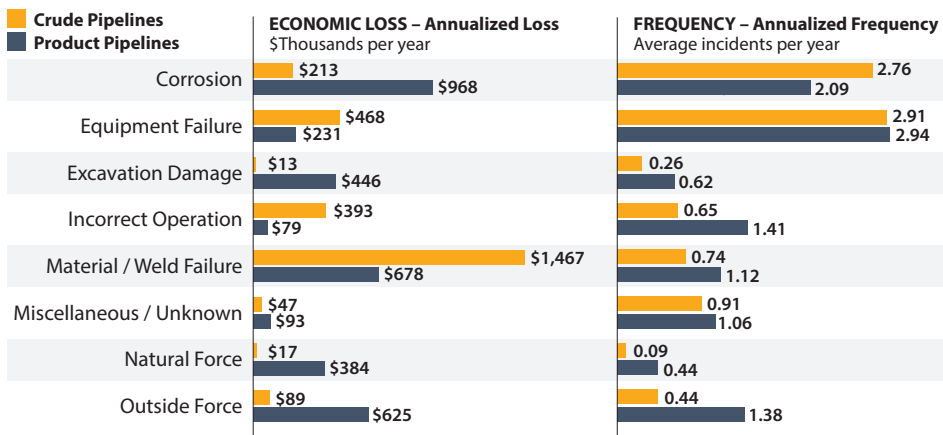
Petroleum Transport

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



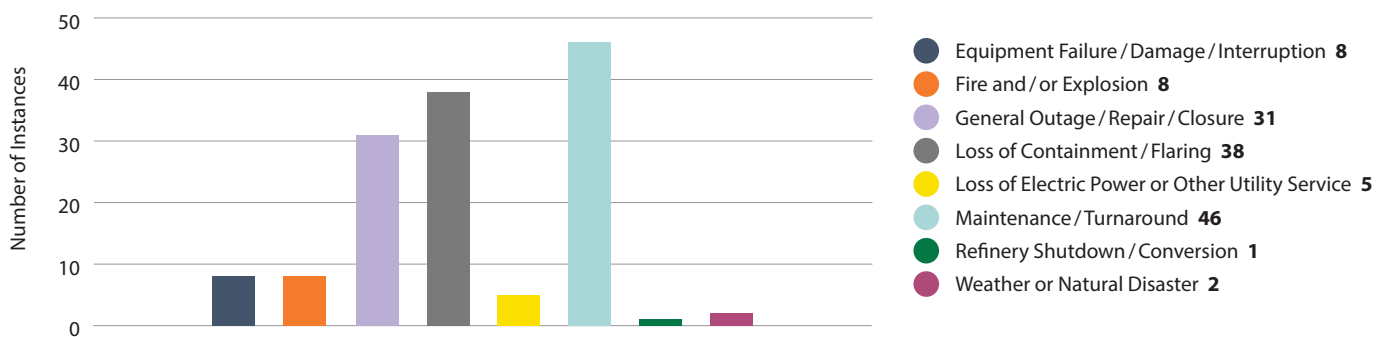
Data Source: DOT PHMSA

- Region 7 is part of Petroleum Administration for Defense District (PADD) 2.
- As of 2018, Region 7 had:
 - 7,257 miles of crude oil pipelines
 - 8,428 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 58% of Region 7’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 7’s petroleum supply was most impacted by:
 - **Miscellaneous or Unknown events** when transported by truck (3rd leading cause nationwide at \$52.87M per year)
 - **Miscellaneous or Unknown events** when transported by rail (3rd leading cause nationwide at \$6.11M per year)
 - **Miscellaneous or Unknown events** when transported by crude pipelines (5th leading cause nationwide at \$4.71M per year)
 - **Equipment Failures** when transported by product pipelines (6th leading cause nationwide at \$4.66M per year)
- Disruptions in other states may impact supply.

Petroleum Refineries

- Region 7 has 3 petroleum refineries with a total operable capacity of 393.7 Mb/d.

Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing