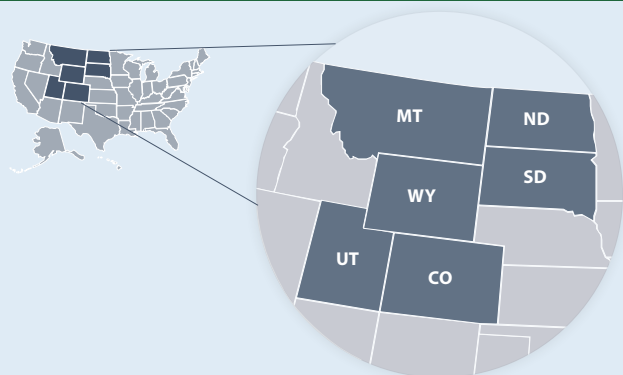




FEMA Region 8

ENERGY SECTOR RISK PROFILE



Region 8 Facts



POPULATION

12.14 M



HOUSING
UNITS

5.1 M



BUSINESS
ESTABLISHMENTS

0.35 M

ENERGY EMPLOYMENT: 219,993 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF:
9.28 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES:
\$3,656.22/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA:
353.39 MMBtu

GDP: \$747.4 billion

Data from 2020 or most recent year available.

For more information, see the Data Sources document.

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 155,970 GWh

COAL: 94,500 MSTN

NATURAL GAS: 995 Bcf

MOTOR GASOLINE: 135,000 Mbbl

DISTILLATE FUEL: 95,400 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 562 plants, 221.1 TWh,
54.0 GW total capacity

Coal: 40 plants, 127.8 TWh, 24.0 GW total capacity

Hydro: 119 plants, 24.8 TWh, 6.2 GW total capacity

Natural Gas: 81 plants, 30.6 TWh, 13.8 GW total capacity

Nuclear: 0 plants

Petroleum: 40 plants, 0.6 TWh, 0.7 GW total capacity

Wind & Solar: 246 plants, 35.9 TWh, 13.1 GW total capacity

Other sources: 36 plants, 1.4 TWh, 1.0 GW total capacity

COAL: 409,800 MSTN

NATURAL GAS: 4,920 Bcf

CRUDE OIL: 871,500 Mbbl

ETHANOL: 40,400 Mbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 8's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 8 includes Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

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 8 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Thunderstorms & Lightning** at \$476 million per year (2nd leading cause nationwide at \$2.8 billion per year).
- FEMA Region 8 had 414 Major Disaster Declarations, 21 Emergency Declarations, and 49 Fire Management Assistance Declarations for 76 events between 2013 and 2019.
- The FEMA Region 8 office is located in Denver, CO.

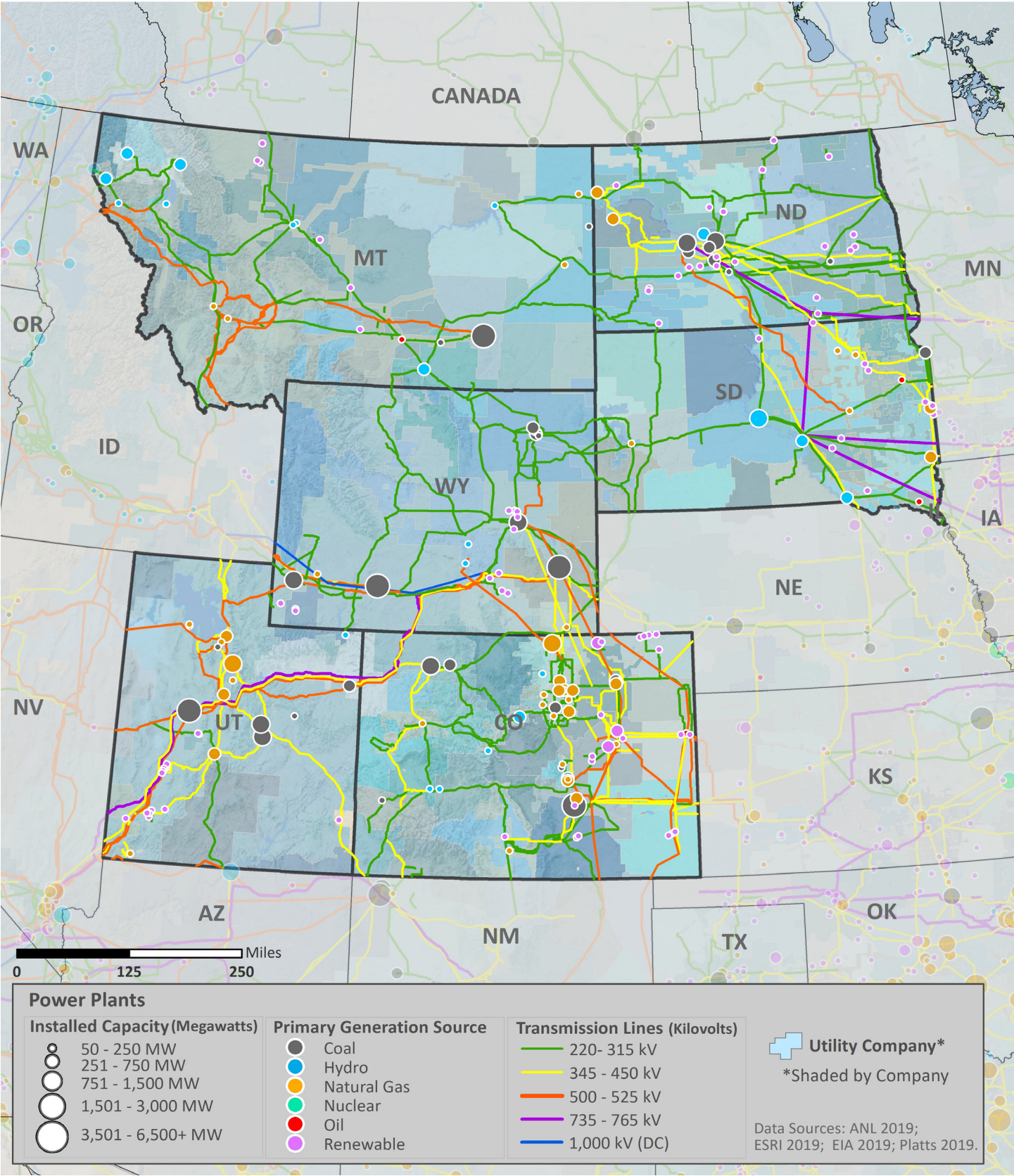
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009–2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	26	\$0
Earthquake (≥ 3.5 M)	16	\$0
Extreme Heat	3	\$0
Flood	167	\$118
Hurricane	0	\$0
Landslide	27	\$2
Thunderstorm & Lightning	746	\$476
Tornado	80	\$14
Wildfire	29	\$152
Winter Storm & Extreme Cold	316	\$23

Data Sources: NOAA and USGS



ELECTRIC



Electric Infrastructure

- Region 8 has 261 electric utilities:
 - 9 Investor owned
 - 114 Cooperative
 - 123 Municipal
 - 15 Other utilities
- Plant retirements scheduled by 2025: 16 electric generating units totaling 2,460 MW of installed capacity.

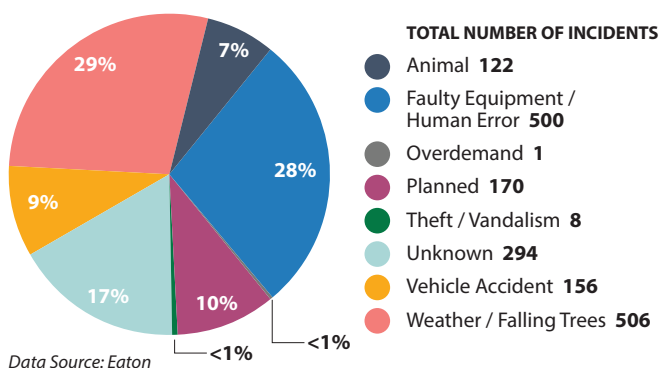
- In 2018, the average Region 8 electric customer experienced 1 service interruption that lasted an average of 2 hours.
- Between 2008 and 2017:
 - In Region 8, the greatest number of electric outages occurred in **October** (5th for outages nationwide)
 - The leading cause of electric outages in Region 8 was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 594,256 customers on average

Electric Customers and Consumption by Sector, 2018

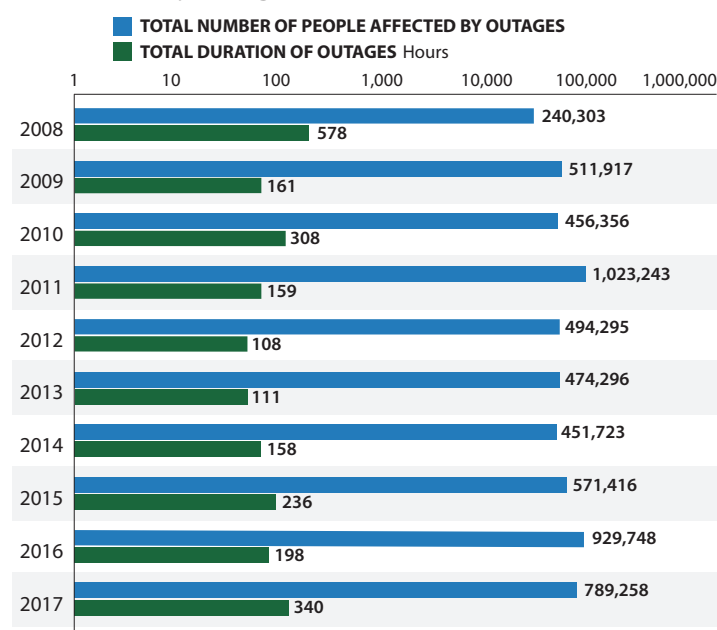
		
	CUSTOMERS	CONSUMPTION
Residential 	85%	31%
Commercial 	14%	35%
Industrial 	1%	34%
Transportation 	<1%	<1%

Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



Electric Utility Outage Data, 2008 – 2017

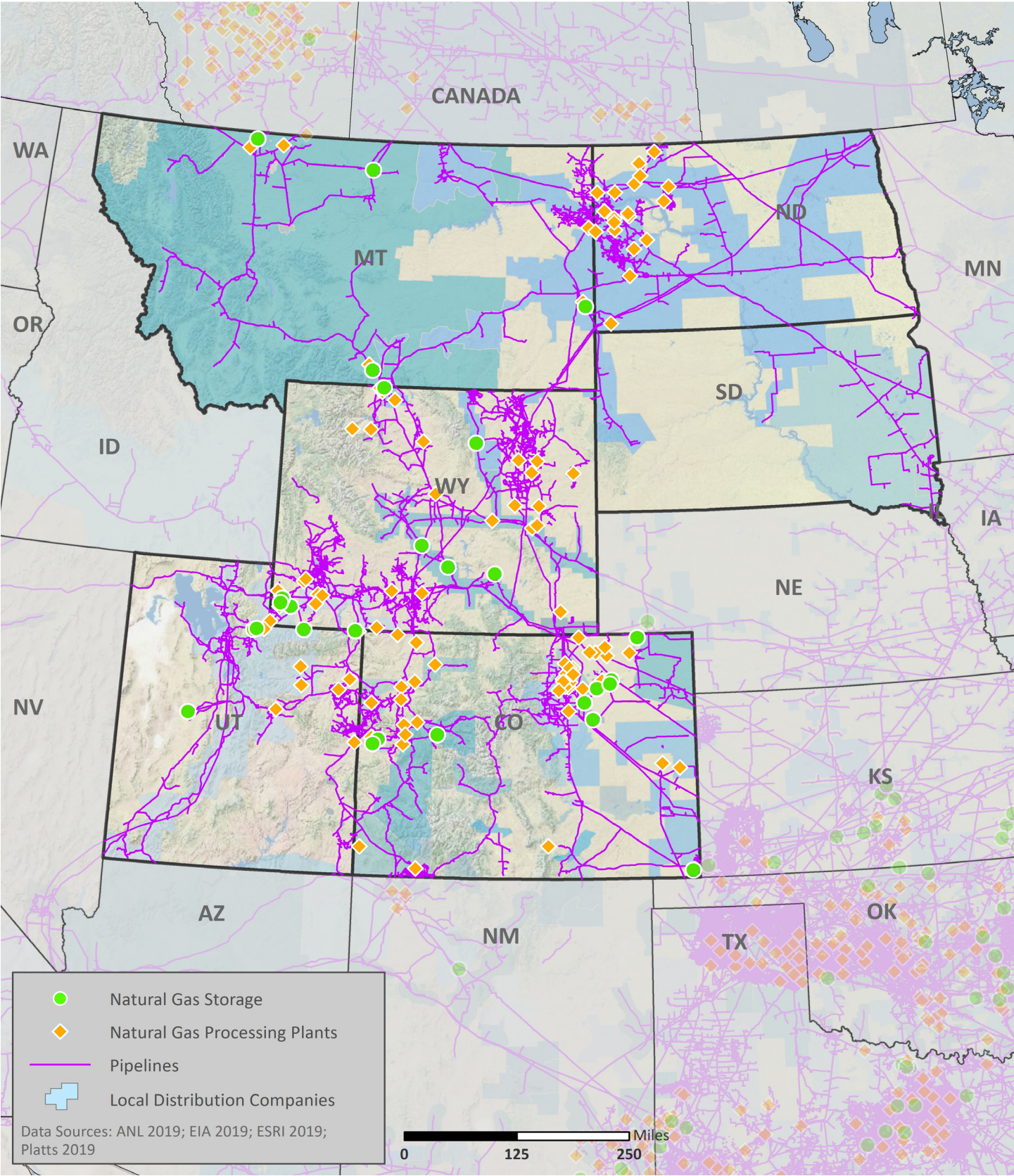


Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton



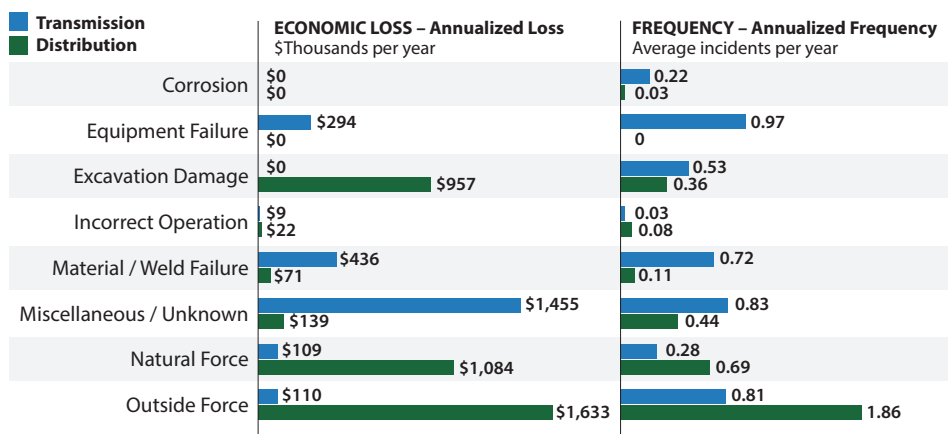


NATURAL GAS



Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Region 8 had:
 - 25,532 miles of natural gas transmission pipelines
 - 76,814 miles of natural gas distribution pipelines
- 36% of Region 8's natural gas transmission system and 31% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 8's natural gas supply was most impacted by:
 - Miscellaneous or Unknown** events when transported by transmission pipelines (5th leading cause nationwide at \$16.77M 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

	 CUSTOMERS	 CONSUMPTION
Residential 	91%	27%
Commercial 	8%	17%
Industrial 	<1%	29%
Transportation 	<1%	<1%
Electric Power 	<1%	27%
Other	<1%	<1%

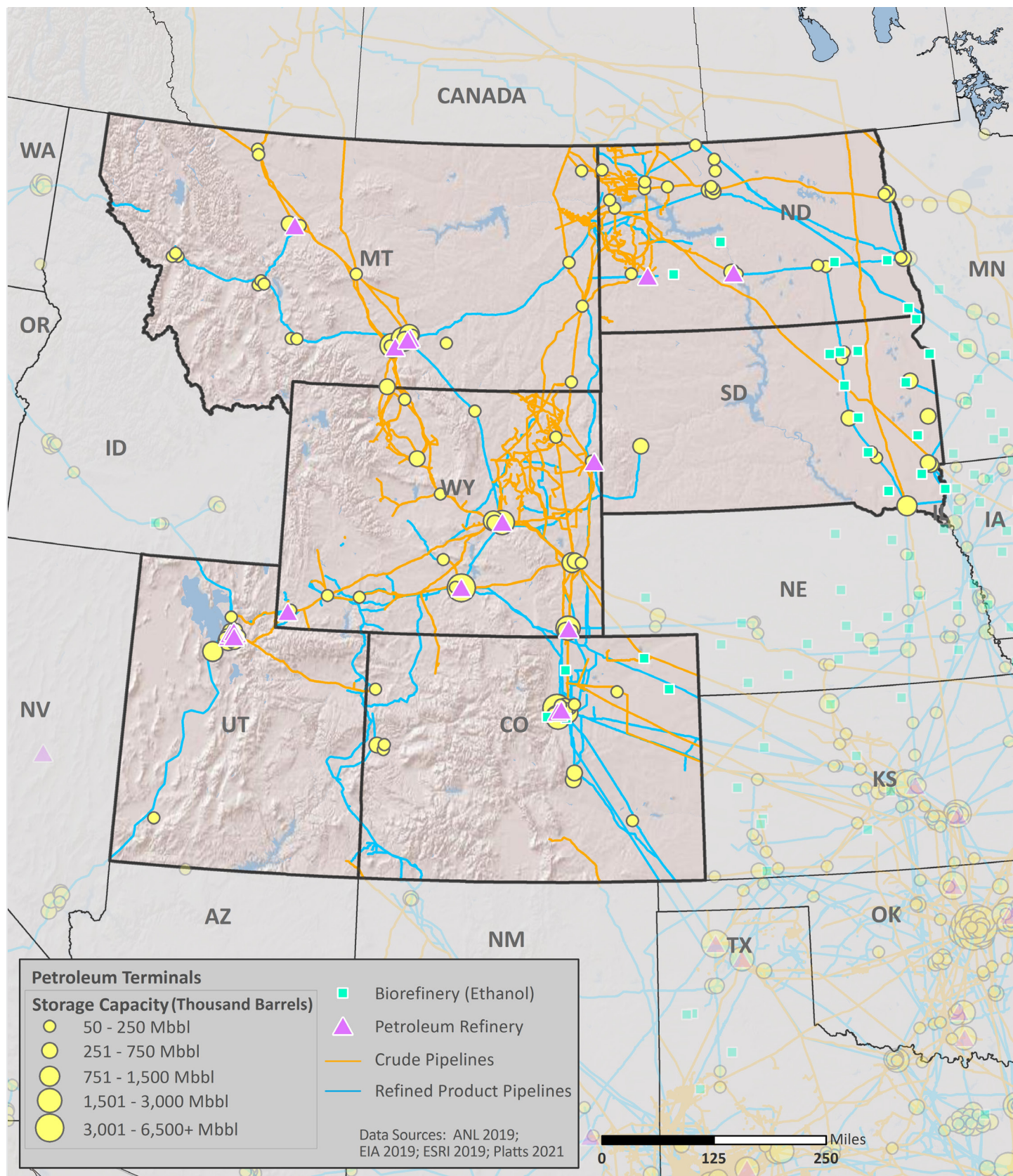
Data Source: EIA

- Region 8 has 98 natural gas processing facilities.
- Region 8 has 3 liquefied natural gas (LNG) facilities with a total storage capacity of 7,361 barrels.



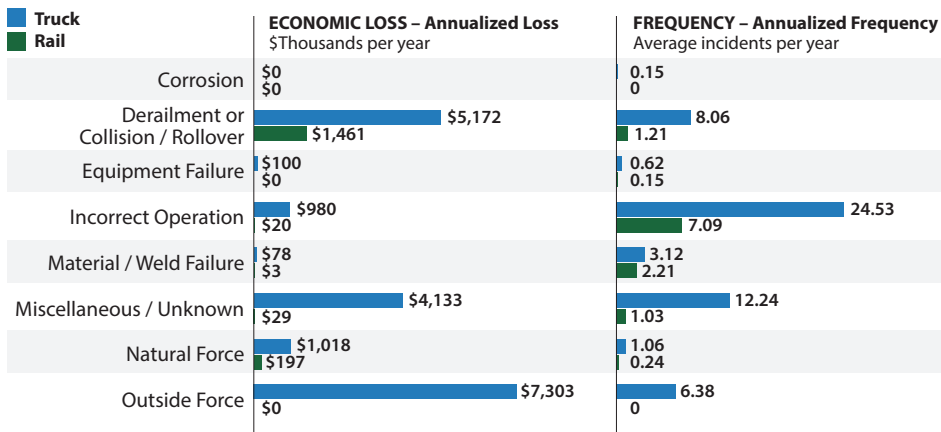


PETROLEUM



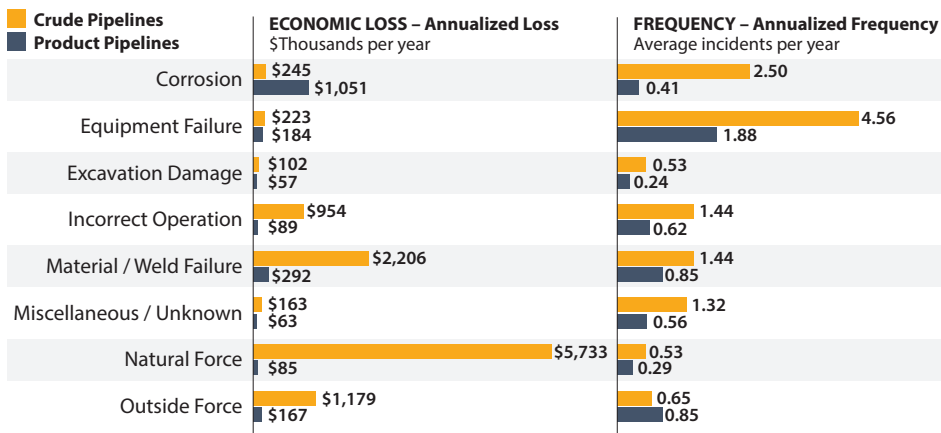
Petroleum Transport

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



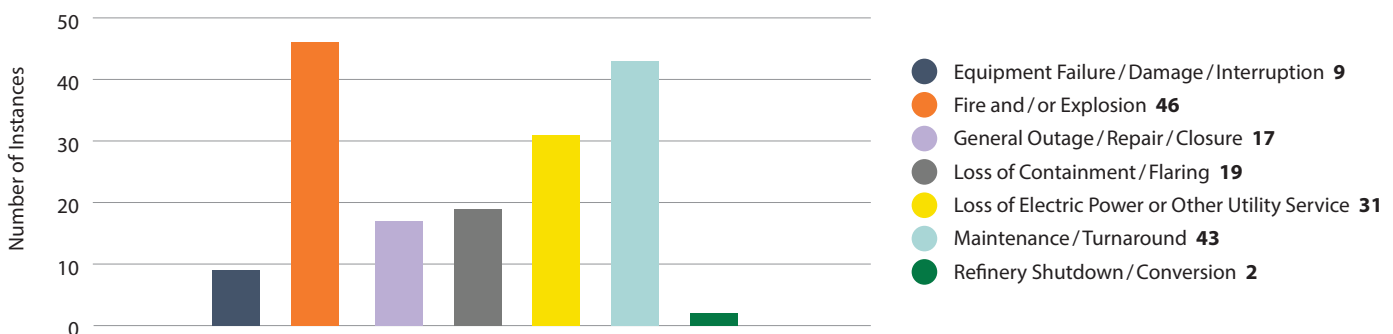
Data Source: DOT PHMSA

- Region 8 is part of Petroleum Administration for Defense Districts (PADDs) 2 and 4.
- As of 2018, Region 8 had:
 - 13,456 miles of crude oil pipelines
 - 5,255 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 42% of Region 8's petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 8's petroleum supply was most impacted by:
 - **Outside Forces** when transported by truck (2nd leading cause nationwide at \$60.45M per year)
 - **Derailments, Collisions, or Rollovers** when transported by rail (leading cause nationwide at \$19.71M per year)
 - **Outside Forces** when transported by crude pipelines (4th leading cause nationwide at \$8.71M 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 8 has 18 petroleum refineries with a total operable capacity of 777 Mb/d.

Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing