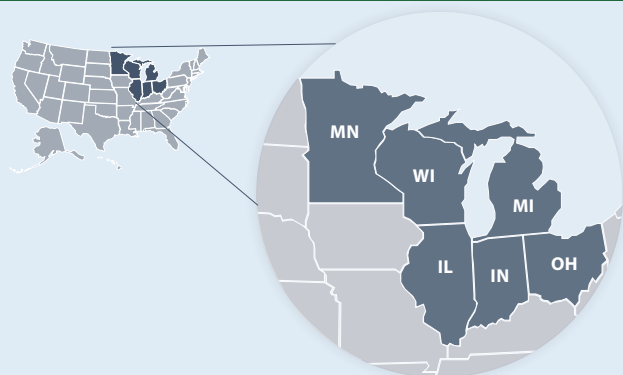




# FEMA Region 5 ENERGY SECTOR RISK PROFILE



## Region 5 Facts



POPULATION

52.54 M



HOUSING UNITS

23.28 M



BUSINESS ESTABLISHMENTS

1.23 M

ENERGY EMPLOYMENT: 442,768 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 10.23 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,449/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 317 MMBtu

GDP: \$3,140.3 billion

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

## ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 849,680 GWh

COAL: 174,600 MSTN

NATURAL GAS: 5,155 Bcf

MOTOR GASOLINE: 519,400 Mbbl

DISTILLATE FUEL: 219,100 Mbbl

## ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 1,628 plants, 645.8 TWh, 149.8 GW total capacity

Coal: 79 plants, 237.8 TWh, 60.8 GW total capacity

Hydro: 167 plants, 6.1 TWh, 1.4 GW total capacity

Natural Gas: 311 plants, 172.1 TWh, 68.5 GW total capacity

Nuclear: 14 plants, 172.8 TWh, 22.1 GW total capacity

Petroleum: 244 plants, 2.1 TWh, 3.9 GW total capacity

Wind & Solar: 641 plants, 43.3 TWh, 16.5 GW total capacity

Other sources: 172 plants, 11.6 TWh, 5.3 GW total capacity

COAL: 89,300 MSTN

NATURAL GAS: 2,750 Bcf

CRUDE OIL: 42,900 Mbbl

ETHANOL: 133,400 Mbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 5's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 5 includes Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

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 5 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Flooding** at \$450 million per year (leading cause nationwide at \$12 billion per year).
- Region 5 had 473 Major Disaster Declarations, 1 Emergency Declaration, and 0 Fire Management Assistance Declarations for 28 events between 2013 and 2019.
- The FEMA Region 5 office is located in Chicago, IL.

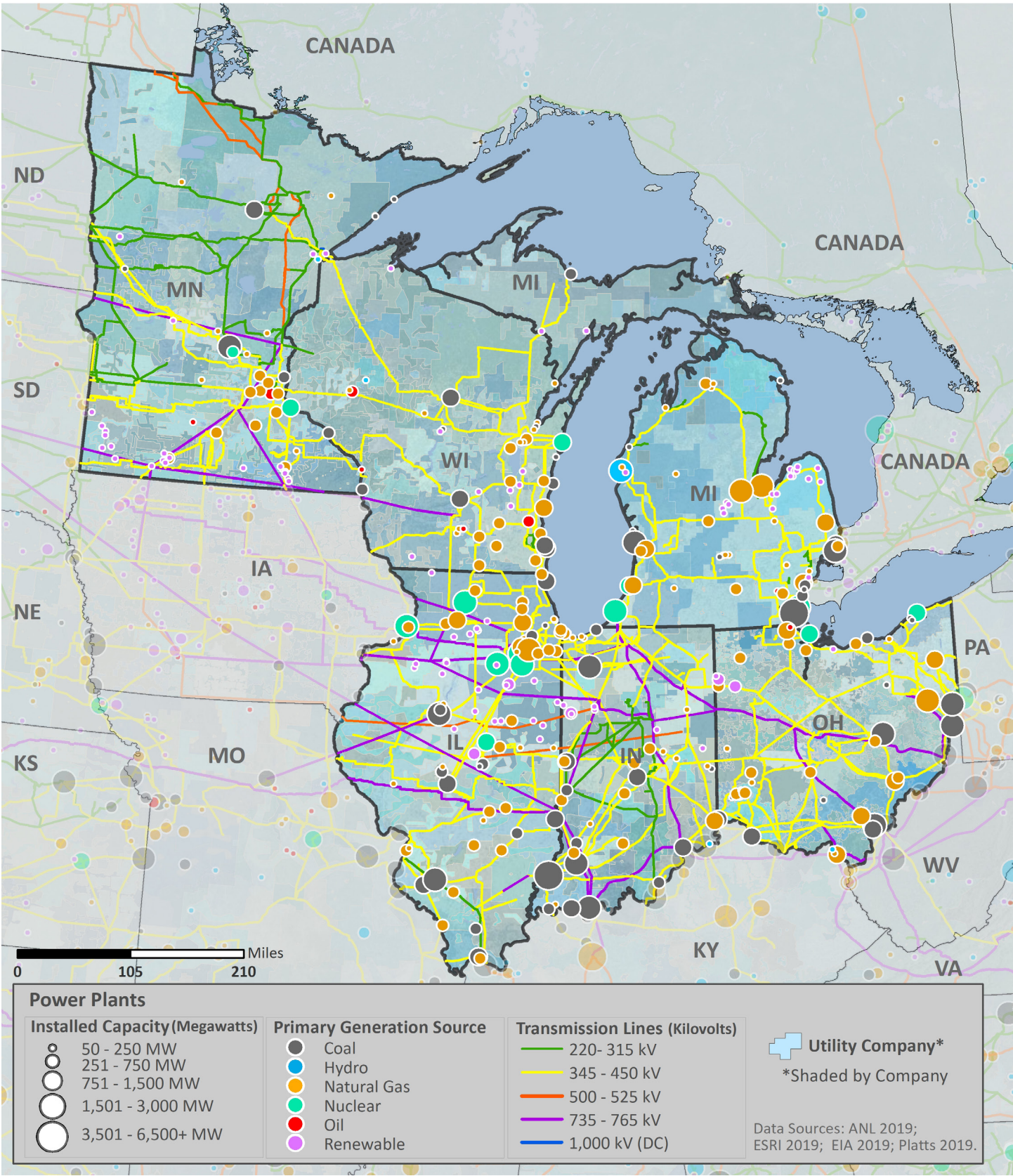
## Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	23	\$0
Earthquake (≥ 3.5 M)	1	\$0
Extreme Heat	24	\$0
Flood	250	\$450
Hurricane	0	\$0
Landslide	<1	\$0
Thunderstorm & Lightning	689	\$237
Tornado	105	\$277
Wildfire	3	\$2
Winter Storm & Extreme Cold	287	\$48

Data Sources: NOAA and USGS



# ELECTRIC









## Electric Infrastructure

- Region 5 has 687 electric utilities:
  - 47 Investor owned
  - 169 Cooperative
  - 434 Municipal
  - 37 Other utilities
- Plant retirements scheduled by 2025: 137 electric generating units totaling 15,310 MW of installed capacity.

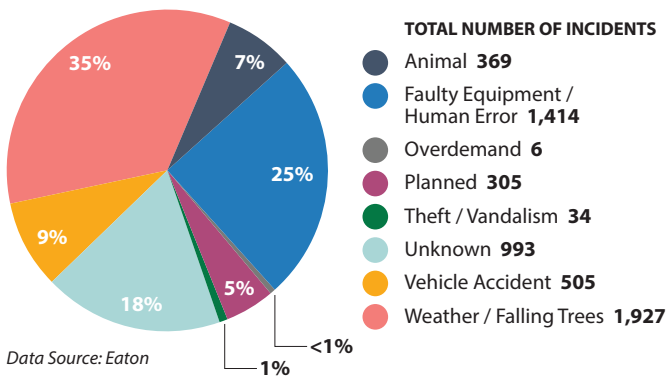
- In 2018, the average Region 5 electric customer experienced 1.2 service interruptions that lasted an average of 4.3 hours.
- Between 2008 and 2017:
  - In Region 5, the greatest number of electric outages occurred in **June** (2nd for outages nationwide)
  - The leading cause of electric outages in Region 5 was **Weather or Falling Trees** (leading cause nationwide)
  - Electric outages affected 3,529,015 customers on average

### Electric Customers and Consumption by Sector, 2018

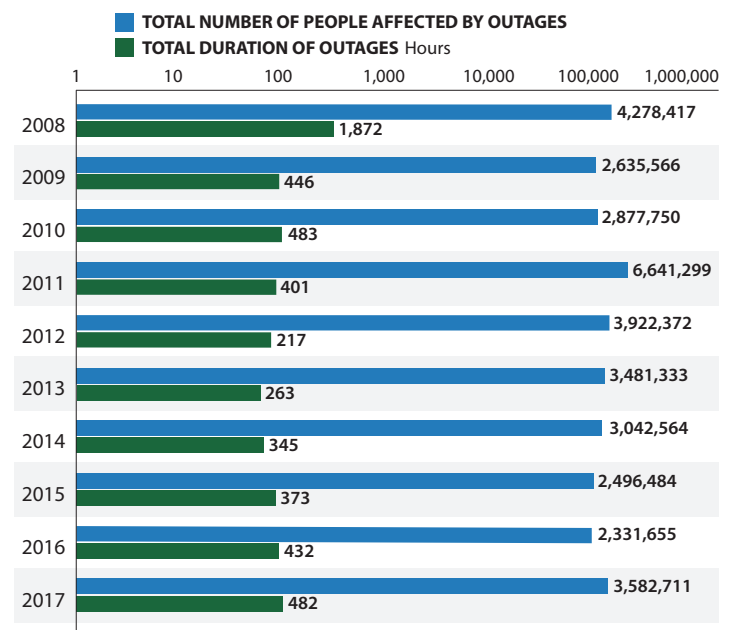
	 CUSTOMERS	 CONSUMPTION
Residential 	89%	34%
Commercial 	11%	32%
Industrial 	<1%	34%
Transportation 	<1%	<1%

Data Source: EIA

### Electric Utility-Reported Outages by Cause, 2008 – 2017



### Electric Utility Outage Data, 2008 – 2017

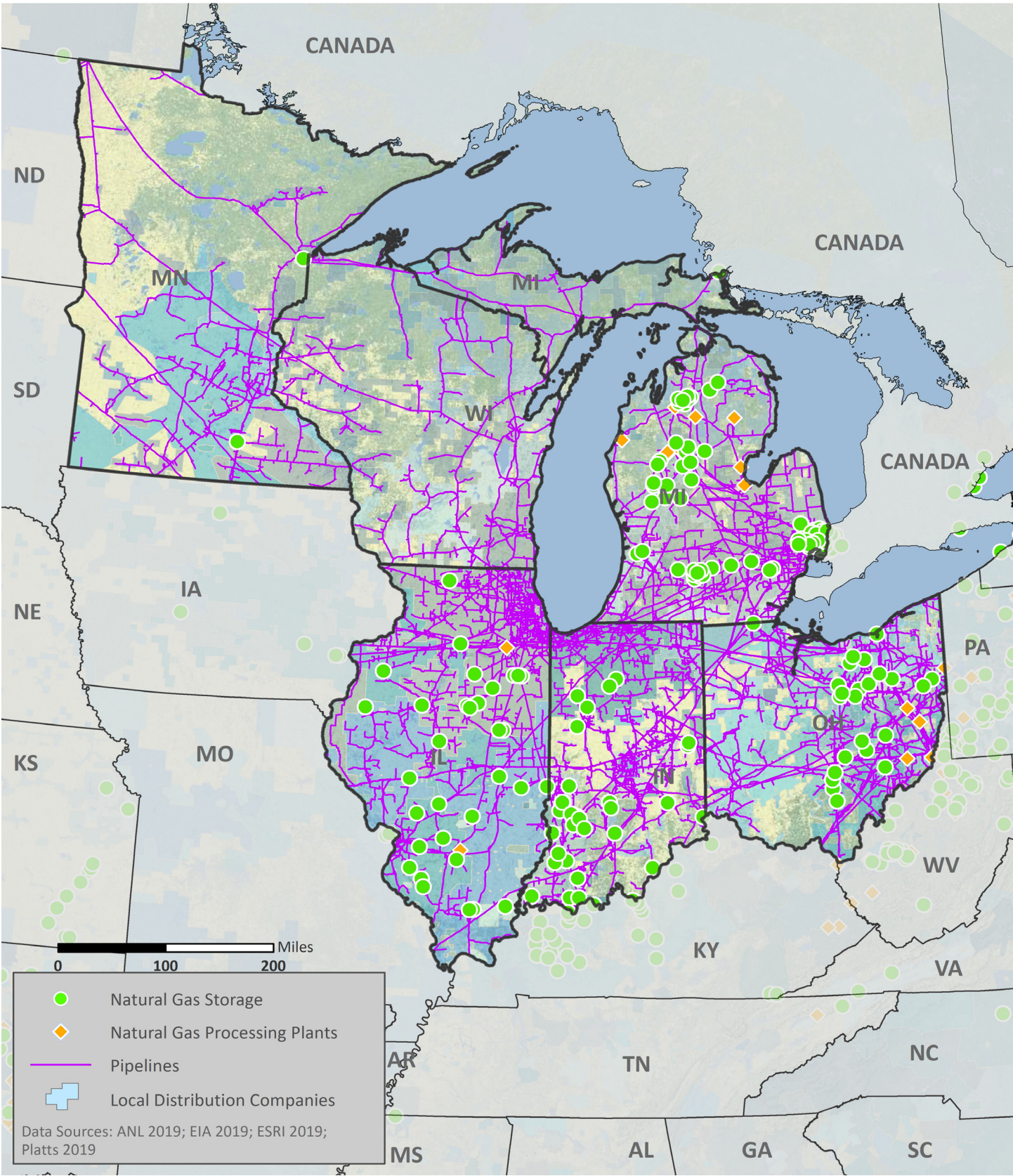


Note: This chart uses a logarithmic scale to display a very wide range of values.  
Data Source: Eaton



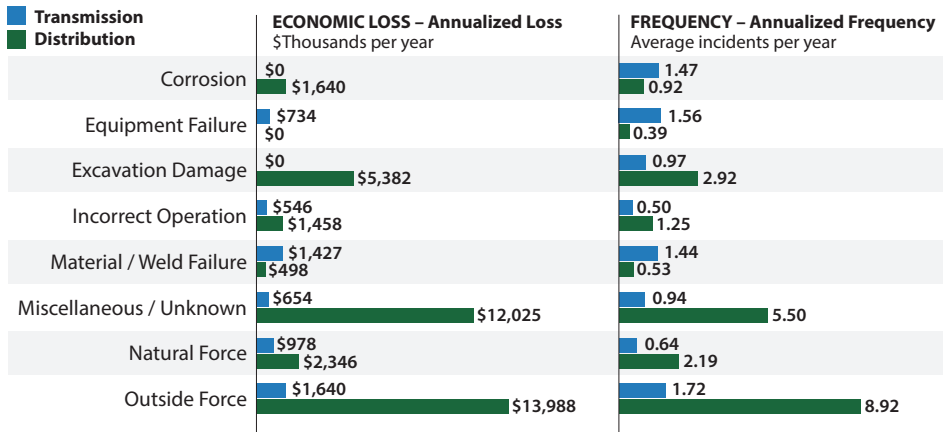


# NATURAL GAS



## Natural Gas Transport

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








Data Source: DOT PHMSA

- As of 2018, Region 5 had:
  - 43,922 miles of natural gas transmission pipelines
  - 295,681 miles of natural gas distribution pipelines
- 65% of Region 5’s natural gas transmission system and 34% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 5’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

	CUSTOMERS	CONSUMPTION
Residential 	92%	29%
Commercial 	7%	18%
Industrial 	<1%	32%
Transportation 	<1%	<1%
Electric Power 	<1%	22%
Other	<1%	<1%

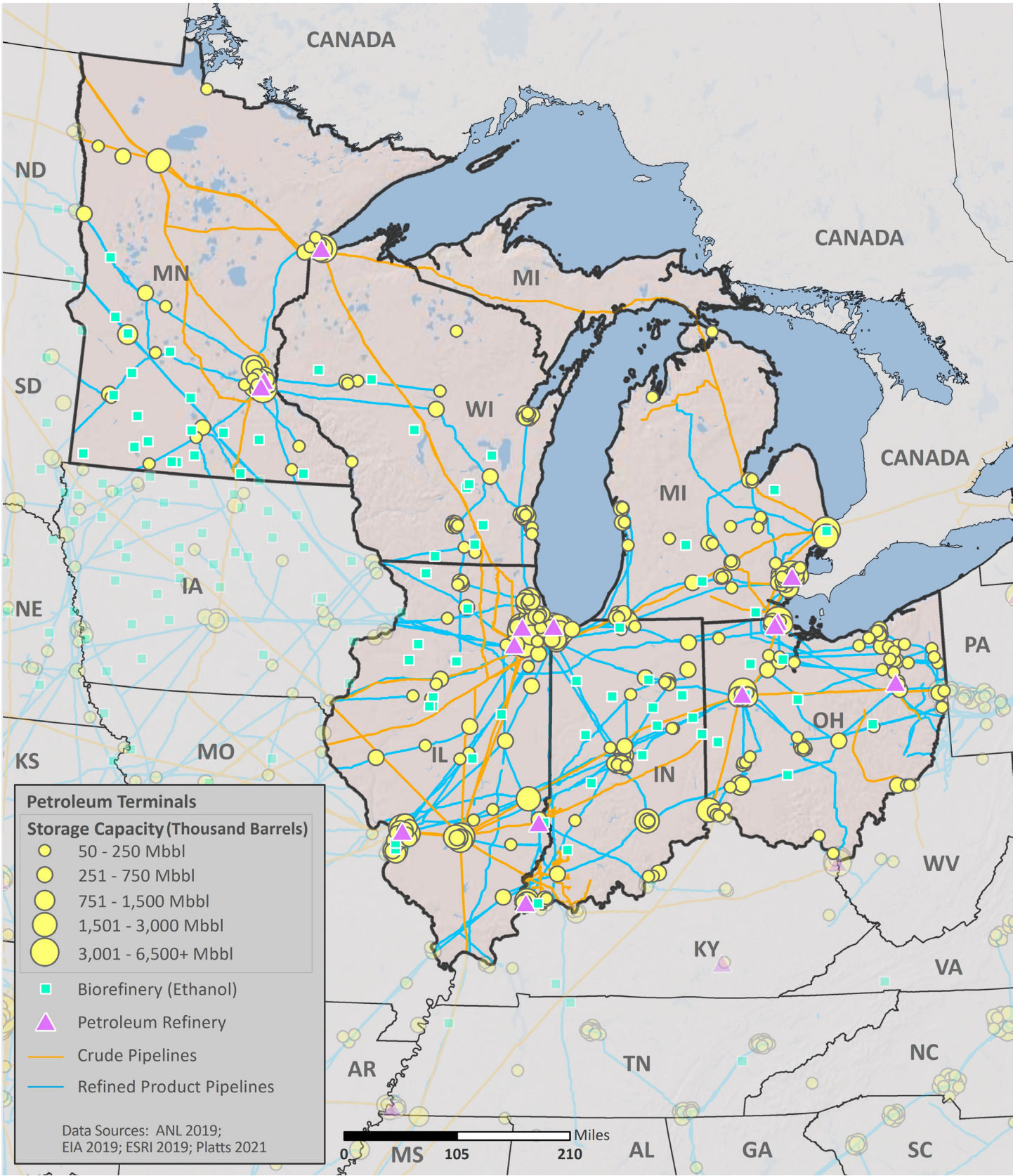
Data Source: EIA

- Region 5 has 16 natural gas processing facilities.
- Region 5 has 11 liquefied natural gas (LNG) facilities with a total storage capacity of 4,119,220 barrels.



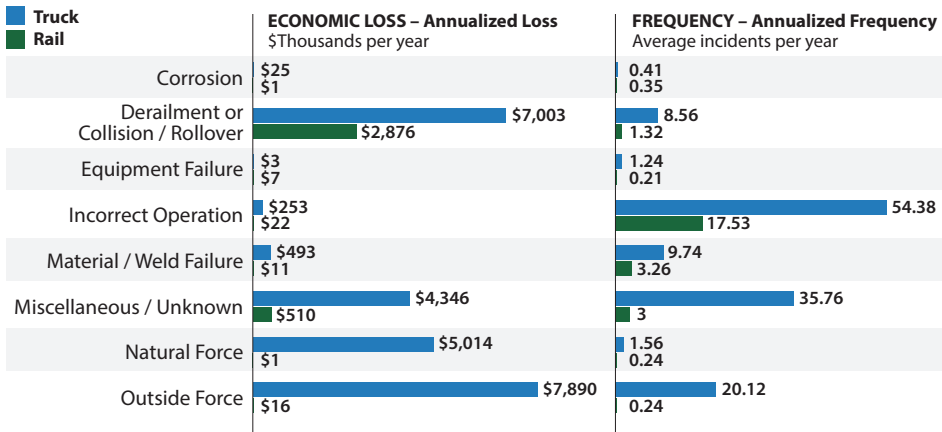


# PETROLEUM



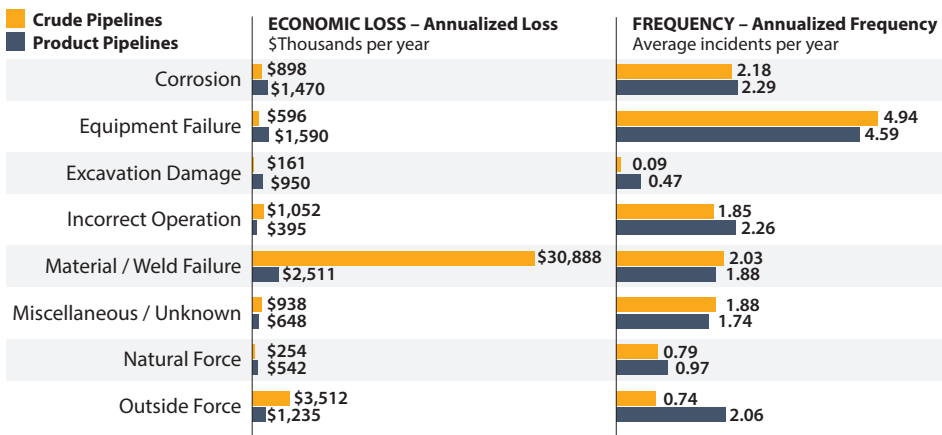
## Petroleum Transport

### 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



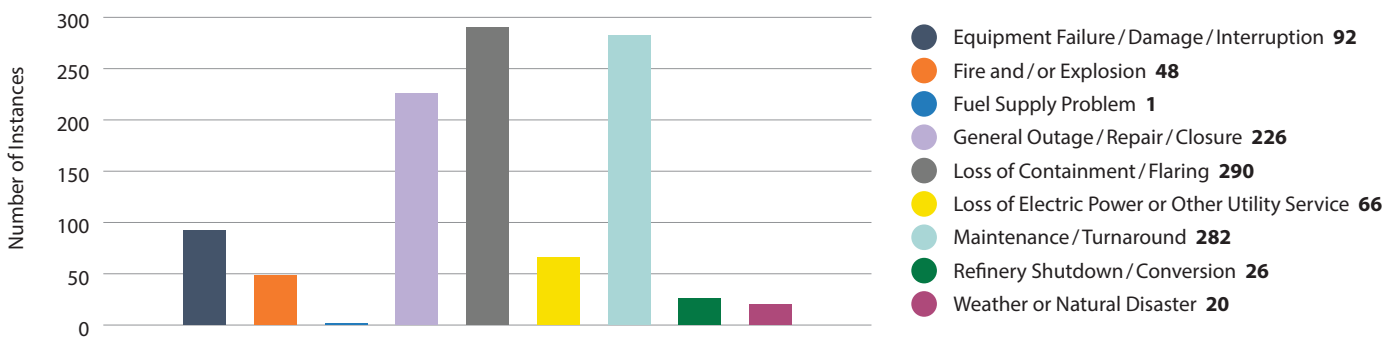
Data Source: DOT PHMSA

- Region 5 is part of Petroleum Administration for Defense District (PADD) 2.
- As of 2018, Region 5 had:
  - 9,887 miles of crude oil pipelines
  - 13,503 miles of refined product pipelines
  - 0 miles of biofuels pipelines
- 60% of Region 5’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 5’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)
  - **Miscellaneous or Unknown** events when transported by crude pipelines (5th leading cause nationwide at \$4.71M per year)
  - **Miscellaneous or Unknown** events when transported by product pipelines (3rd leading cause nationwide at \$11.97M per year)
- Disruptions in other states may impact supply.

## Petroleum Refineries

- Region 5 has 14 petroleum refineries with a total operable capacity of 2,672 Mb/d.

### Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing