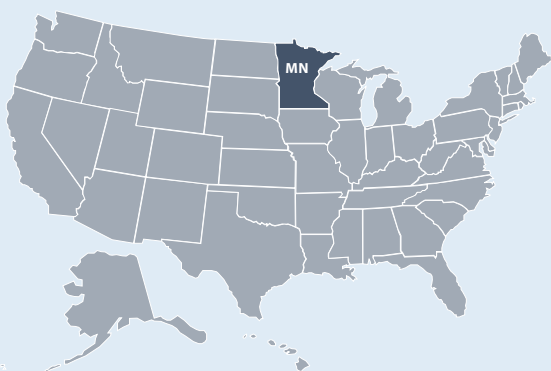




# State of Minnesota ENERGY SECTOR RISK PROFILE



## Minnesota State Facts



POPULATION

5.61 M



HOUSING UNITS

2.46 M



BUSINESS ESTABLISHMENTS

0.15 M

ENERGY EMPLOYMENT: 47,518 jobs

PUBLIC UTILITY COMMISSION: Minnesota Public Utilities Commission

STATE ENERGY OFFICE: Minnesota Department of Commerce, Division of Energy Resources

EMERGENCY MANAGEMENT AGENCY: Minnesota Homeland Security and Emergency Management Division

AVERAGE ELECTRICITY TARIFF: 10.37 cents/kWh

ENERGY EXPENDITURES: \$3,604/capita

ENERGY CONSUMPTION PER CAPITA: 329 MMBtu (18th highest out of 50 states and Washington, D.C.)

GDP: \$368.9 billion

Data from 2020 or most recent year available.

For more information, see the Data Sources document.

## ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 68,730 GWh

COAL: 14,900 MSTN

NATURAL GAS: 497 Bcf

MOTOR GASOLINE: 54,800 Mbbbl

DISTILLATE FUEL: 25,400 Mbbbl

## ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 560 plants, 59.4 TWh, 18.8 GW total capacity

Coal: 13 plants, 17.8 TWh, 4.5 GW total capacity

Hydro: 27 plants, 1.1 TWh, 0.2 GW total capacity

Natural Gas: 38 plants, 12.6 TWh, 6.2 GW total capacity

Nuclear: 2 plants, 14.1 TWh, 1.7 GW total capacity

Petroleum: 73 plants, 0.1 TWh, 0.9 GW total capacity

Wind & Solar: 384 plants, 12.2 TWh, 4.8 GW total capacity

Other sources: 23 plants, 1.5 TWh, 0.5 GW total capacity

COAL: 0 MSTN

NATURAL GAS: 0 Bcf

CRUDE OIL: 0 Mbbbl

ETHANOL: 28,500 Mbbbl

Data from EIA (2018, 2019).

This State Energy Risk Profile examines the relative magnitude of the risks that the state of Minnesota’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.

## Minnesota Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Flooding** at \$23 million per year (leading cause nationwide at \$12 billion per year).
- Minnesota had 160 Major Disaster Declarations, 0 Emergency Declarations, and 0 Fire Management Assistance Declarations for 7 events between 2013 and 2019.
- Minnesota registered 0% greater Heating Degree Days and 6% greater Cooling Degree Days than average in 2019.
- There is 1 Fusion Center located in St. Paul.

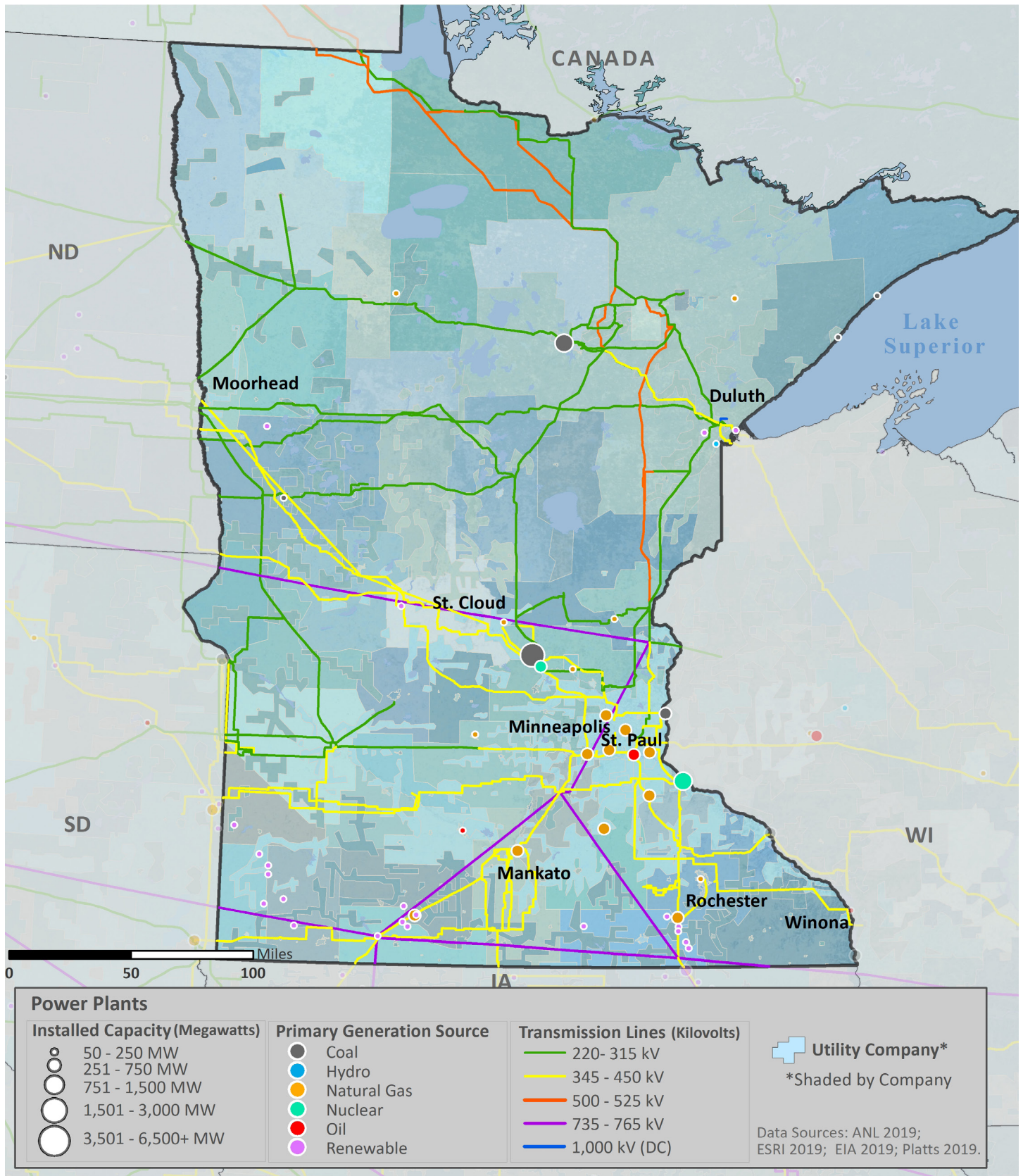
## Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	7	\$0
Earthquake (≥ 3.5 M)	0	\$0
Extreme Heat	3	\$0
Flood	33	\$23
Hurricane	0	\$0
Landslide	0	\$0
Thunderstorm & Lightning	111	\$9
Tornado	25	\$21
Wildfire	1	\$0
Winter Storm & Extreme Cold	67	\$12

Data Sources: NOAA and USGS



# ELECTRIC









## Electric Infrastructure

- Minnesota has 174 electric utilities:
  - 4 Investor owned
  - 44 Cooperative
  - 121 Municipal
  - 5 Other utilities
- Plant retirements scheduled by 2025: 19 electric generating units totaling 2,011 MW of installed capacity.

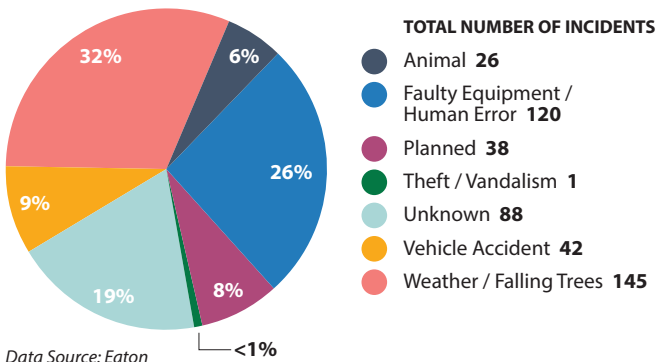
- In 2018, the average Minnesota electric customer experienced 1 service interruption that lasted an average of less than 1 hour.
- In Minnesota, between 2008 and 2017:
  - The greatest number of electric outages occurred in **March** (7th for outages nationwide)
  - The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)
  - Electric outages affected 356,918 customers on average

### Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	89%	33%
Commercial 	11%	34%
Industrial 	<1%	33%
Transportation 	<1%	<1%

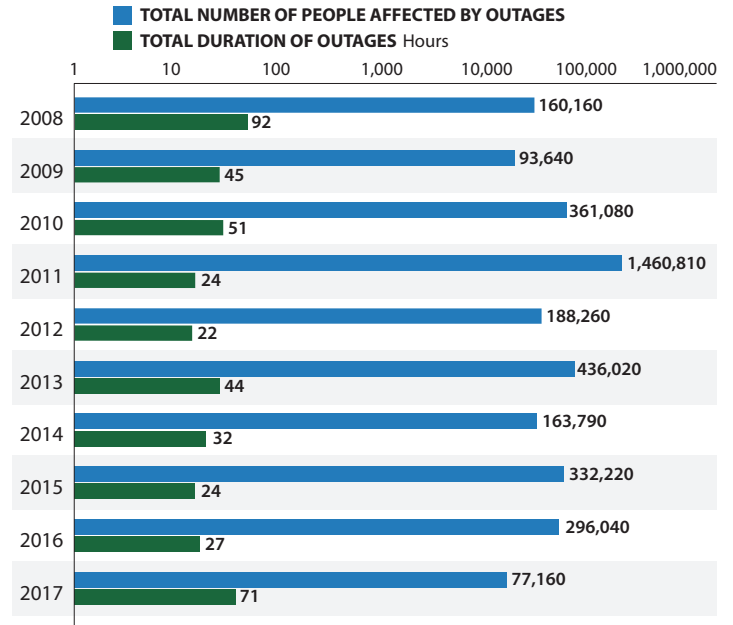
Data Source: EIA

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



Data Source: Eaton

### Electric Utility Outage Data, 2008 – 2017

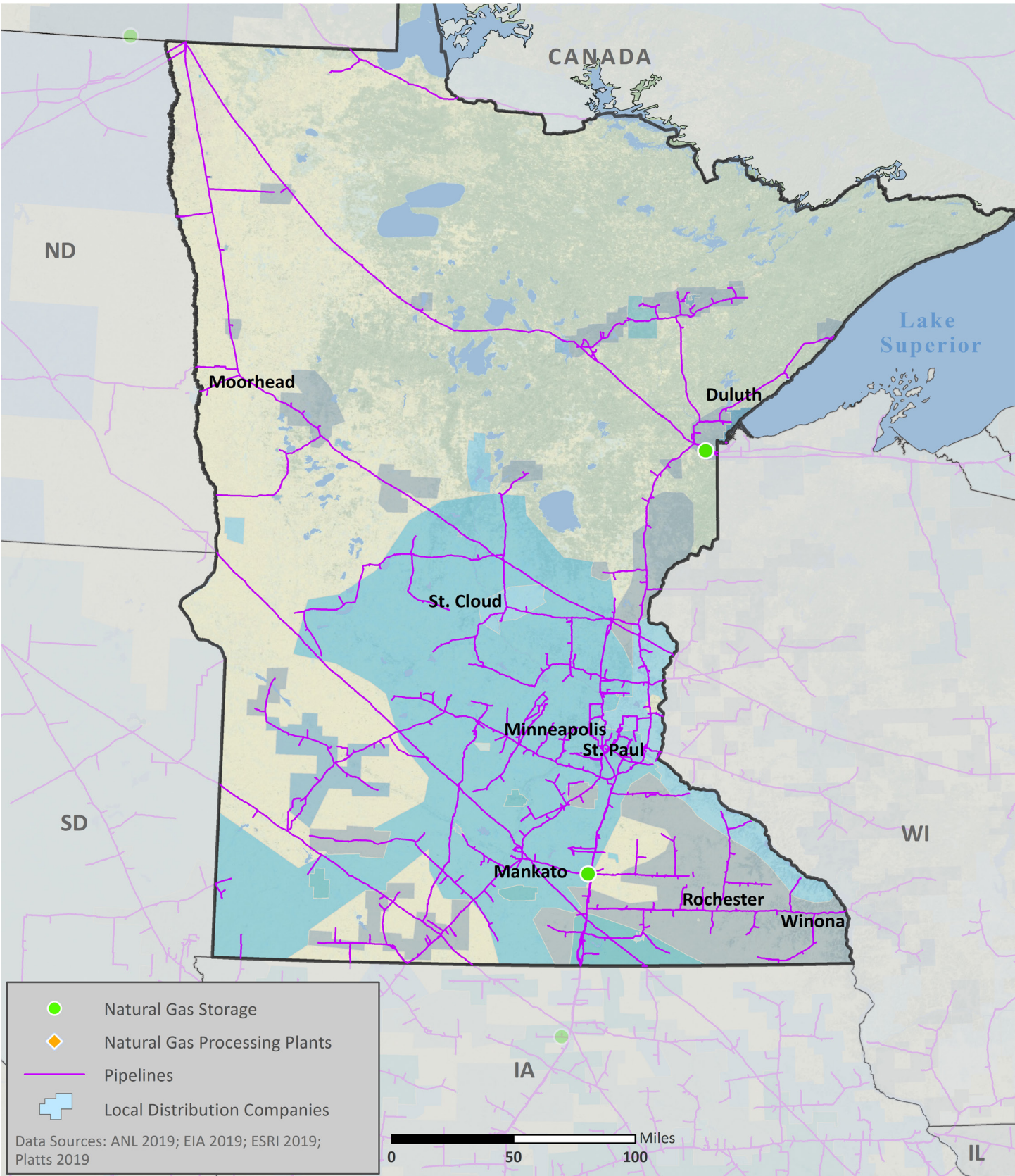


Note: This chart uses a logarithmic scale to display a very wide range of values.  
Data Source: Eaton



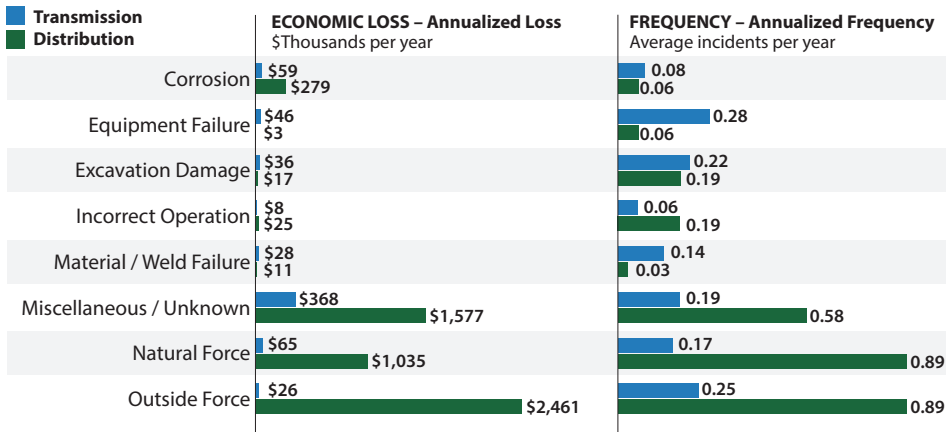


# NATURAL GAS



## Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Minnesota had:
  - 5,465 miles of natural gas transmission pipelines
  - 32,874 miles of natural gas distribution pipelines
- 63% of Minnesota’s natural gas transmission system and 17% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Minnesota’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	92%	30%
Commercial	8%	24%
Industrial	<1%	34%
Transportation	<1%	<1%
Electric Power	<1%	13%
Other	<1%	<1%

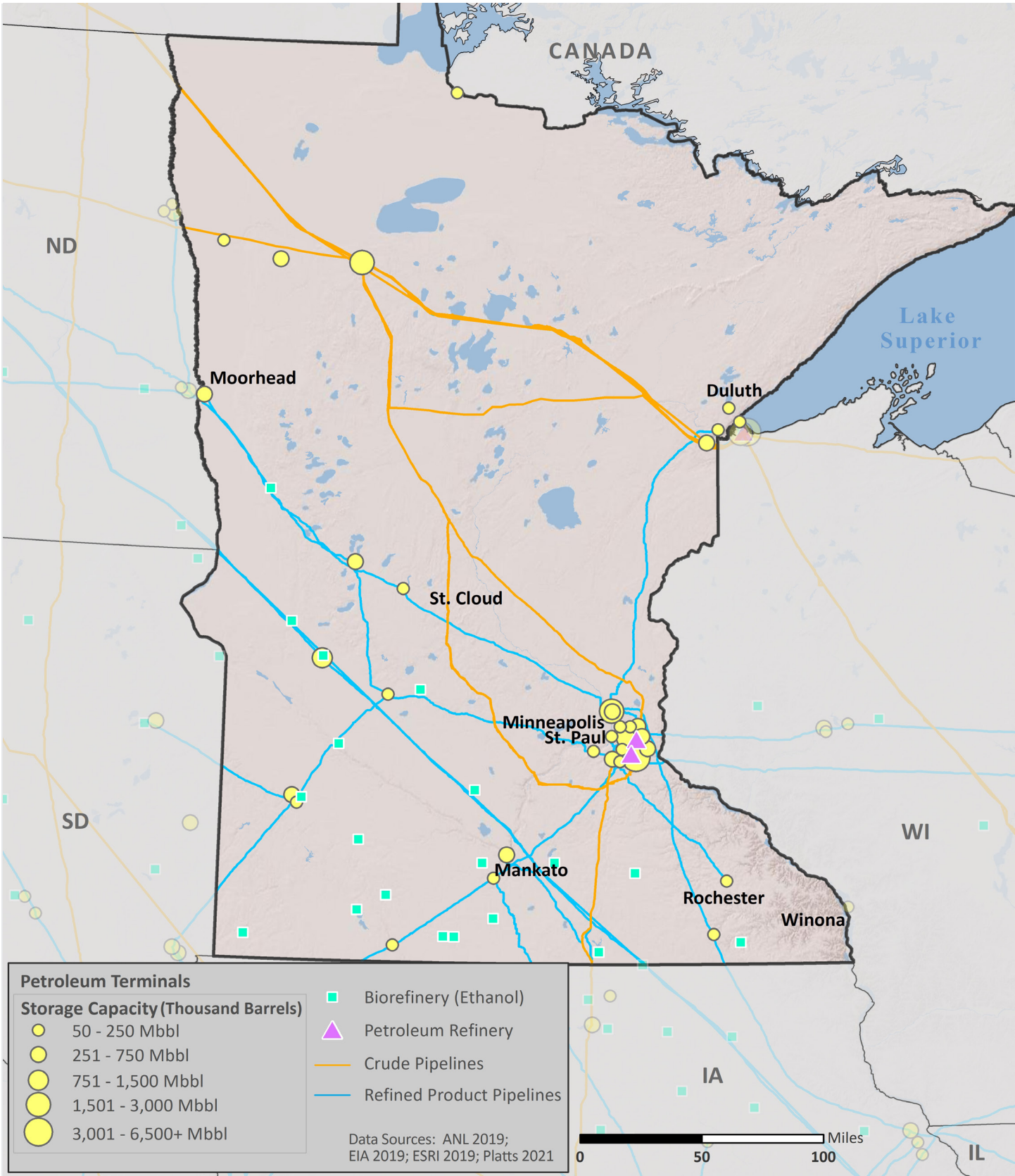
Data Source: EIA

- Minnesota has 0 natural gas processing facilities.
- Minnesota has 3 liquefied natural gas (LNG) facilities with a total storage capacity of 1,528,000 barrels.



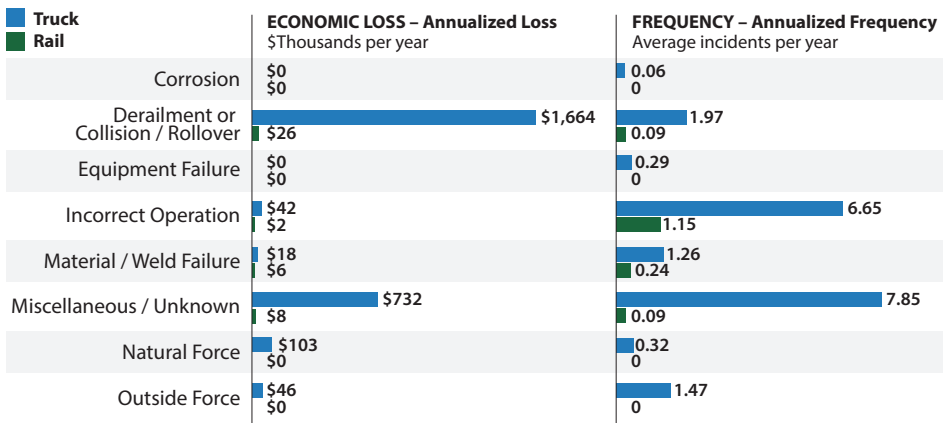


# PETROLEUM



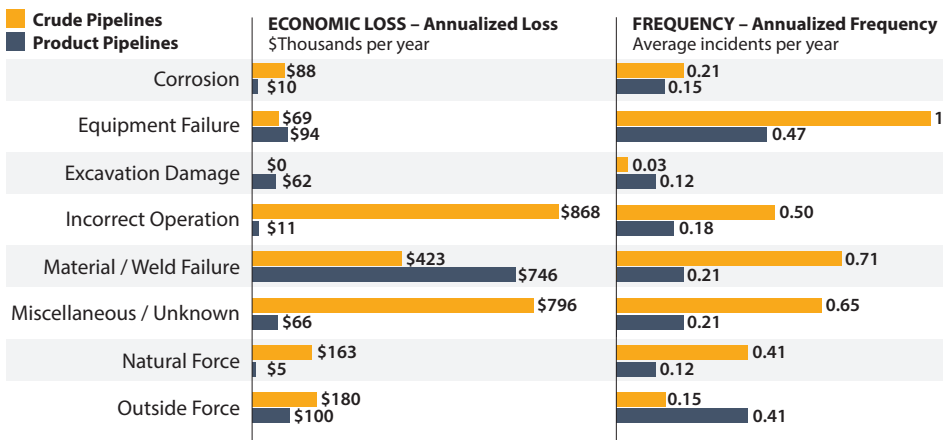
## Petroleum Transport

### 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



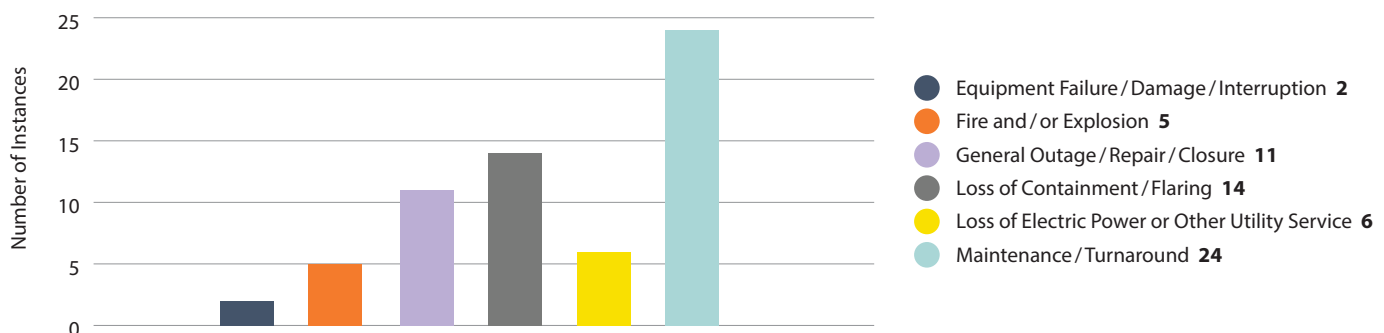
Data Source: DOT PHMSA

- As of 2018, Minnesota had:
  - 2,566 miles of crude oil pipelines
  - 1,821 miles of refined product pipelines
  - 0 miles of biofuels pipelines
- 52% of Minnesota’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Minnesota’s petroleum supply was most impacted by:
  - **Derailments, Collisions, or Rollovers** when transported by truck (8th leading cause nationwide at \$0.07M per year)
  - **Derailments, Collisions, or Rollovers** when transported by rail (leading cause nationwide at \$19.71M per year)
  - **Incorrect Operations** when transported by crude pipelines (6th leading cause nationwide at \$4.23M per year)
  - **Material Failures** when transported by product pipelines (4th leading cause nationwide at \$9.47M per year)
- Disruptions in other states may impact supply.

## Petroleum Refineries

- Minnesota has 2 petroleum refineries with a total operable capacity of 418.5 Mb/d.
- Between 2009 and 2019, the leading cause of petroleum refinery disruptions in Minnesota was:
  - **Maintenance** (2nd leading cause nationwide)

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



Data Source: Hydrocarbon Publishing