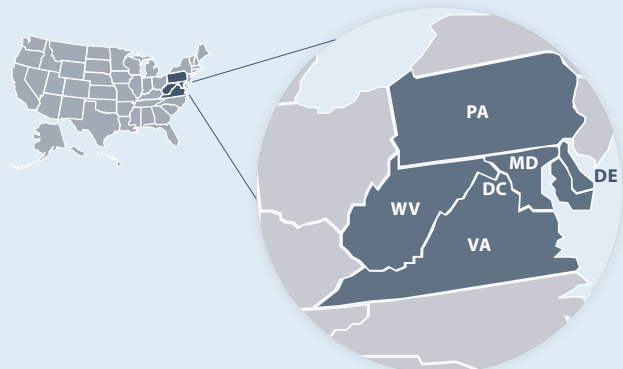




# FEMA Region 3 ENERGY SECTOR RISK PROFILE



## Region 3 Facts



POPULATION

30.84 M



HOUSING UNITS

13.36 M



BUSINESS ESTABLISHMENTS

0.72 M

ENERGY EMPLOYMENT: 267,329 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 10.19 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,332/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 280 MMBtu

GDP: \$2,020.2 billion

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

## ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 530,270 GWh

COAL: 68,200 MSTN

NATURAL GAS: 2,482 Bcf

MOTOR GASOLINE: 238,300 Mbbl

DISTILLATE FUEL: 118,800 Mbbl

## ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 618 plants, 434.5 TWh, 117.0 GW total capacity

Coal: 41 plants, 105.4 TWh, 32.0 GW total capacity

Hydro: 56 plants, 8.9 TWh, 3.0 GW total capacity

Natural Gas: 129 plants, 177.8 TWh, 51.0 GW total capacity

Nuclear: 7 plants, 127.7 TWh, 15.0 GW total capacity

Petroleum: 95 plants, 0.66 TWh, 6.0 GW total capacity

Wind & Solar: 187 plants, 7.0 TWh, 3.0 GW total capacity

Other sources: 103 plants, 7.0 TWh, 7.0 GW total capacity

COAL: 157,500 MSTN

NATURAL GAS: 9,160 Bcf

CRUDE OIL: 23,300 Mbbl

ETHANOL: 4,100 Mbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 3's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 3 includes Delaware, Maryland, Pennsylvania, Virginia, West Virginia, and Washington, D.C.

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 3 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Flooding** at \$117 million per year (leading cause nationwide at \$12 billion per year).
- Region 3 had 338 Major Disaster Declarations, 141 Emergency Declarations, and 0 Fire Management Assistance Declarations for 30 events between 2013 and 2019.
- The FEMA Region 3 office is located in Philadelphia, PA.

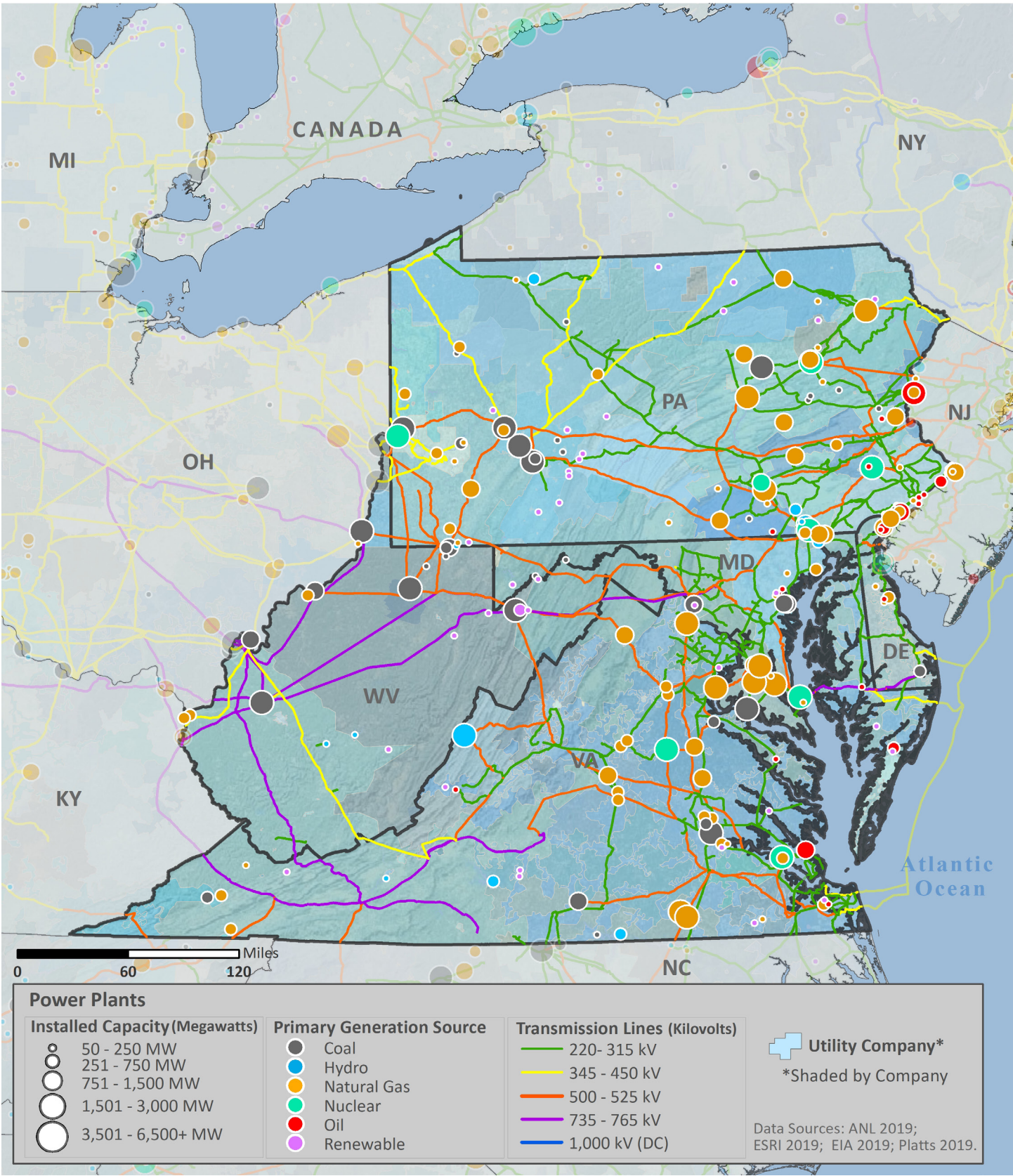
## Annualized Frequency of and Property Damage Due to Natural Hazards, 2009–2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	2	\$0
Earthquake (≥ 3.5 M)	1	\$0
Extreme Heat	24	\$0
Flood	184	\$117
Hurricane	2	\$5
Landslide	2	\$0
Thunderstorm & Lightning	438	\$33
Tornado	35	\$15
Wildfire	2	\$1
Winter Storm & Extreme Cold	214	\$14

Data Sources: NOAA and USGS



# ELECTRIC









## Electric Infrastructure

- Region 3 has 139 electric utilities:
  - 16 Investor owned
  - 32 Cooperative
  - 66 Municipal
  - 25 Other utilities
- Plant retirements scheduled by 2025: 58 electric generating units totaling 8,594 MW of installed capacity.

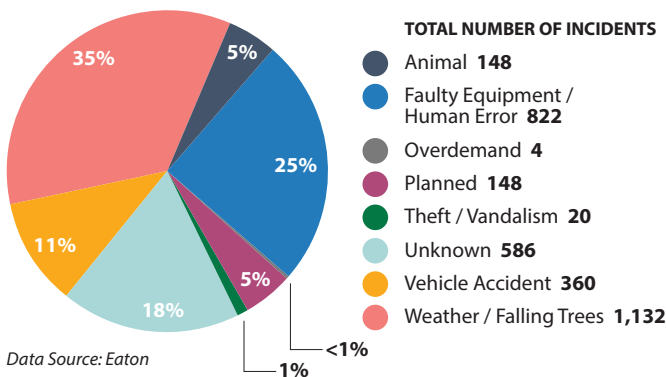
- In 2018, the average Region 3 electric customer experienced 1.6 service interruptions that lasted an average of 8 hours.
- Between 2008 and 2017:
  - In Region 3, the greatest number of electric outages occurred in **July** (leading month for outages nationwide)
  - The leading cause of electric outages in Region 3 was **Weather or Falling Trees** (leading cause nationwide)
  - Electric outages affected 2,409,972 customers on average

### Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	88%	39%
Commercial 	11%	38%
Industrial 	<1%	23%
Transportation 	<1%	<1%

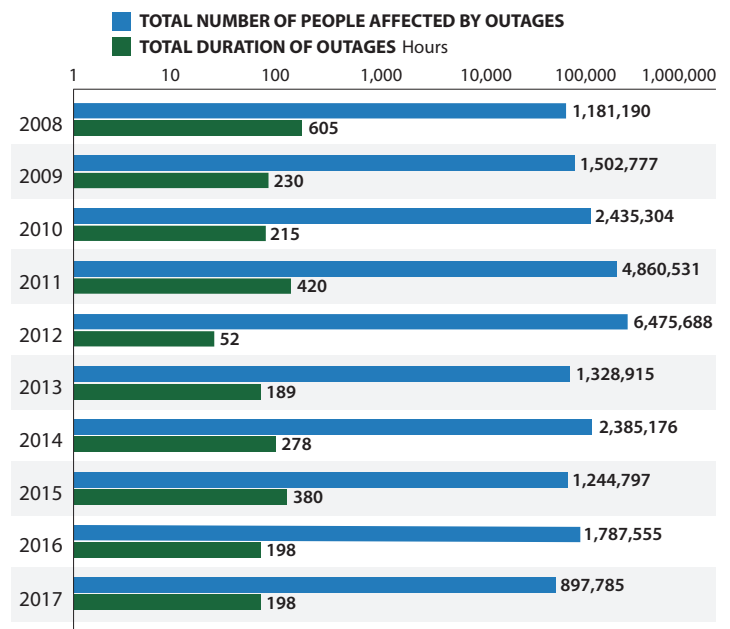
Data Source: EIA

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



Data Source: Eaton

### Electric Utility Outage Data, 2008 – 2017

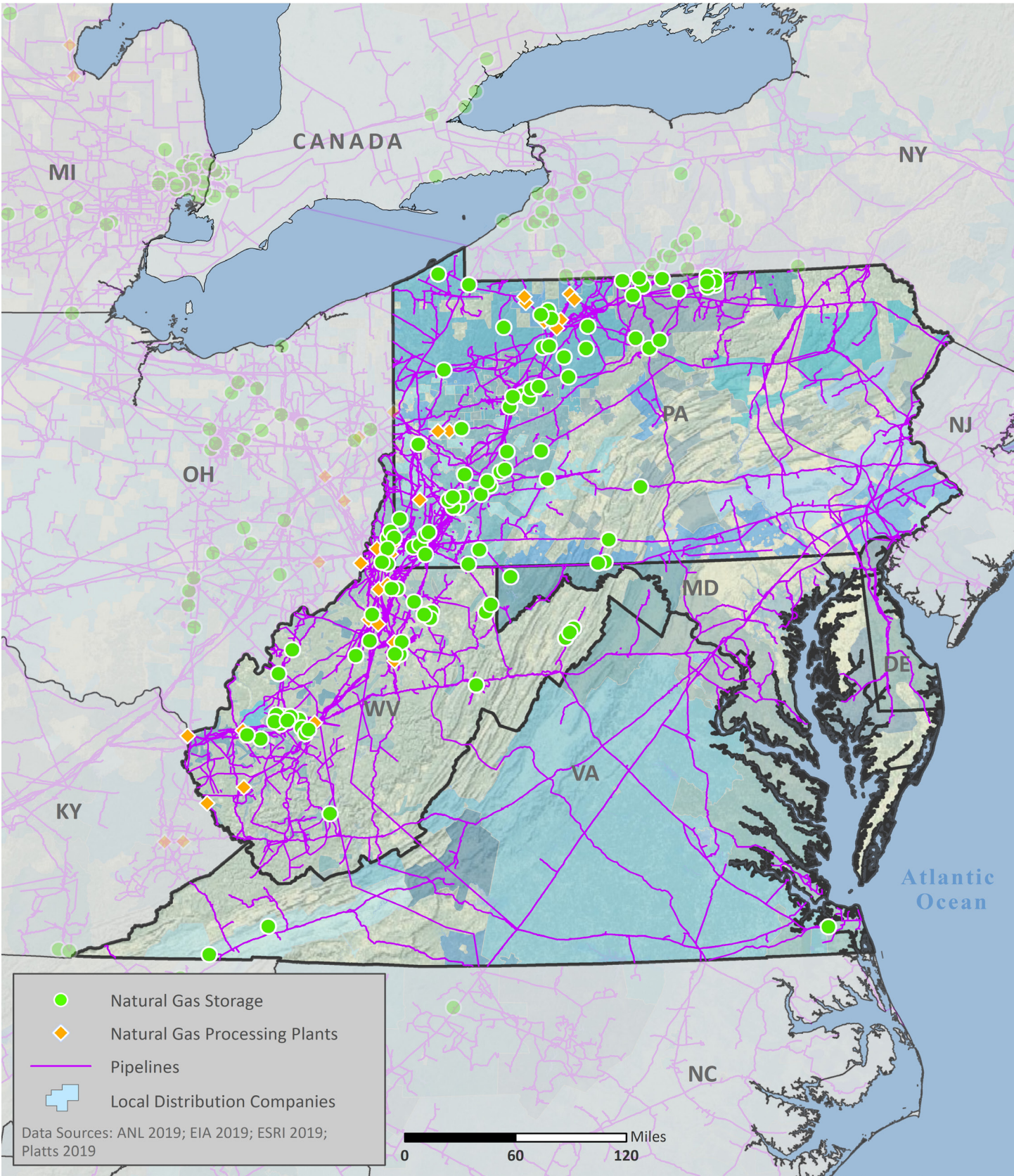


Note: This chart uses a logarithmic scale to display a very wide range of values.  
Data Source: Eaton



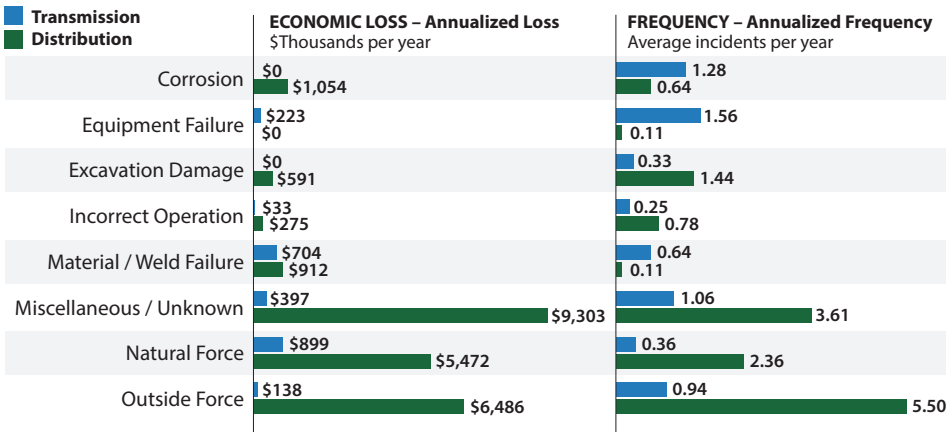


# NATURAL GAS



## Natural Gas Transport

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








Data Source: DOT PHMSA

- As of 2018, Region 3 had:
  - 2,700 miles of natural gas transmission pipelines
  - 2,170,916 miles of natural gas distribution pipelines
- 47% of Region 3’s natural gas transmission system and 24% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 3’s natural gas supply was most impacted by:
  - **Corrosion** when transported by transmission pipelines (4th leading cause nationwide at \$20.15M 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 	93%	21%
Commercial 	7%	16%
Industrial 	<1%	18%
Transportation 	<1%	<1%
Electric Power 	<1%	45%
Other	<1%	<1%

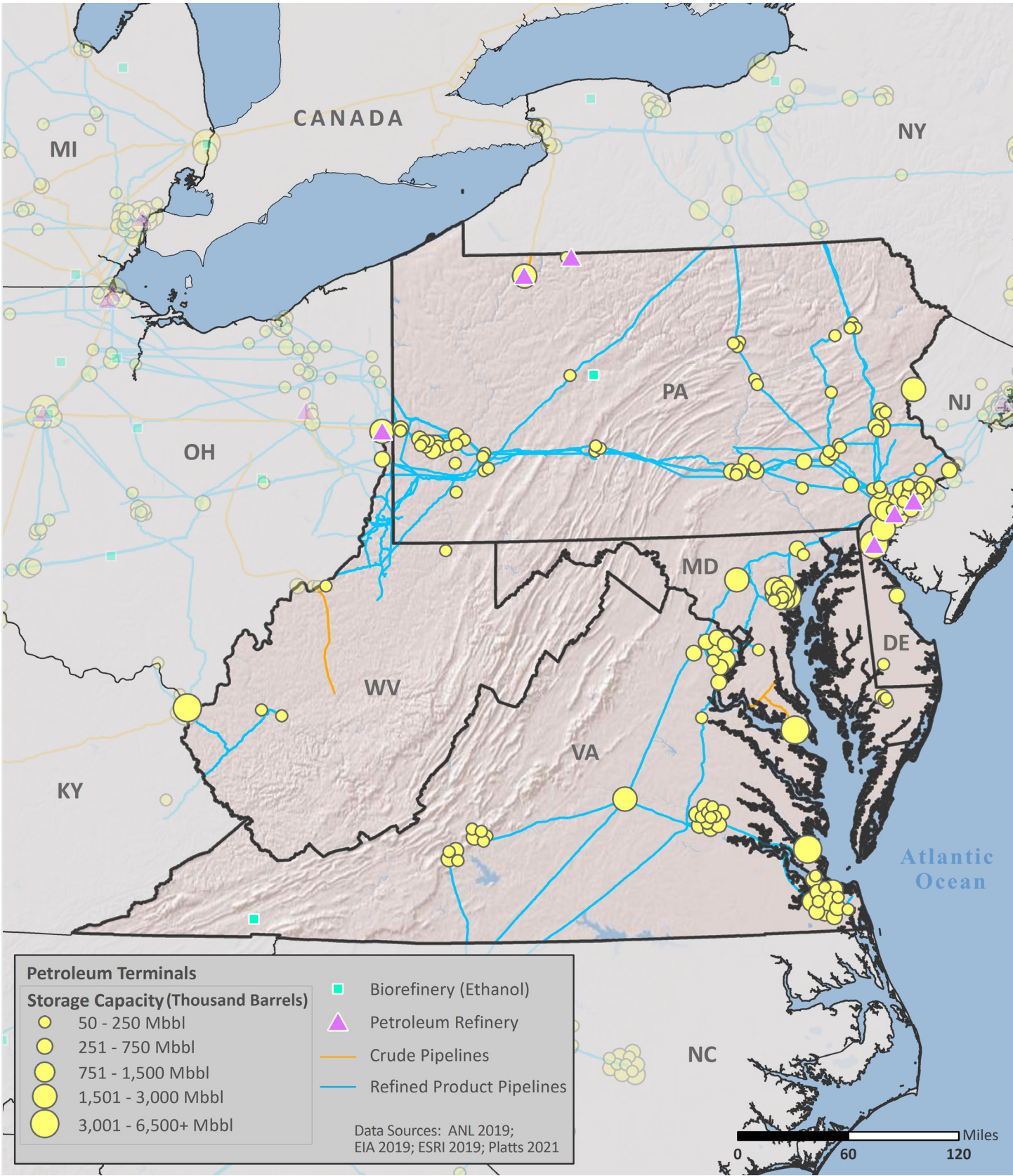
Data Source: EIA

- Region 3 has 25 natural gas processing facilities.
- Region 3 has 12 liquefied natural gas (LNG) facilities with a total storage capacity of 7,182,769 barrels.



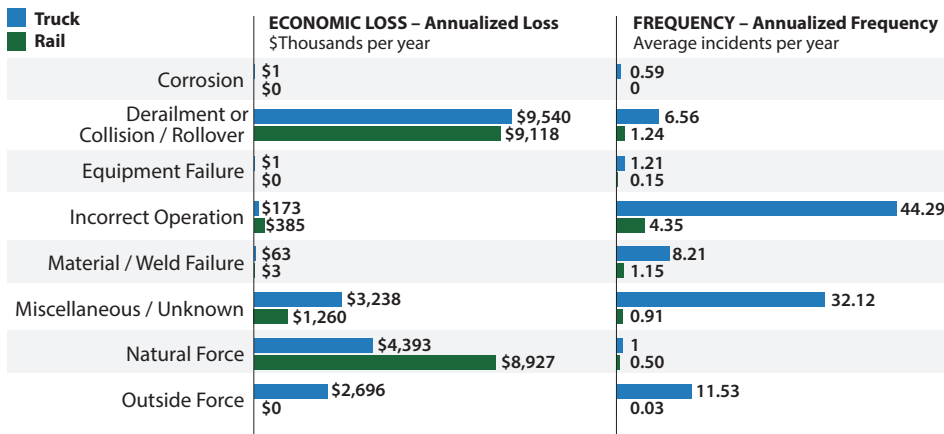


# PETROLEUM



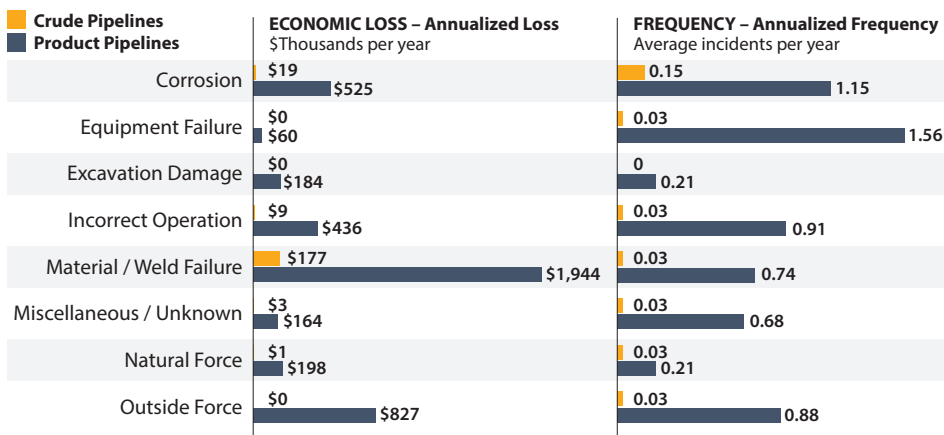
## Petroleum Transport

### 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



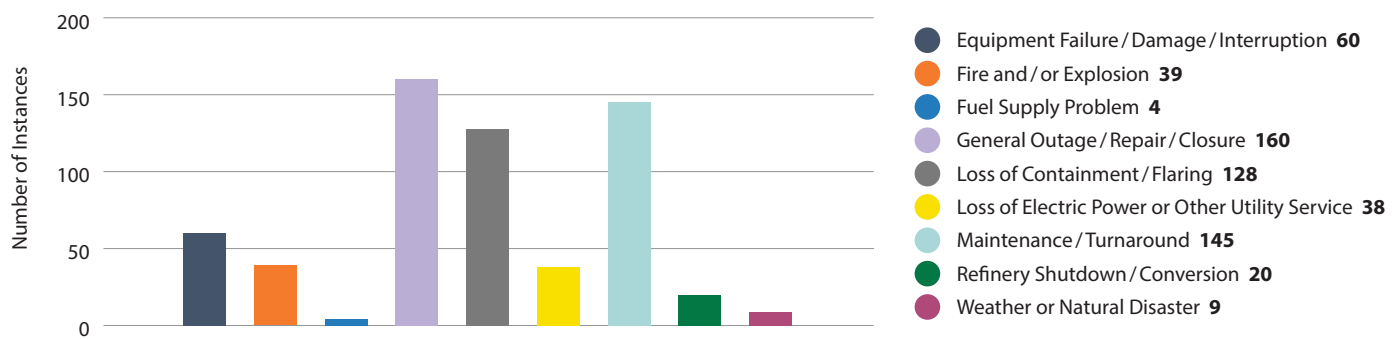
Data Source: DOT PHMSA

- Region 3 is part of Petroleum Administration for Defense District (PADD) 1.
- As of 2018, Region 3 had:
  - 167 miles of crude oil pipelines
  - 3,462 miles of refined product pipelines
  - 0 miles of biofuels pipelines
- 80% of Region 3’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 3’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)
  - **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 3 has 6 petroleum refineries with a total operable capacity of 805.5 Mb/d.

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



Data Source: Hydrocarbon Publishing