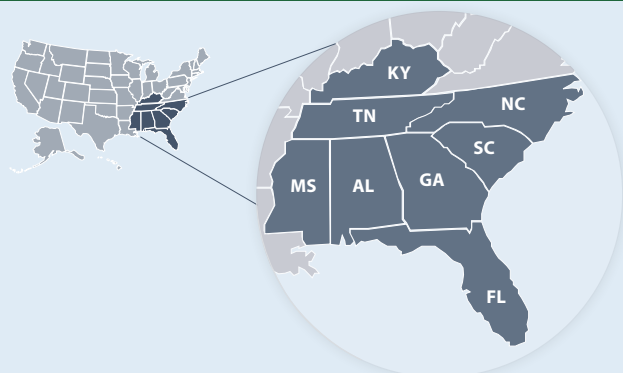




FEMA Region 4 ENERGY SECTOR RISK PROFILE



This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 4's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 4 includes Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee.

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 4 Facts



POPULATION

66.4 M



HOUSING UNITS
29.47 M



BUSINESS ESTABLISHMENTS
1.49 M

ENERGY EMPLOYMENT: 473,887 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 9.69 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,282/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 275 MMBtu

GDP: \$3,337.8 billion

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

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 919,140 GWh

COAL: 116,800 MSTN

NATURAL GAS: 5,109 Bcf

MOTOR GASOLINE: 684,100 Mbbl

DISTILLATE FUEL: 253,800 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 1,572 plants, 968.3 TWh, 227.8 GW total capacity

Coal: 51 plants, 193.5 TWh, 61.0 GW total capacity

Hydro: 164 plants, 39.1 TWh, 12.2 GW total capacity

Natural Gas: 226 plants, 444.0 TWh, 131.3 GW total capacity

Nuclear: 16 plants, 251.1 TWh, 32.0 GW total capacity

Petroleum: 115 plants, 2.3 TWh, 6.5 GW total capacity

Wind & Solar: 819 plants, 16.0 TWh, 9.7 GW total capacity

Other sources: 181 plants, 22.4 TWh, 11.6 GW total capacity

COAL: 57,700 MSTN

NATURAL GAS: 250 Bcf

CRUDE OIL: 26,400 Mbbl

ETHANOL: 10,500 Mbbl

Data from EIA (2018, 2019).

Region 4 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Hurricanes** at \$1.2 billion per year (leading cause nationwide at \$12 billion per year).
- Region 4 had 1,588 Major Disaster Declarations, 1,288 Emergency Declarations, and 24 Fire Management Assistance Declarations for 105 events between 2013 and 2019.
- The FEMA Region 4 office is located in Atlanta, GA.

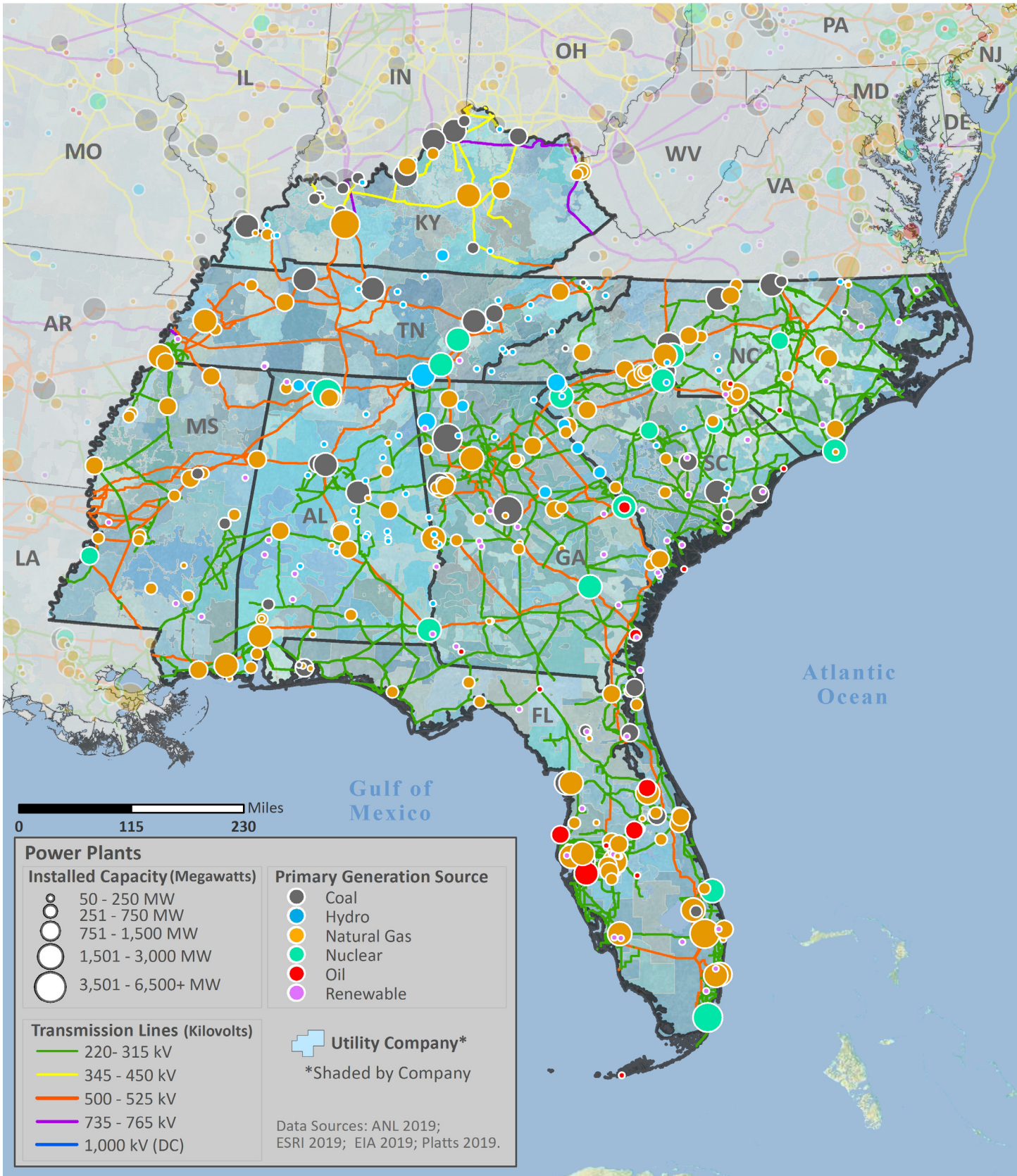
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	39	\$0
Earthquake (≥ 3.5 M)	2	\$0
Extreme Heat	68	\$0
Flood	379	\$1,031
Hurricane	10	\$1,230
Landslide	24	\$3
Thunderstorm & Lightning	1,147	\$171
Tornado	144	\$785
Wildfire	22	\$9
Winter Storm & Extreme Cold	234	\$51

Data Sources: NOAA and USGS



ELECTRIC









Electric Infrastructure

- Region 4 has 573 electric utilities:
 - 19 Investor owned
 - 201 Cooperative
 - 320 Municipal
 - 33 Other utilities
- Plant retirements scheduled by 2025: 59 electric generating units totaling 12,272 MW of installed capacity.

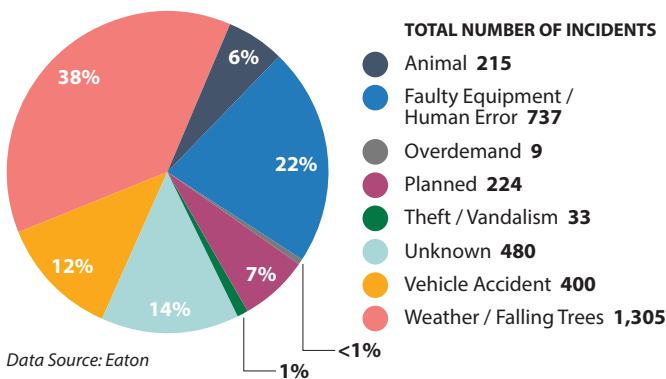
- In 2018, the average Region 4 electric customer experienced 1.6 service interruptions that lasted an average of 9.3 hours.
- Between 2008 and 2017:
 - In Region 4, the greatest number of electric outages occurred in **July** (leading month for outages nationwide)
 - The leading cause of electric outages in Region 4 was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 4,707,886 customers on average

Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	87%	44%
Commercial 	13%	34%
Industrial 	<1%	22%
Transportation 	<1%	<1%

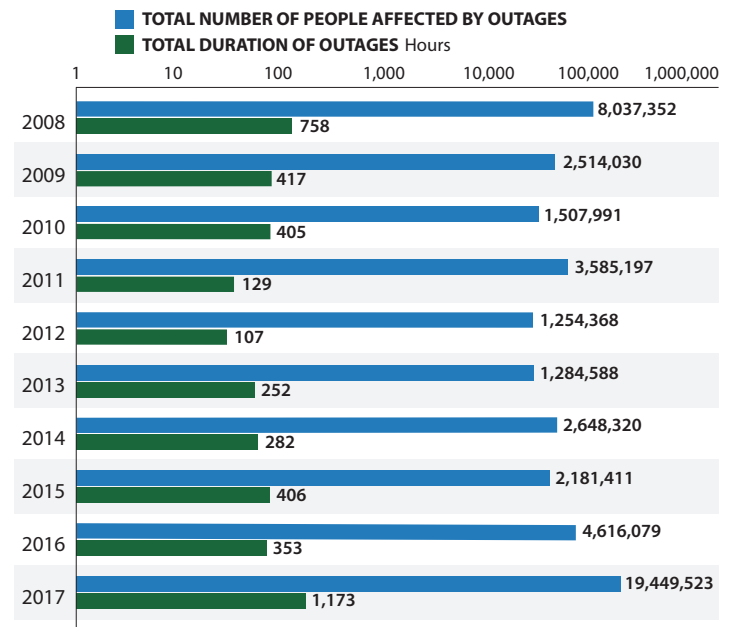
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008–2017



Data Source: Eaton

Electric Utility Outage Data, 2008–2017



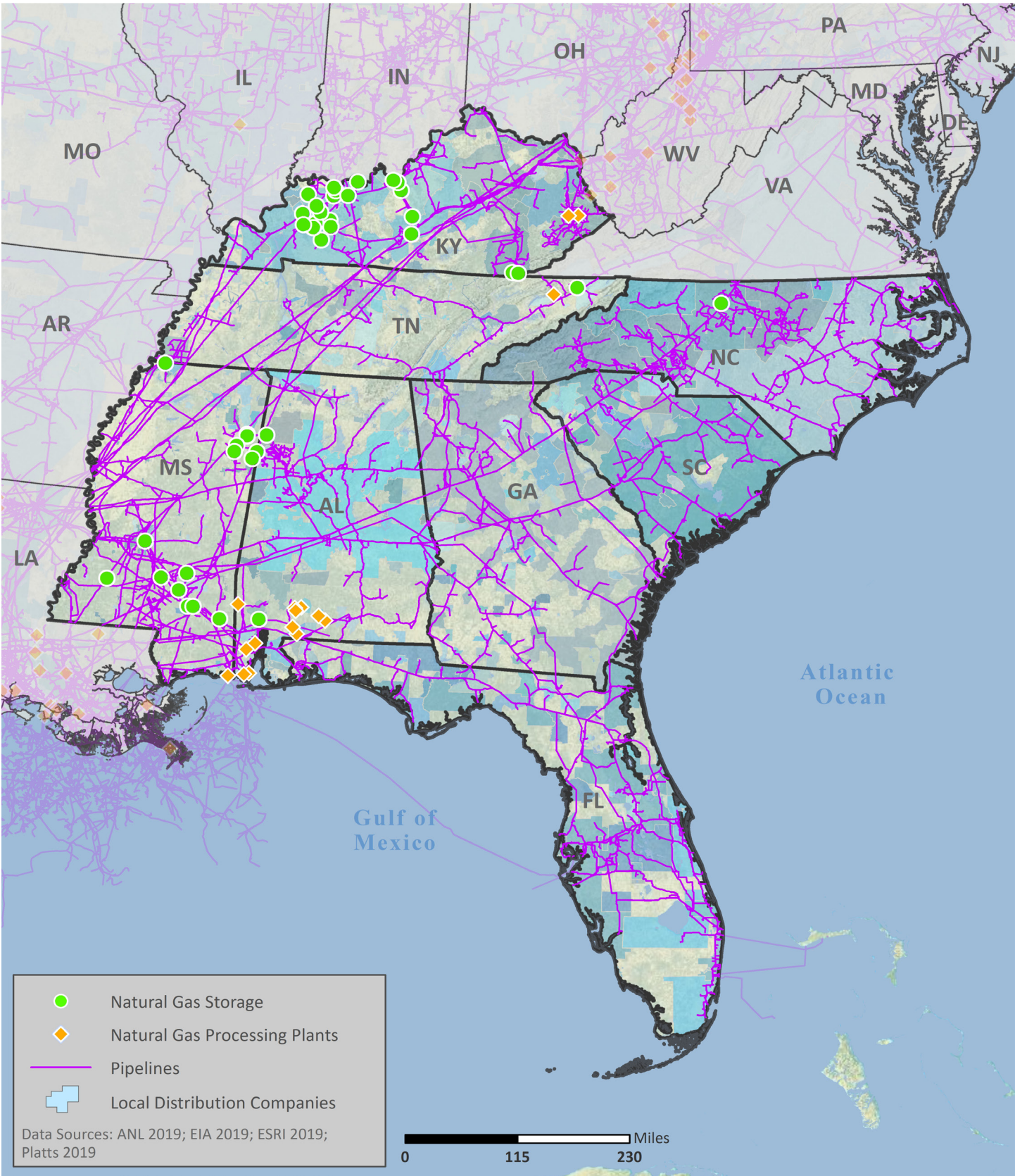
Note: This chart uses a logarithmic scale to display a very wide range of values.

Data Source: Eaton



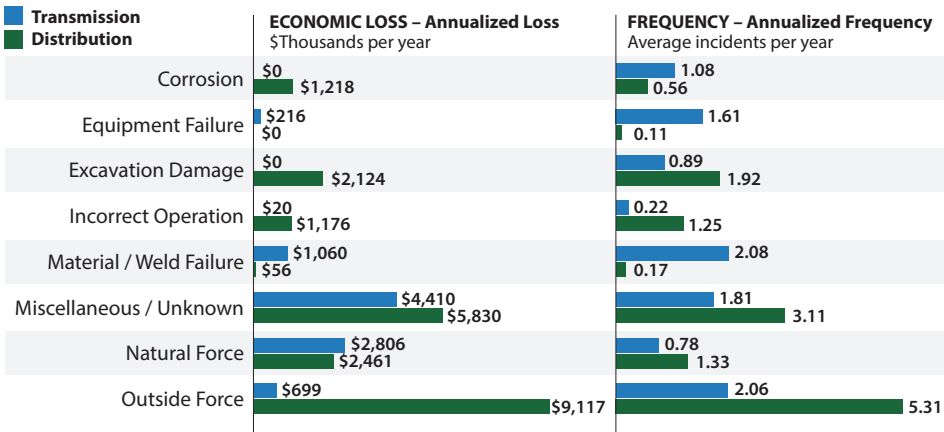


NATURAL GAS



Natural Gas Transport

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








Data Source: DOT PHMSA

- As of 2018, Region 4 had:
 - 46,180 miles of natural gas transmission pipelines
 - 237,893 miles of natural gas distribution pipelines
- 57% of Region 4’s natural gas transmission system and 30% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 4’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%	7%
Commercial 	9%	7%
Industrial 	<1%	20%
Transportation 	<1%	<1%
Electric Power 	<1%	66%
Other	<1%	<1%

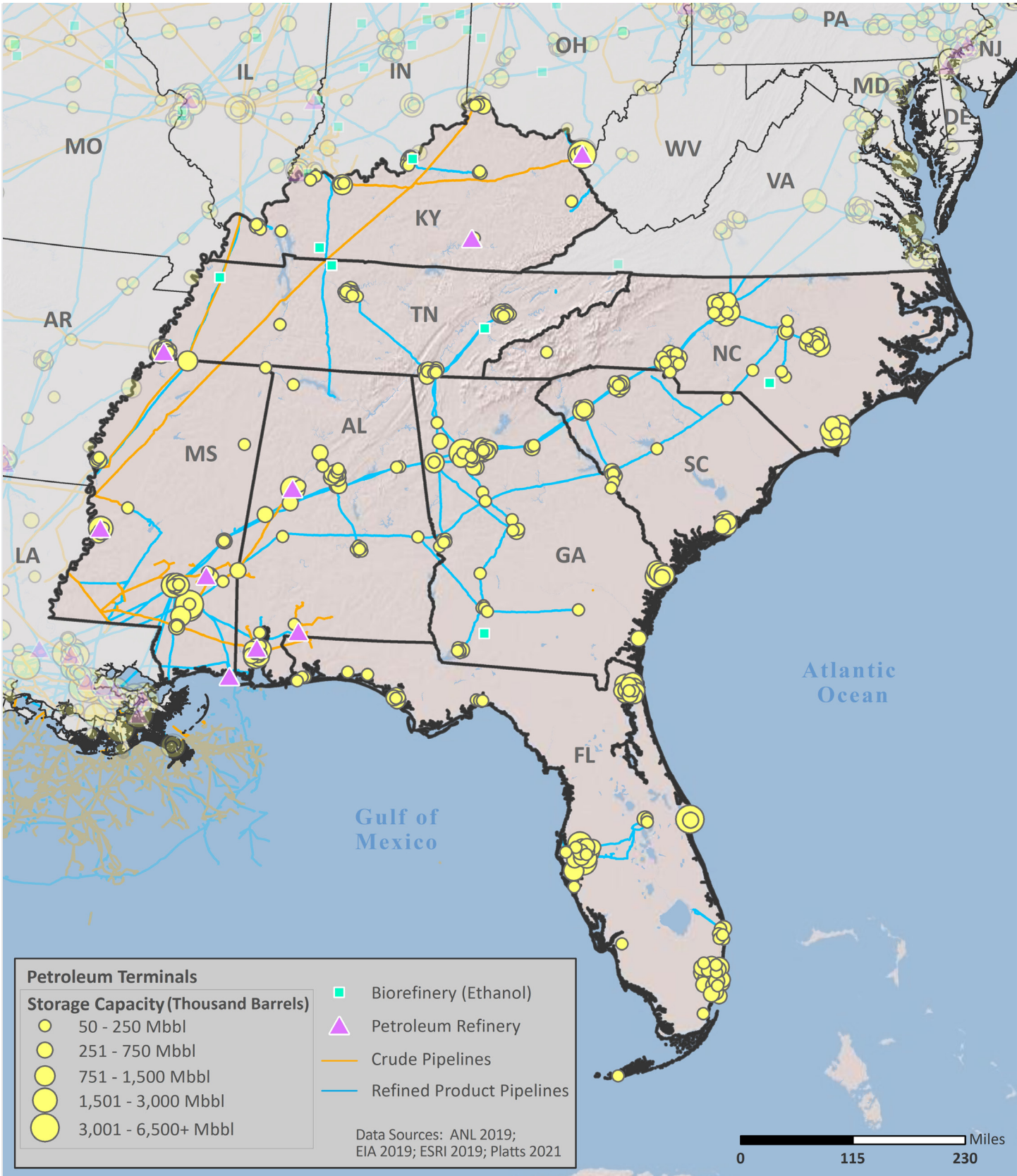
Data Source: EIA

- Region 4 has 16 natural gas processing facilities.
- Region 4 has 27 liquefied natural gas (LNG) facilities with a total storage capacity of 11,826,818 barrels.



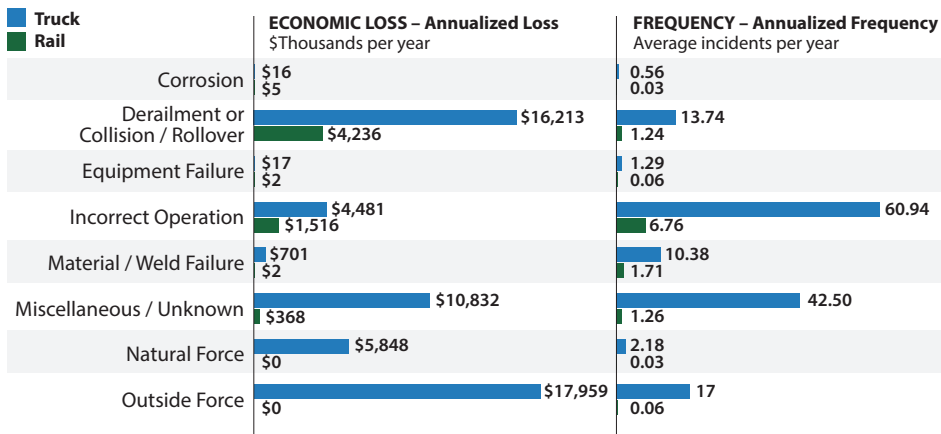


PETROLEUM



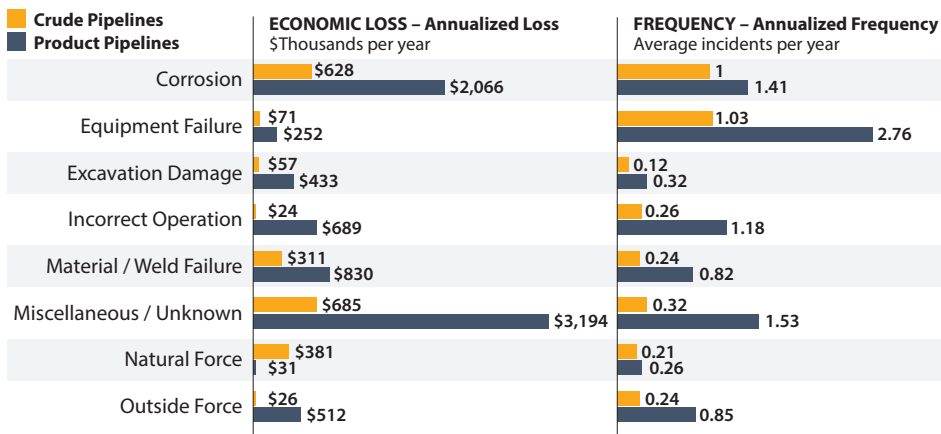
Petroleum Transport

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



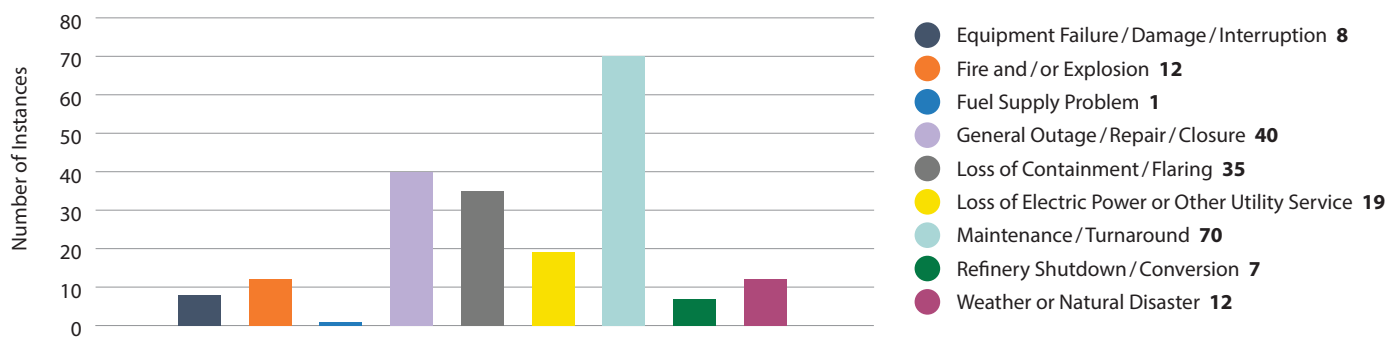
Data Source: DOT PHMSA

- Region 4 is part of Petroleum Administration for Defense Districts (PADDs) 1, 2, and 3.
- As of 2018, Region 4 had:
 - 3,144 miles of crude oil pipelines
 - 7,524 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 57% of Region 4’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 4’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)
 - **Natural Forces** when transported by crude pipelines (2nd leading cause nationwide at \$15.24M per year)
 - **Natural Forces** when transported by product pipelines (8th leading cause nationwide at \$2.12M per year)
- Disruptions in other states may impact supply.

Petroleum Refineries

- Region 4 has 9 petroleum refineries with a total operable capacity of 998.1 Mb/d.

Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing