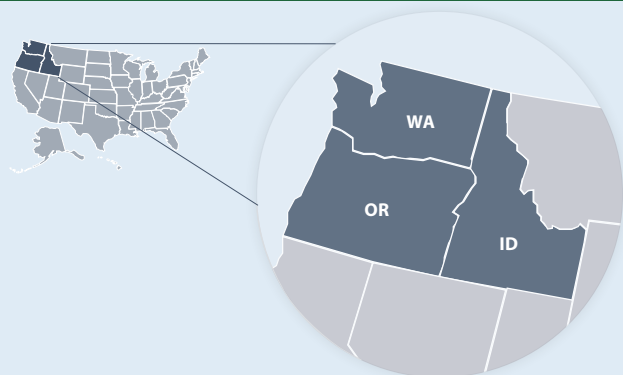




# FEMA Region 10 ENERGY SECTOR RISK PROFILE



## Region 10 Facts



POPULATION

13.48 M



HOUSING UNITS

5.67 M



BUSINESS ESTABLISHMENTS

0.35 M

ENERGY EMPLOYMENT: 96,880 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 8.29 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,256.07/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 276.96 MMBtu

GDP: \$882.7 billion

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

## ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 167,730 GWh

COAL: 4,800 MSTN

NATURAL GAS: 736 Bcf

MOTOR GASOLINE: 123,400 Mbbbl

DISTILLATE FUEL: 62,300 Mbbbl

## ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 483 plants, 187.1 TWh, 54.8 GW total capacity

Coal: 3 plants, 9.8 TWh, 2.1 GW total capacity

Hydro: 215 plants, 106.7 TWh, 32.3 GW total capacity

Natural Gas: 38 plants, 41.0 TWh, 9.7 GW total capacity

Nuclear: 1 plant, 8.9 TWh, 1.2 GW total capacity

Petroleum: 5 plants, 0.0 TWh, 0.0 GW total capacity

Wind & Solar: 161 plants, 17.1 TWh, 8.1 GW total capacity

Other sources: 60 plants, 3.8 TWh, 1.3 GW total capacity

COAL: 0 MSTN

NATURAL GAS: 0 Bcf

CRUDE OIL: 0 Mbbbl

ETHANOL: 2,500 Mbbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 10's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 10 includes Alaska, Idaho, Oregon, and Washington. This regional profile includes data only for states within the contiguous United States. For information about Alaska, please refer to the Alaska State Energy Risk Profile.

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 10 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Wildfires** at \$89 million (3rd leading cause nationwide at \$2.1 billion per year).
- FEMA Region 10 had 148 Major Disaster Declarations, 19 Emergency Declarations, and 94 Fire Management Assistance Declarations for 100 events between 2013 and 2019.
- The FEMA Region 10 office is located in Bothell, WA.

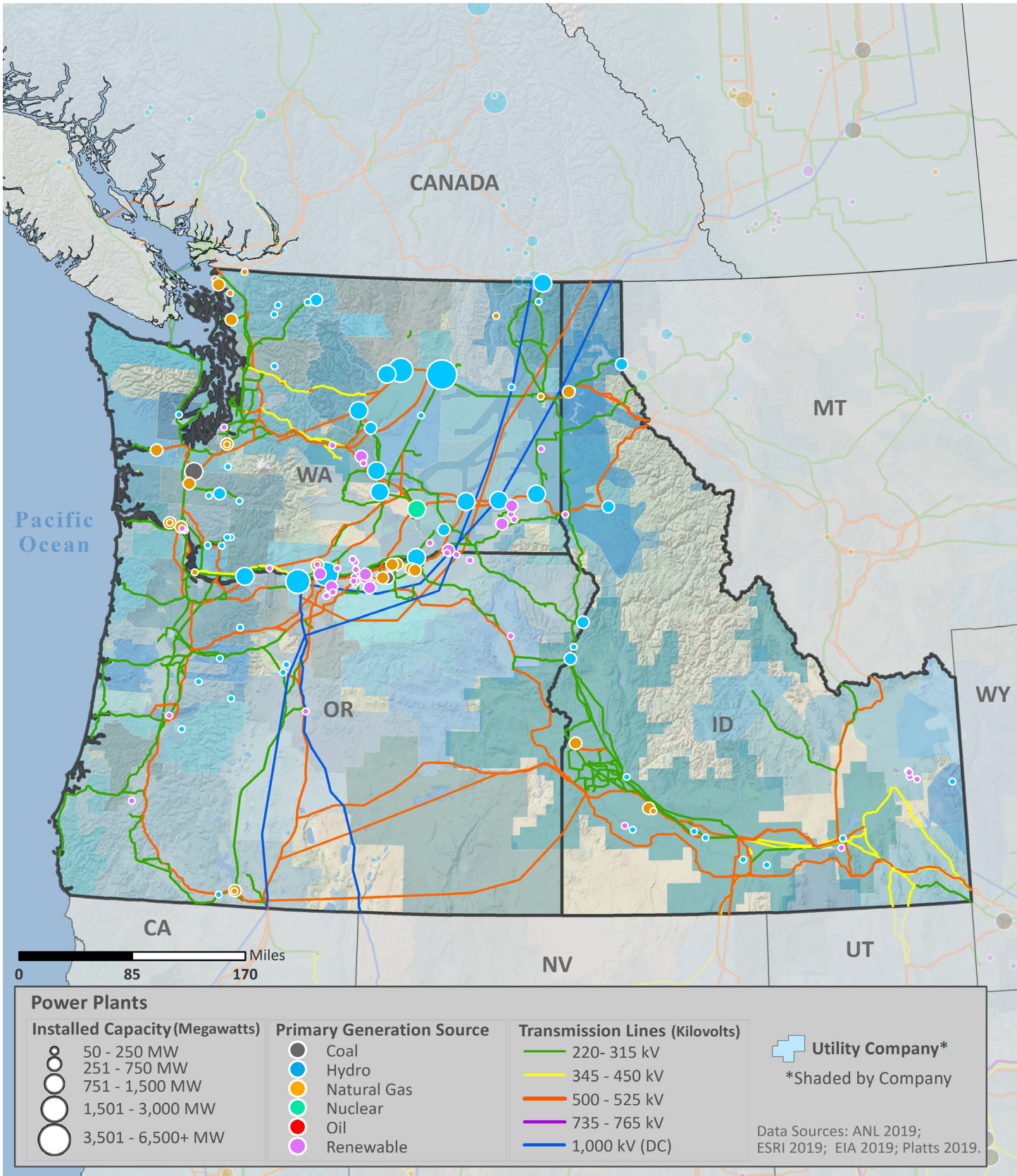
## Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	<1	\$0
Earthquake (≥ 3.5 M)	23	\$0
Extreme Heat	3	\$0
Flood	54	\$33
Hurricane	0	\$0
Landslide	17	\$12
Thunderstorm & Lightning	155	\$17
Tornado	17	\$0
Wildfire	59	\$89
Winter Storm & Extreme Cold	140	\$24

Data Sources: NOAA and USGS



# ELECTRIC











## Electric Infrastructure

- Region 10 has 122 electric utilities:
  - 6 Investor owned
  - 44 Cooperative
  - 66 Municipal / Public Utility Districts
  - 6 Other utilities
- Plant retirements scheduled by 2025: 18 electric generating units totaling 2,234 MW of installed capacity.

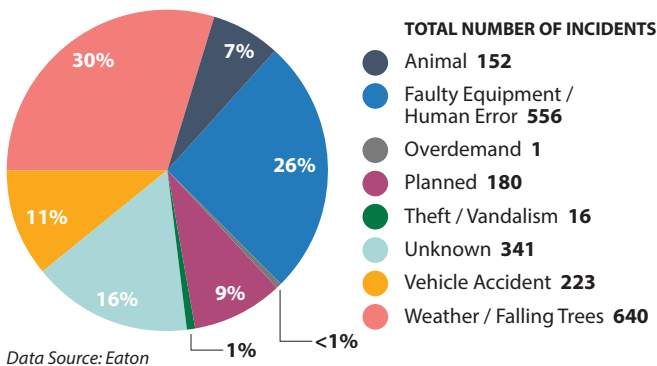
- In 2018, the average Region 10 electric customer experienced 1.1 service interruptions that lasted an average of 3.5 hours.
- Between 2008 and 2017:
  - In Region 10, the greatest number of electric outages occurred in **December** (4th for outages nationwide)
  - The leading cause of electric outages in Region 10 was **Weather or Falling Trees** (leading cause nationwide)
  - Electric outages affected 1,066,515 customers on average

### Electric Customers and Consumption by Sector, 2018

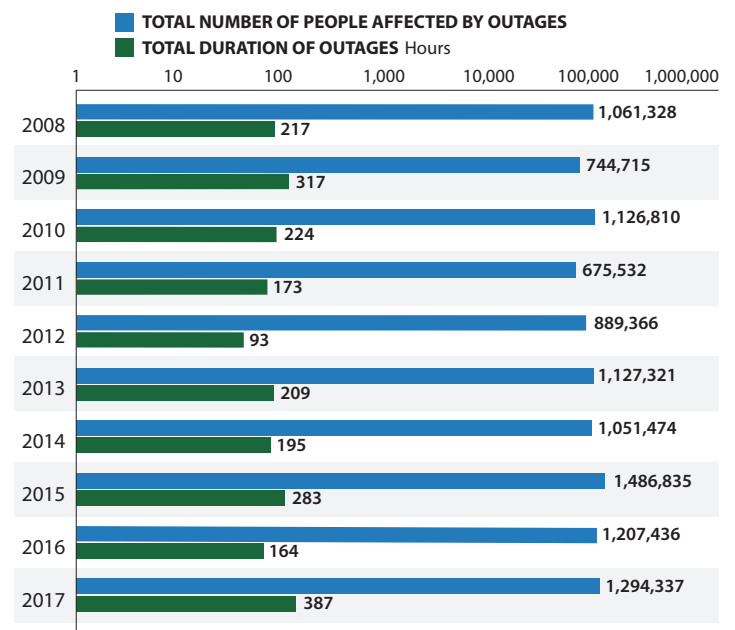
	 CUSTOMERS	 CONSUMPTION
Residential 	88%	37%
Commercial 	11%	34%
Industrial 	1%	29%
Transportation 	<1%	<1%

Data Source: EIA

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

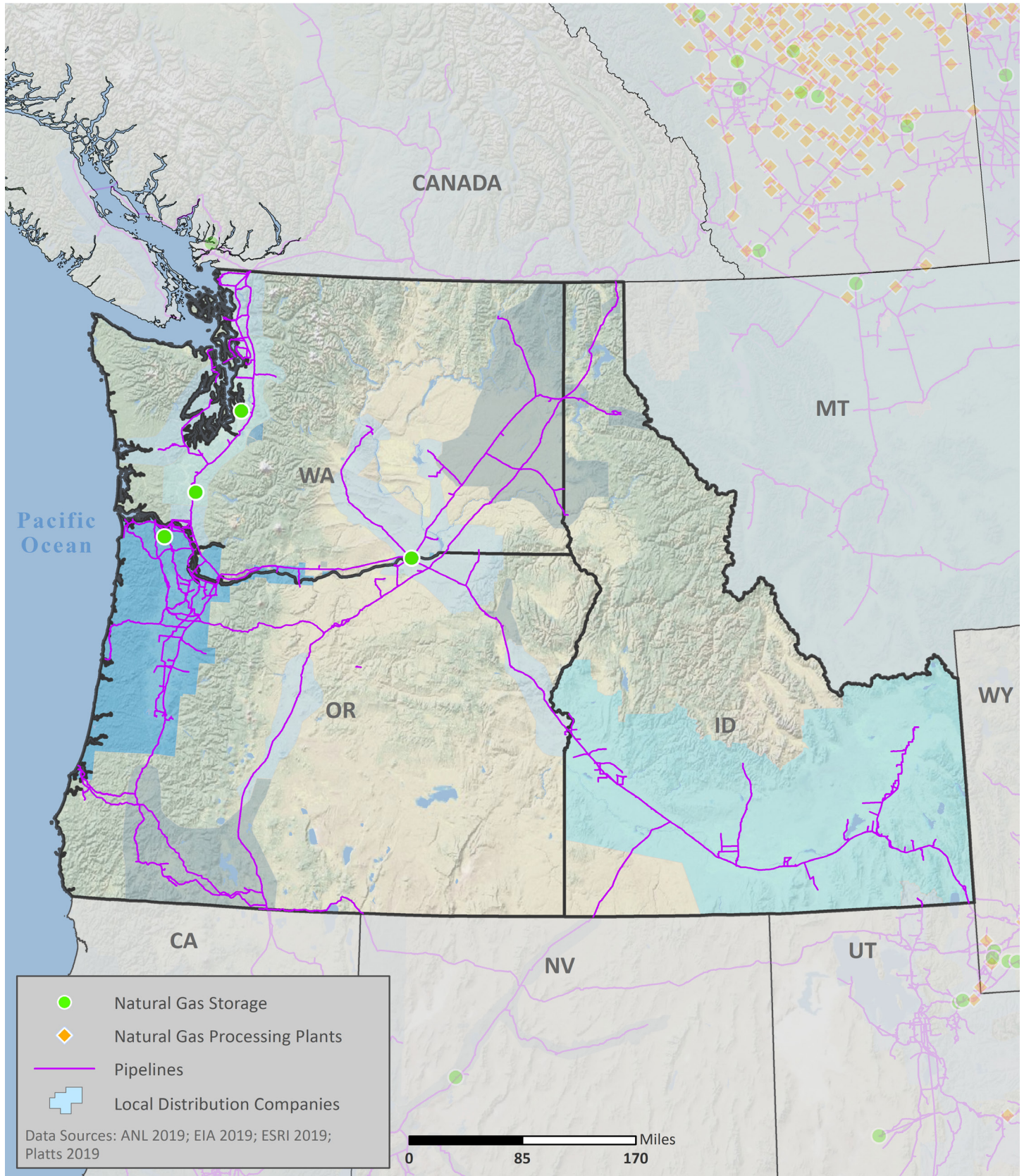


### Electric Utility Outage Data, 2008 – 2017





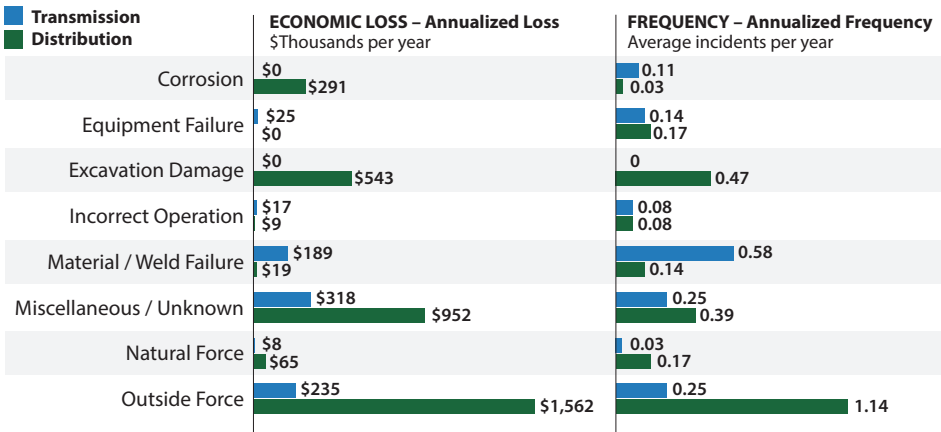
# NATURAL GAS





## Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Region 10 had:
  - 5,959 miles of natural gas transmission pipelines
  - 48,028 miles of natural gas distribution pipelines
- 50% of Region 10’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 10’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%	23%
Commercial	9%	16%
Industrial	<1%	24%
Transportation	<1%	<1%
Electric Power	<1%	36%
Other	<1%	<1%

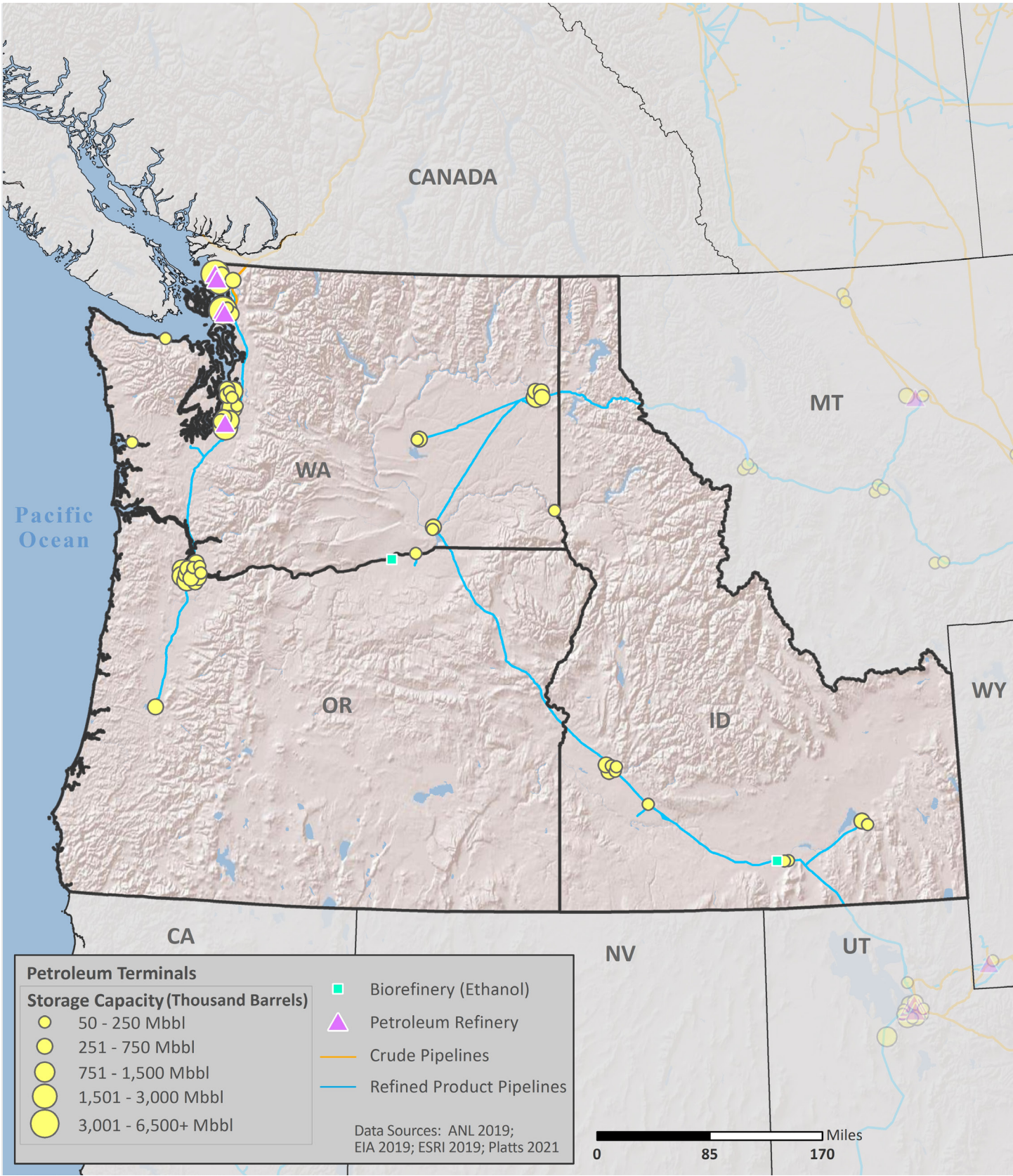
Data Source: EIA

- Region 10 has 0 natural gas processing facilities.
- Region 10 has 7 liquefied natural gas (LNG) facilities with a total storage capacity of 1,345,189 barrels.





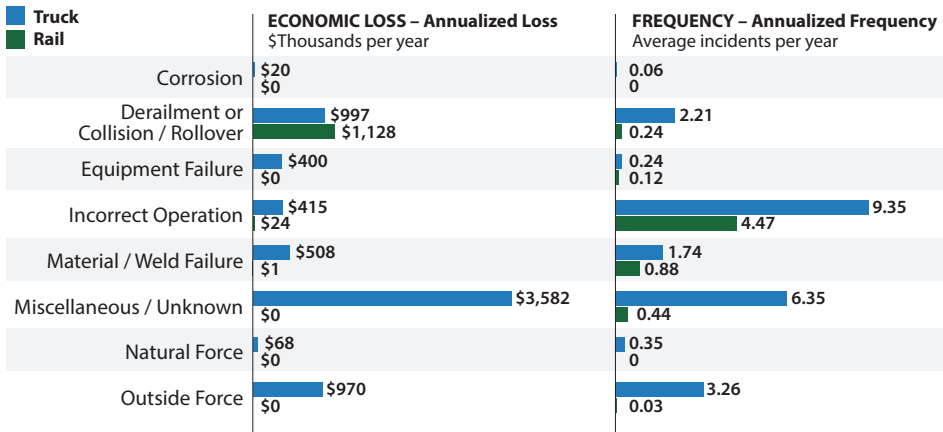
# PETROLEUM





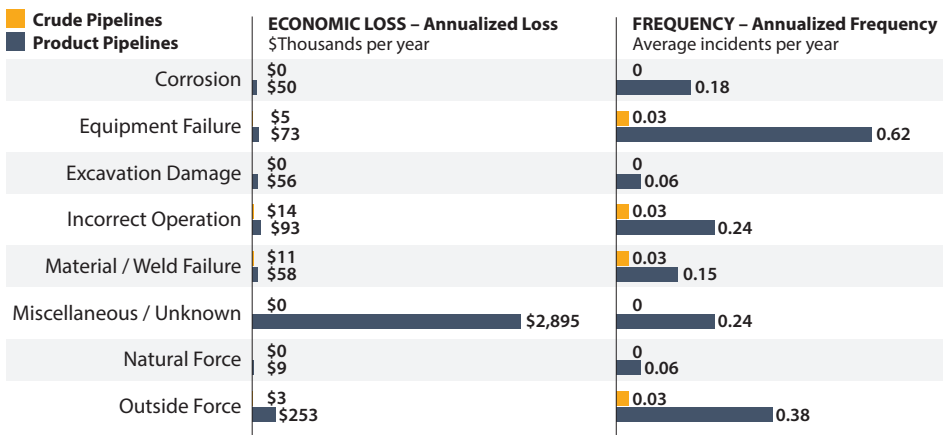
## Petroleum Transport

### 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



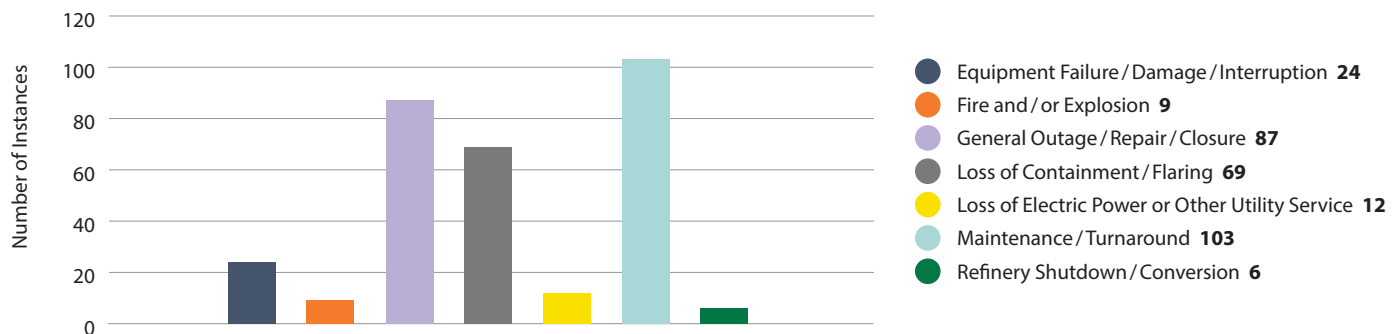
Data Source: DOT PHMSA

- Region 10 is part of Petroleum Administration for Defense Districts (PADDs) 4 and 5.
- As of 2018, Region 10 had:
  - 225 miles of crude oil pipelines
  - 1,796 miles of refined product pipelines
  - 0 miles of biofuels pipelines
- 89% of Region 10’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 10’s petroleum supply was most impacted by:
  - **Miscellaneous or Unknown** events when transported by truck (3rd leading cause nationwide at \$52.87M per year)
  - **Derailments, Collisions, or Rollovers** when transported by rail (leading cause nationwide at \$19.71M per year)
  - **Material Failures** when transported by crude pipelines (leading cause nationwide at \$41.36M 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 10 has 5 petroleum refineries with a total operable capacity of 651.7 Mb/d.

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



Data Source: Hydrocarbon Publishing