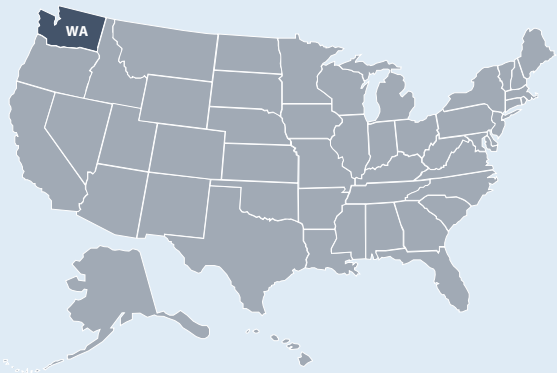
State of Washington
ENERGY SECTOR RISK PROFILE

U.S. DEPARTMENT OF ENERGY
Cybersecurity, Energy Security, and Emergency Response



Washington State Facts

POPULATION
7.54 M

HOUSING UNITS
3.15 M

BUSINESS ESTABLISHMENTS
0.19 M

ENERGY EMPLOYMENT: 55,919 jobs
PUBLIC UTILITY COMMISSION: Washington Utilities and Transportation Commission
STATE ENERGY OFFICE: Washington State Energy Office
EMERGENCY MANAGEMENT AGENCY: Washington Emergency Management Division
AVERAGE ELECTRICITY TARIFF: 8.00 cents/kWh
ENERGY EXPENDITURES: $3,224/capita
ENERGY CONSUMPTION PER CAPITA: 282 MMBtu
(29th highest of 50 states and Washington, D.C.)
GDP: $565.8 billion

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

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 92,030 GWh
COAL: 3,700 MSTN
NATURAL GAS: 332 Bcf
MOTOR GASOLINE: 68,400 Mbbl
DISTILLATE FUEL: 30,600 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 143 plants, 106.5 TWh, *31.8 GW total capacity*
- **Coal:** 1 plant, 7.2 TWh, *1.5 GW total capacity*
- **Hydro:** 76 plants, 66.0 TWh, *21.2 GW total capacity*
- **Natural Gas:** 18 plants, 15.7 TWh, *4.1 GW total capacity*
- **Nuclear:** 1 plant, 8.9 TWh, *1.2 GW total capacity*
- **Petroleum:** 4 plants, 0.0 TWh, *0.0 GW total capacity*
- **Wind & Solar:** 23 plants, 6.7 TWh, *3.1 GW total capacity*
- **Other sources:** 20 plants, 1.9 TWh, *0.7 GW total capacity*

COAL: 0 MSTN
NATURAL GAS: 0 Bcf
CRUDE OIL: 0 Mbbl
ETHANOL: 0 Mbbl

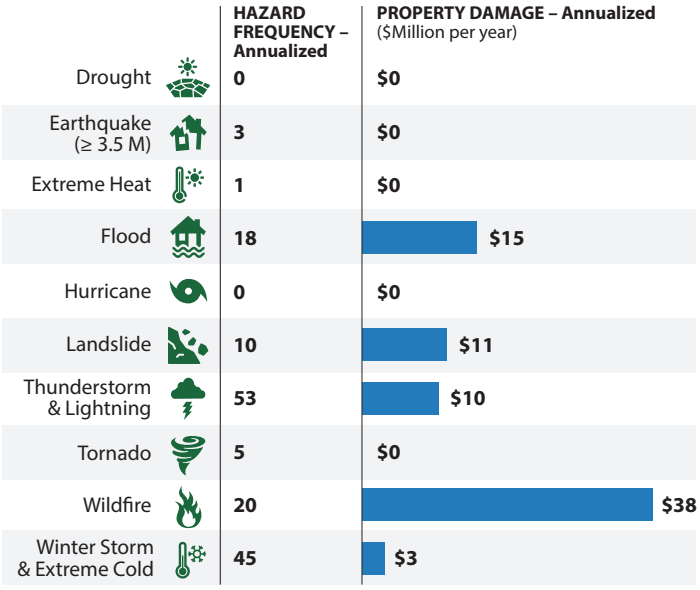
Data from EIA (2018, 2019).

This State Energy Risk Profile examines the relative magnitude of the risks that the state of Washington'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.

Washington Risks and Hazards Overview

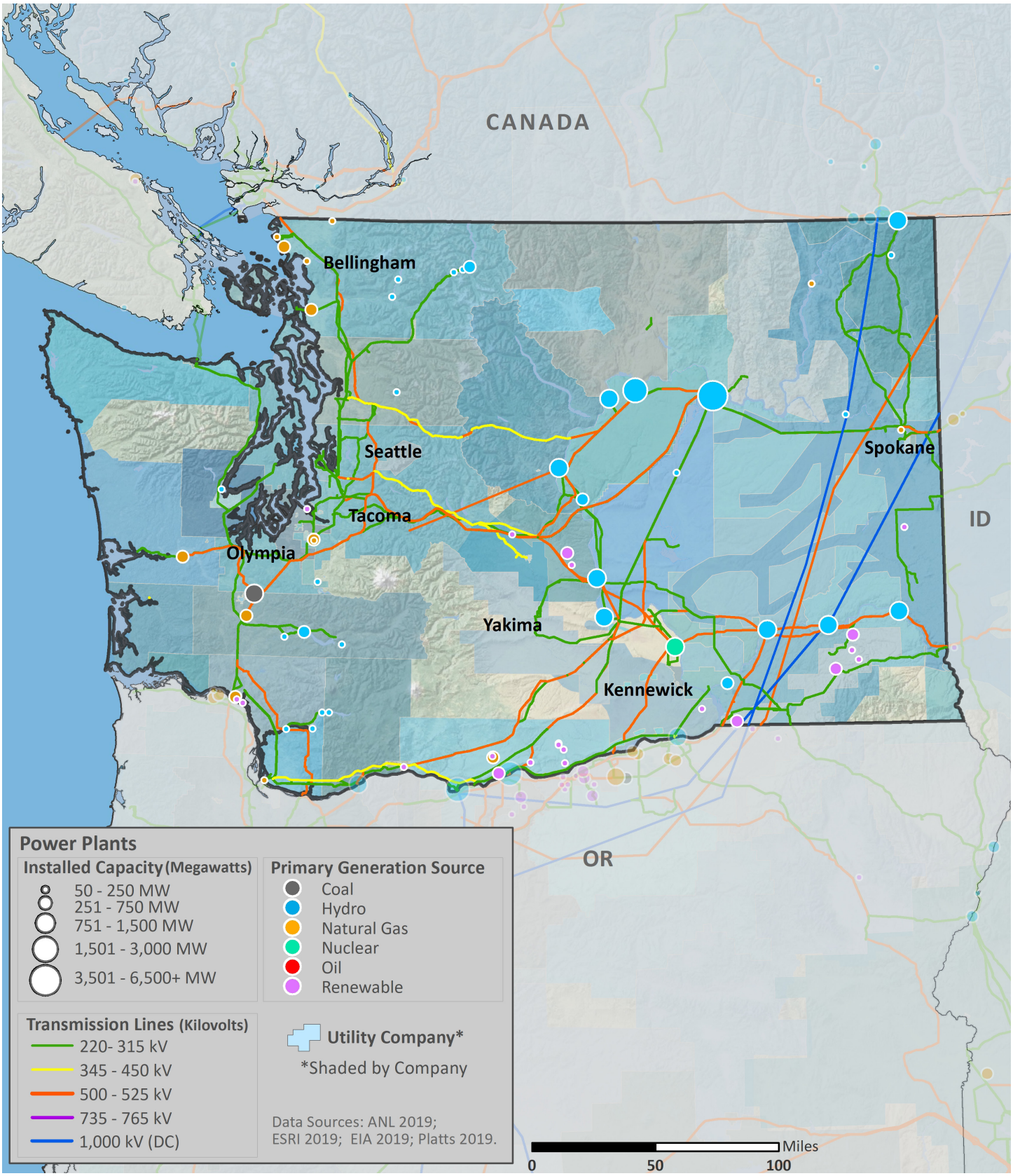
- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Wildfires** at $38 million per year *(3rd leading cause nationwide at $2.1 billion per year)*.
- Washington had 72 Major Disaster Declarations, 19 Emergency Declarations, and 48 Fire Management Assistance Declarations for 51 events between 2013 and 2019.
- Washington registered 4% fewer Heating Degree Days and 45% greater Cooling Degree Days than average in 2019.
- There is 1 Fusion Center located in Seattle.

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



Data Sources: NOAA and USGS

ELECTRIC


CANADA
Bellingham
Seattle
Tacoma
Olympia
Yakima
Kennewick
Spokane
ID
OR
Power Plants
Installed Capacity (Megawatts)
50 - 250 MW
251 - 750 MW
751 - 1,500 MW
1,501 - 3,000 MW
3,501 - 6,500+ MW
Primary Generation Source
Coal
Hydro
Natural Gas
Nuclear
Oil
Renewable
Transmission Lines (Kilovolts)
220- 315 kV
345 - 450 kV
500 - 525 kV
735 - 765 kV
1,000 kV (DC)
Utility Company*
*Shaded by Company
Data Sources: ANL 2019; ESRI 2019; EIA 2019; Platts 2019.
Miles
0
50
100

Electric Infrastructure

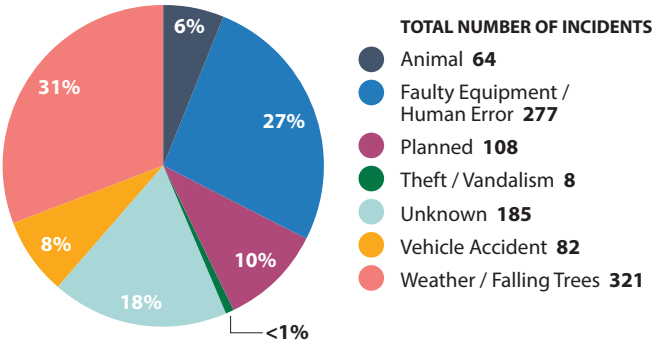
- Washington has 59 electric utilities:
  - *3 Investor owned*
  - *14 Cooperative*
  - *38 Municipal / Public Utility Districts*
  - *4 Other utilities*
- Plant retirements scheduled by 2025: 3 electric generating units totaling 1,564 MW of installed capacity.
- In 2018, the average Washington electric customer experienced 1.2 service interruptions that lasted an average of 4.5 hours.
- In Washington, between 2008 and 2017:
  - *The greatest number of electric outages occurred in **November** (10th for outages nationwide)*
  - *The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)*
  - *Electric outages affected 564,356 customers on average*

Electric Customers and Consumption by Sector, 2018

	CUSTOMERS	CONSUMPTION
Residential	88%	39%
Commercial	11%	33%
Industrial	<1%	28%
Transportation	<1%	<1%

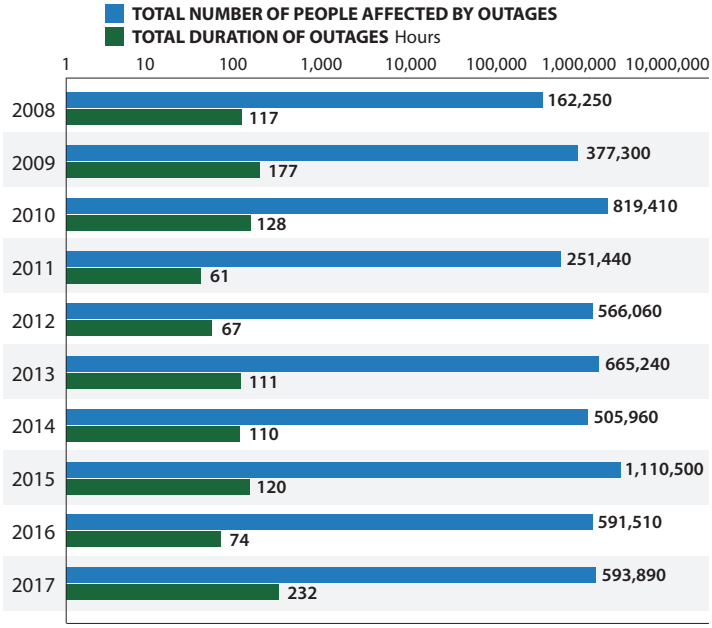
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



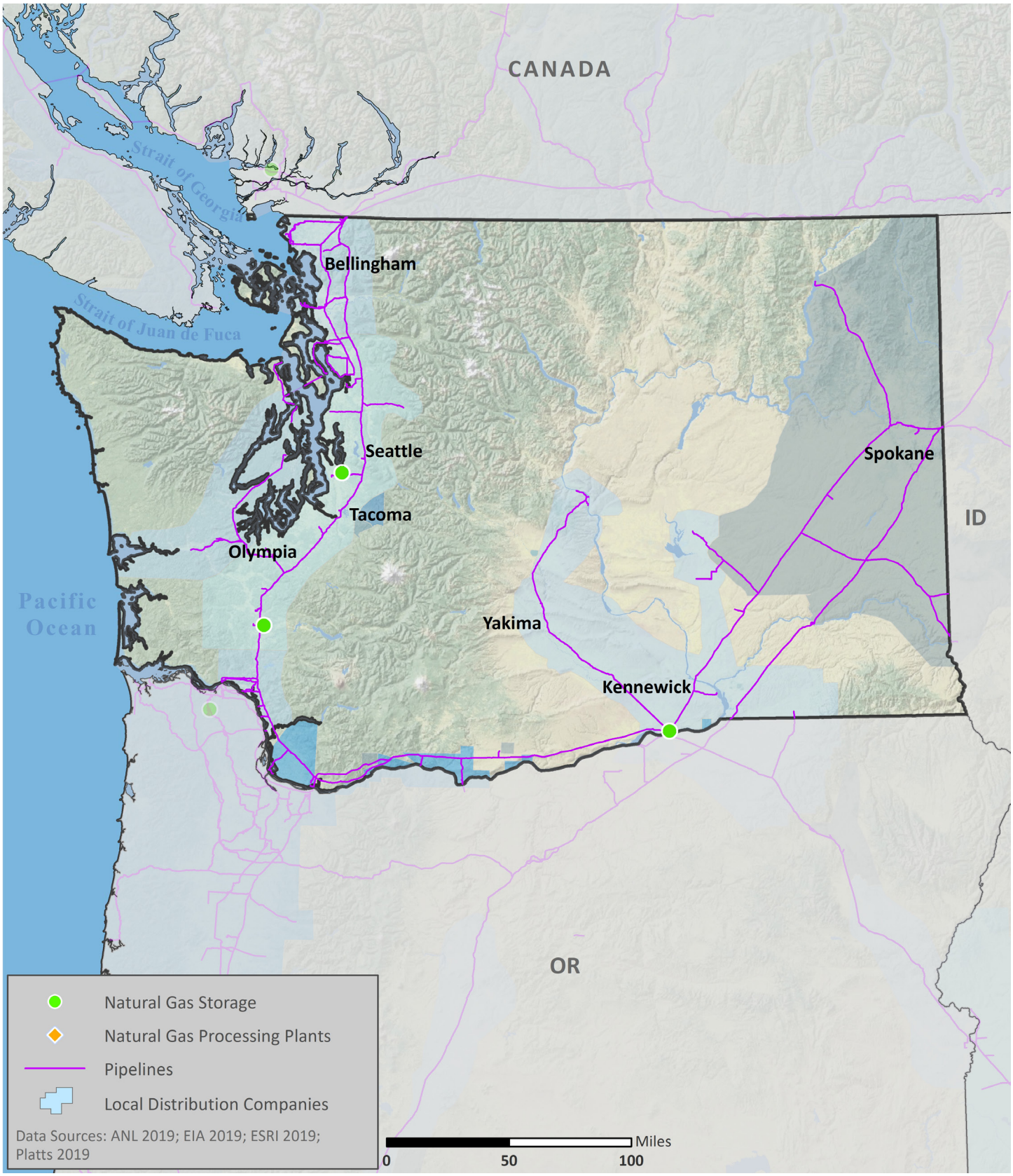
Data Source: Eaton

Electric Utility Outage Data, 2008 – 2017



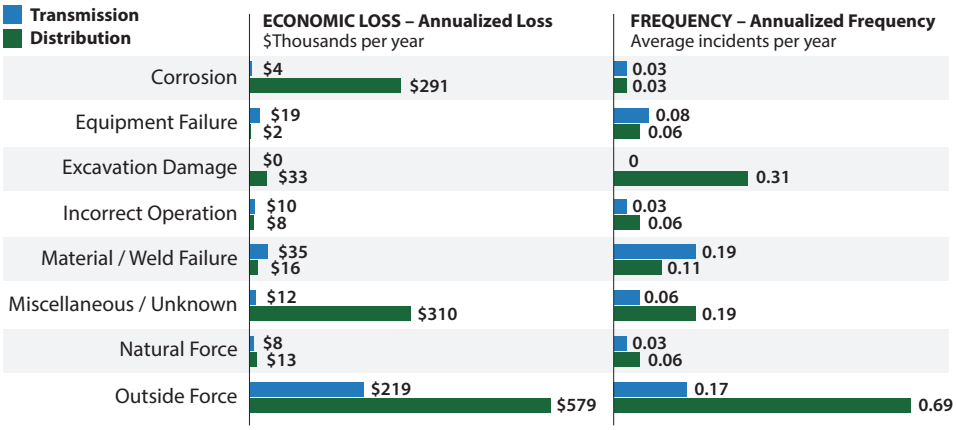
Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton

NATURAL GAS


CANADA
Strait of Georgia
Strait of Juan de Fuca
Bellingham
Seattle
Tacoma
Olympia
Spokane
ID
Pacific Ocean
Yakima
Kennewick
OR
Natural Gas Storage
Natural Gas Processing Plants
Pipelines
Local Distribution Companies
Data Sources: ANL 2019; EIA 2019; ESRI 2019; Platts 2019
0
50
100
Miles

Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Washington had:
  - *1,972 miles of natural gas transmission pipelines*
  - *23,338 miles of natural gas distribution pipelines*
- 57% of Washington's natural gas transmission system and 14% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Washington'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

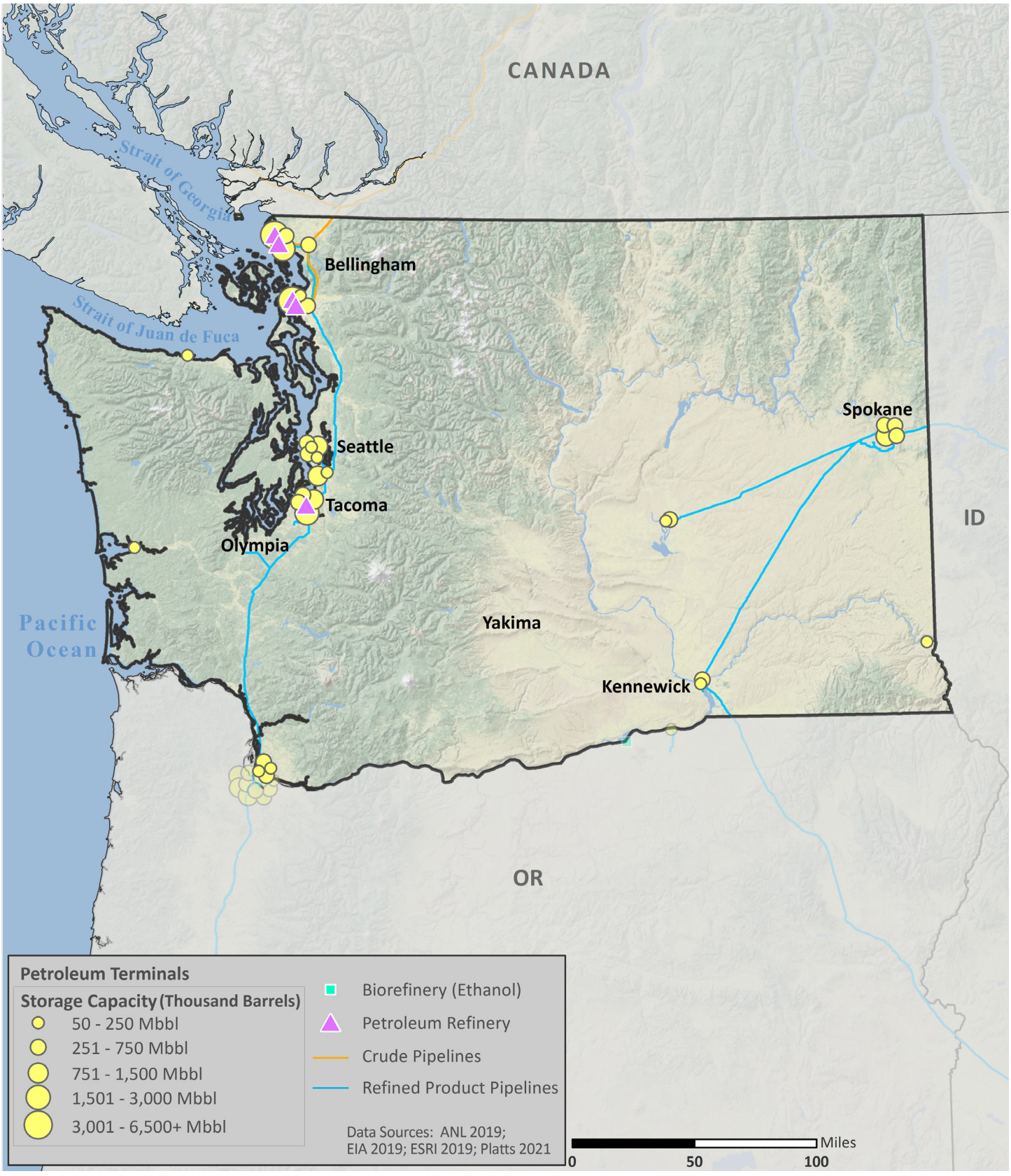
Natural Gas Customers and Consumption by Sector, 2018

	CUSTOMERS	CONSUMPTION
Residential	92%	29%
Commercial	8%	20%
Industrial	<1%	26%
Transportation	<1%	<1%
Electric Power	<1%	25%
Other	<1%	<1%

Data Source: EIA

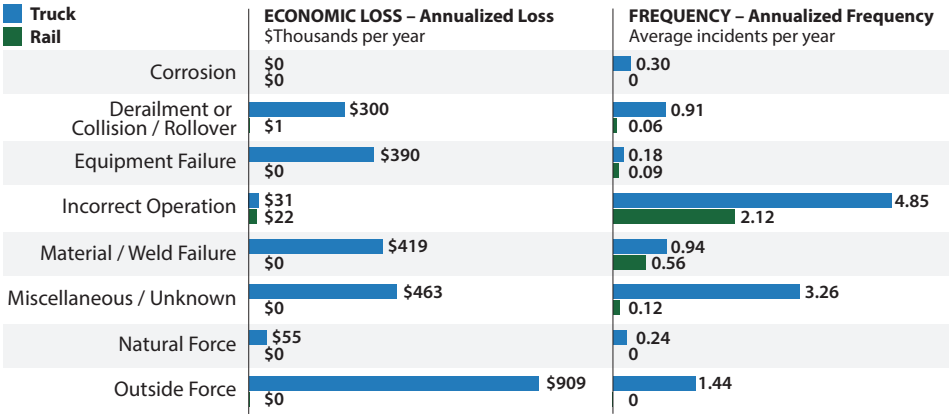
- Washington has 0 natural gas processing facilities.
- Washington has 3 liquefied natural gas (LNG) facilities with a total storage capacity of 693,523 barrels.

PETROLEUM


CANADA
Strait of Georgia
Strait of Juan de Fuca
Bellingham
Seattle
Tacoma
Olympia
Spokane
ID
Yakima
Kennewick
Pacific Ocean
OR
Petroleum Terminals
Storage Capacity (Thousand Barrels)
50 - 250 Mbbl
251 - 750 Mbbl
751 - 1,500 Mbbl
1,501 - 3,000 Mbbl
3,001 - 6,500+ Mbbl
Biorefinery (Ethanol)
Petroleum Refinery
Crude Pipelines
Refined Product Pipelines
Data Sources: ANL 2019; EIA 2019; ESRI 2019; Platts 2021
Miles
0
50
100

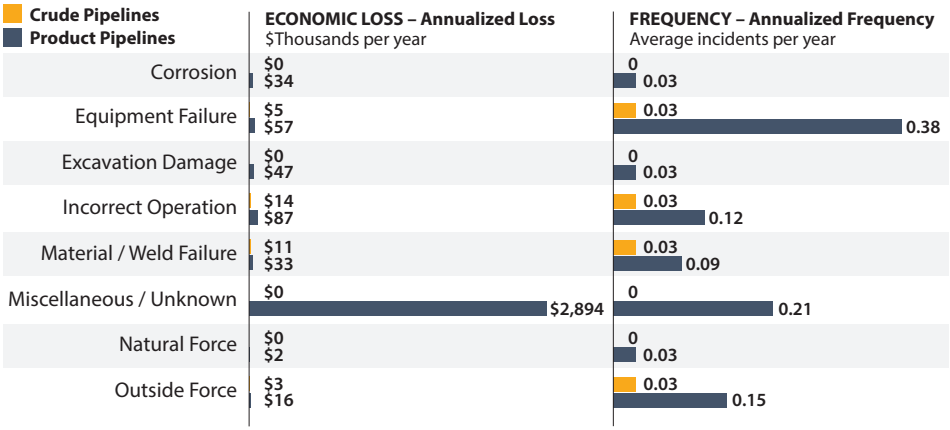
Petroleum Transport

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



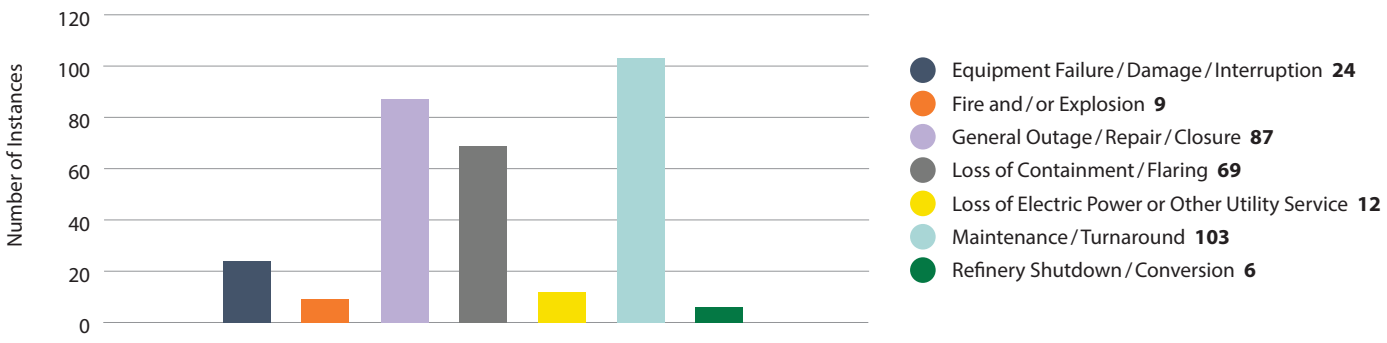
Data Source: DOT PHMSA

- As of 2018, Washington had:
  - *69 miles of crude oil pipelines*
  - *732 miles of refined product pipelines*
  - *0 miles of biofuels pipelines*
- 83% of Washington's petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Washington's petroleum supply was most impacted by:
  - ***Outside Forces*** *when transported by truck (2nd leading cause nationwide at $60.45M per year)*
  - ***Incorrect Operations*** *when transported by rail (4th leading cause nationwide at $2.02M per year)*
  - ***Incorrect Operations*** *when transported by crude pipelines (6th leading cause nationwide at $4.23M 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

- Washington has 5 petroleum refineries with a total operable capacity of 651.7 Mb/d.
- Between 2009 and 2019, the leading cause of petroleum refinery disruptions in Washington was:
  - ***Maintenance*** *(2nd leading cause nationwide)*

Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing