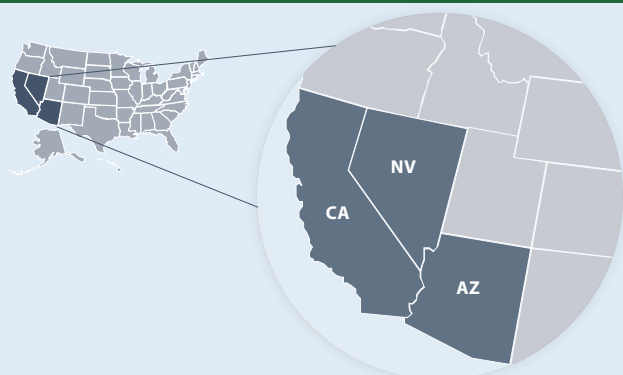




# FEMA Region 9 ENERGY SECTOR RISK PROFILE



## Region 9 Facts



POPULATION

49.76 M



HOUSING UNITS

18.58 M



BUSINESS ESTABLISHMENTS

1.13 M

ENERGY EMPLOYMENT: 494,642 jobs

POPULATION-WEIGHTED AVERAGE ELECTRICITY TARIFF: 15.27 cents/kWh

POPULATION-WEIGHTED ENERGY EXPENDITURES: \$3,125.12/capita

POPULATION-WEIGHTED ENERGY CONSUMPTION PER CAPITA: 203.63 MMBtu

GDP: \$3,515.3 billion

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

## ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 424,250 GWh

COAL: 20,200 MSTN

NATURAL GAS: 2,845 Bcf

MOTOR GASOLINE: 434,000 Mbbbl

DISTILLATE FUEL: 128,700 Mbbbl

## ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 1,745 plants, 355.2 TWh, 121.0 GW total capacity

Coal: 7 plants, 26.2 TWh, 4.5 GW total capacity

Hydro: 267 plants, 46.8 TWh, 13.8 GW total capacity

Natural Gas: 360 plants, 157.7 TWh, 65.5 GW total capacity

Nuclear: 2 plants, 48.1 TWh, 6.5 GW total capacity

Petroleum: 24 plants, 0.1 TWh, 0.7 GW total capacity

Wind & Solar: 839 plants, 53.0 TWh, 23.9 GW total capacity

Other sources: 246 plants, 23.3 TWh, 9.7 GW total capacity

COAL: 6,200 MSTN

NATURAL GAS: 200 Bcf

CRUDE OIL: 161,800 Mbbbl

ETHANOL: 6,500 Mbbbl

Data from EIA (2018, 2019).

This Energy Risk Profile examines the relative magnitude of the risks that Federal Emergency Management Agency (FEMA) Region 9's energy infrastructure routinely encounters in comparison with the probable impacts. FEMA Region 9 includes American Samoa, Arizona, California, Guam, the Commonwealth of the Northern Mariana Islands, Hawaii, and Nevada. This regional profile includes data only for states within the contiguous United States. For information about Hawaii, please refer to the Hawaii State Energy Risk Profile. For information about American Samoa and Guam, please refer to their [Energy Snapshots](#).

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 9 Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Wildfires** at \$1.76 billion (3rd leading cause nationwide at \$2.1 billion per year).
- Region 9 had 181 Major Disaster Declarations, 14 Emergency Declarations, and 133 Fire Management Assistance Declarations for 134 events between 2013 and 2019.
- The FEMA Region 9 office is located in Oakland, CA.

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

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	12	\$0
Earthquake (≥ 3.5 M)	142	\$554
Extreme Heat	25	\$0
Flood	141	\$139
Hurricane	0	\$0
Landslide	18	\$62
Thunderstorm & Lightning	300	\$340
Tornado	23	\$3
Wildfire	43	\$1,763
Winter Storm & Extreme Cold	111	\$19

Data Sources: NOAA and USGS



# ELECTRIC









## Electric Infrastructure

- Region 9 has 160 electric utilities:
  - 12 Investor owned
  - 13 Cooperative
  - 79 Municipal / Public Utility Districts
  - 56 Other utilities
- Plant retirements scheduled by 2025: 97 electric generating units totaling 12,913 MW of installed capacity.

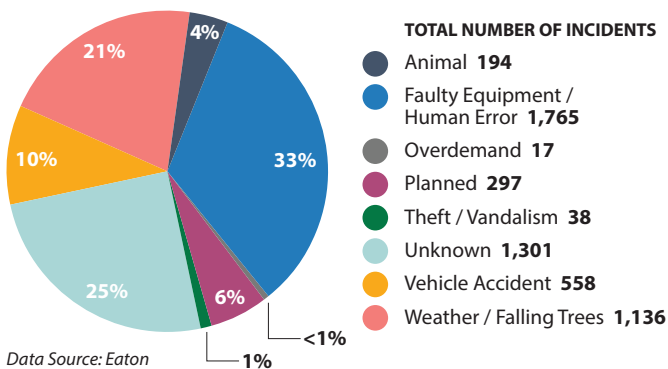
- In 2018, the average Region 9 electric customer experienced 1 service interruption that lasted an average of 3 hours.
- Between 2008 and 2017:
  - In Region 9, the greatest number of electric outages occurred in **December** (4th for outages nationwide)
  - The leading cause of electric outages in Region 9 was **Faulty Equipment or Human Error** (2nd leading cause nationwide)
  - Electric outages affected 3,349,888 customers on average

### Electric Customers and Consumption by Sector, 2018

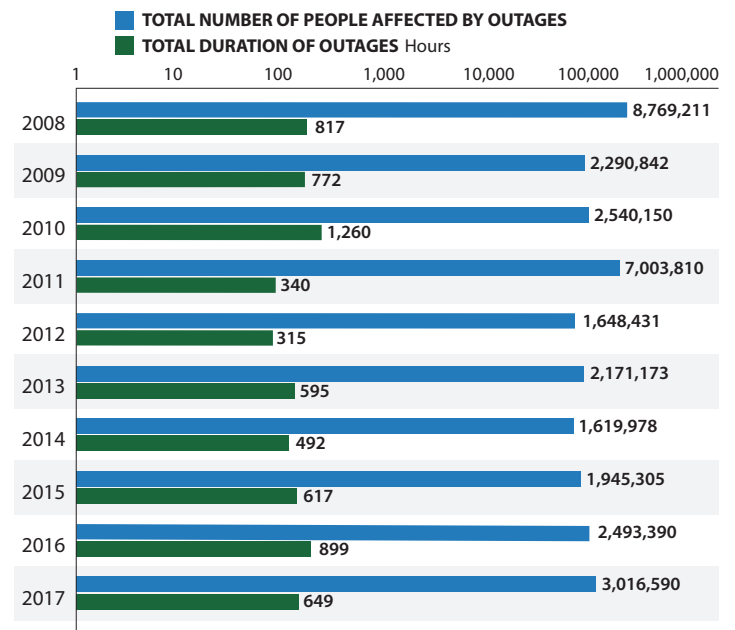
	 CUSTOMERS	 CONSUMPTION
Residential 	88%	37%
Commercial 	11%	34%
Industrial 	1%	29%
Transportation 	<1%	<1%

Data Source: EIA

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



### Electric Utility Outage Data, 2008 – 2017

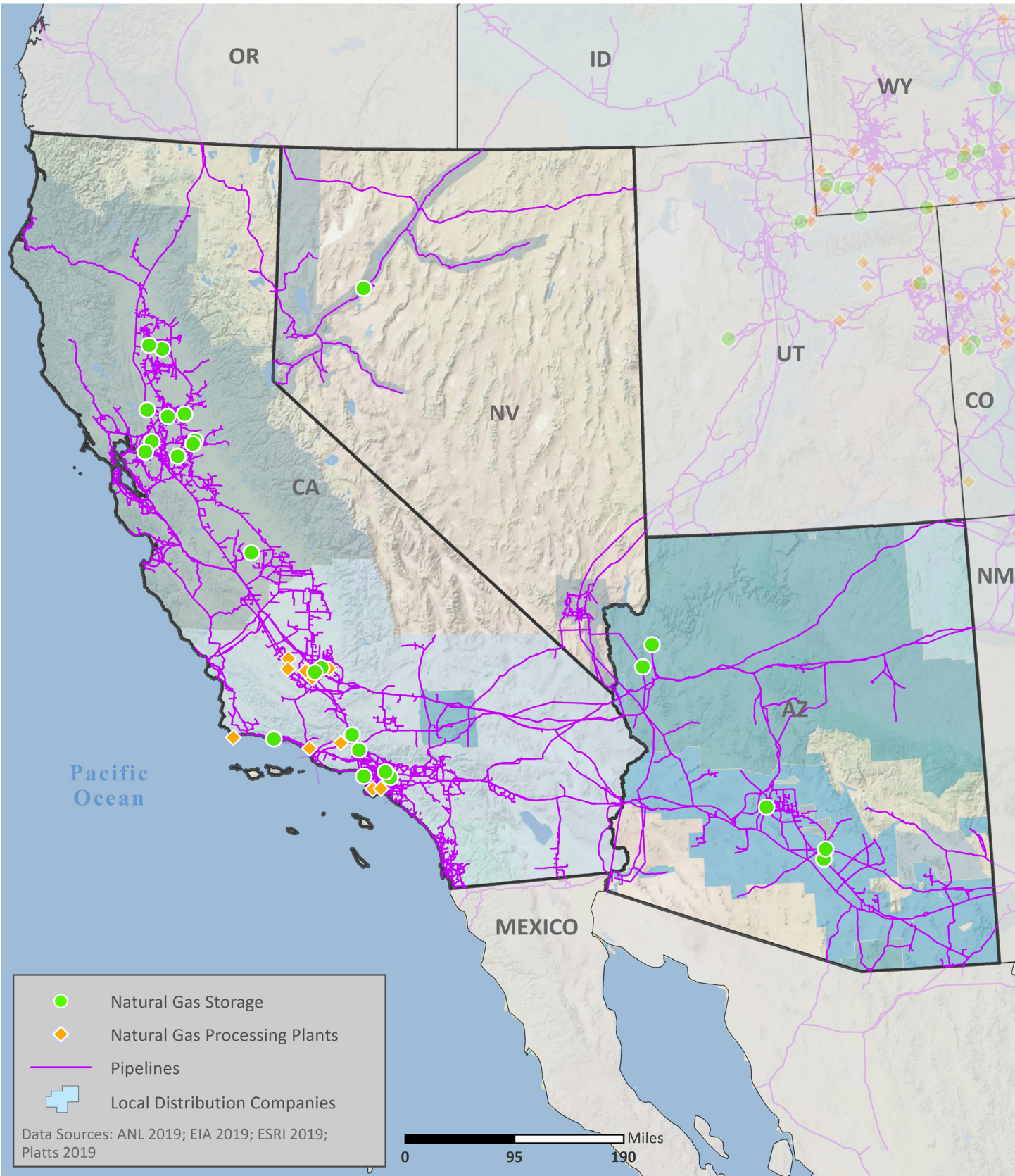


Note: This chart uses a logarithmic scale to display a very wide range of values.  
Data Source: Eaton



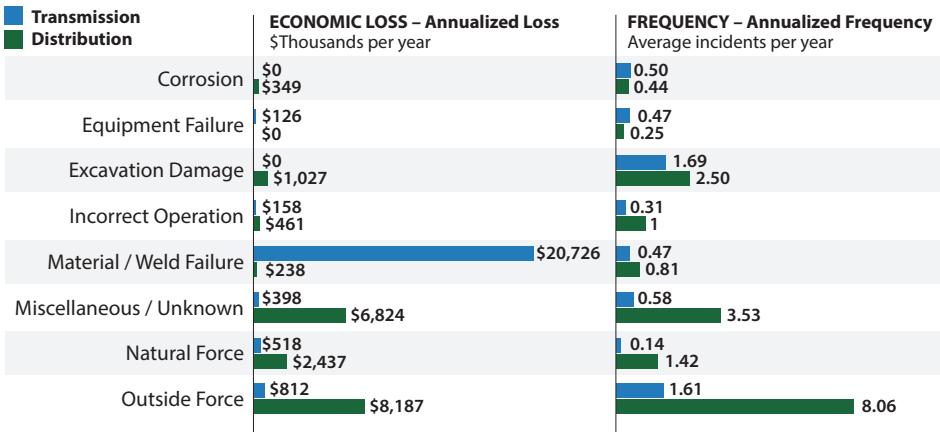


# NATURAL GAS



## Natural Gas Transport

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

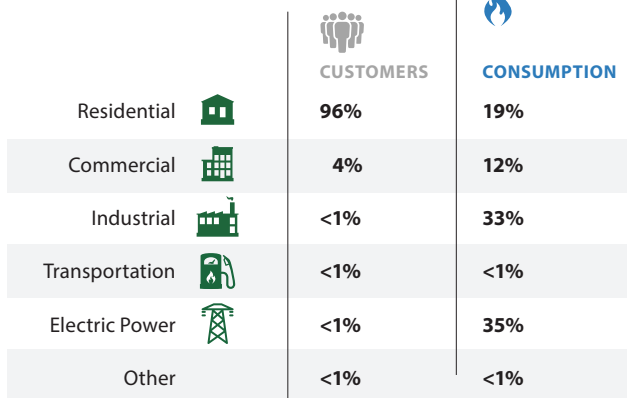


Data Source: DOT PHMSA

- As of 2018, Region 9 had:
  - 20,967 miles of natural gas transmission pipelines
  - 142,261 miles of natural gas distribution pipelines
- 59% of Region 9’s natural gas transmission system and 33% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Region 9’s natural gas supply was most impacted by:
  - **Material Failures** when transported by transmission pipelines (leading cause nationwide at \$28.43M 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



Data Source: EIA

- Region 9 has 10 natural gas processing facilities.
- Region 9 has 5 liquefied natural gas (LNG) facilities with a total storage capacity of 364,219 barrels.



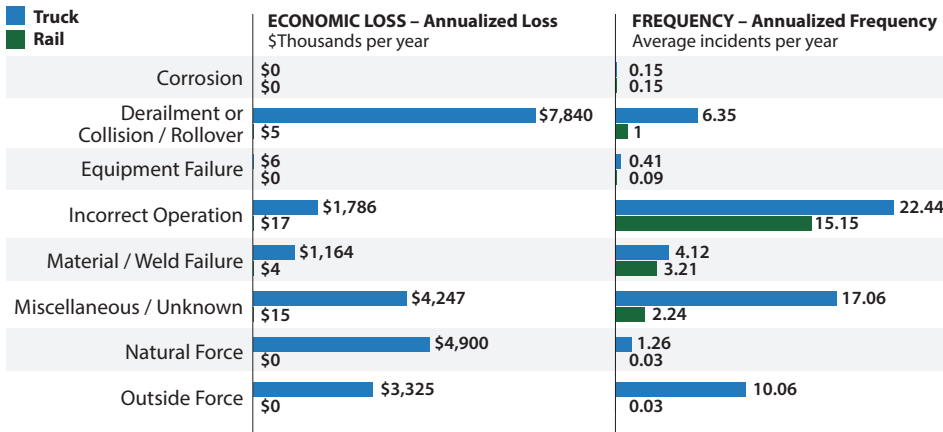


# PETROLEUM



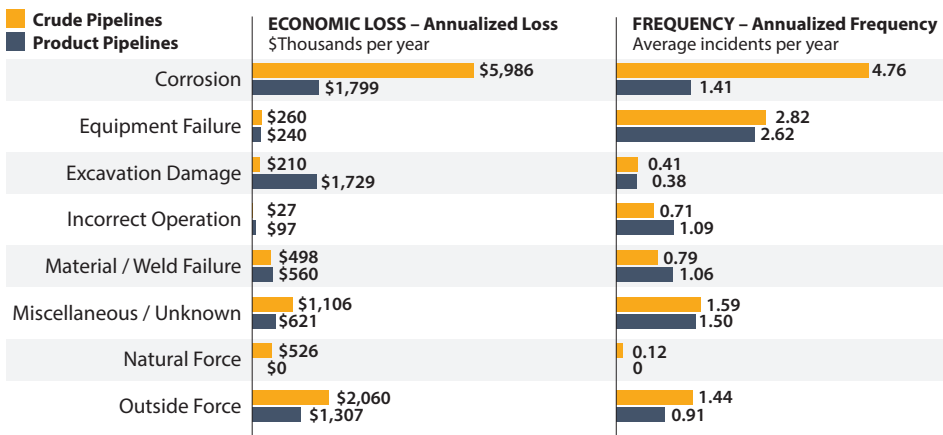
## Petroleum Transport

### 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



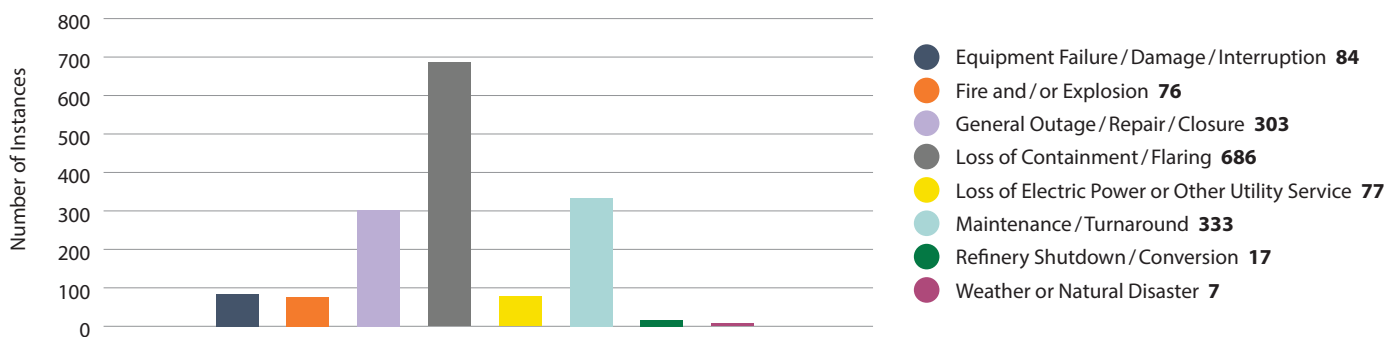
Data Source: DOT PHMSA

- Region 9 is part of Petroleum Administration for Defense District (PADD) 5.
- As of 2018, Region 9 had:
  - 3,786 miles of crude oil pipelines
  - 4,114 miles of refined product pipelines
  - 15 miles of biofuels pipelines
- 52% of Region 9’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Region 9’s petroleum supply was most impacted by:
  - **Derailments, Collisions, or Rollovers** when transported by truck (8th leading cause nationwide at \$0.07M per year)
  - **Incorrect Operations** when transported by rail (leading cause nationwide at \$19.71M per year)
  - **Equipment Failures** when transported by crude pipelines (8th leading cause nationwide at \$2.88M per year)
  - **Equipment Failures** when transported by product pipelines (6th leading cause nationwide at \$4.66M per year)
- Disruptions in other states may impact supply.

## Petroleum Refineries

- Region 9 has 15 petroleum refineries with a total operable capacity of 1,910 Mb/d.

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



Data Source: Hydrocarbon Publishing