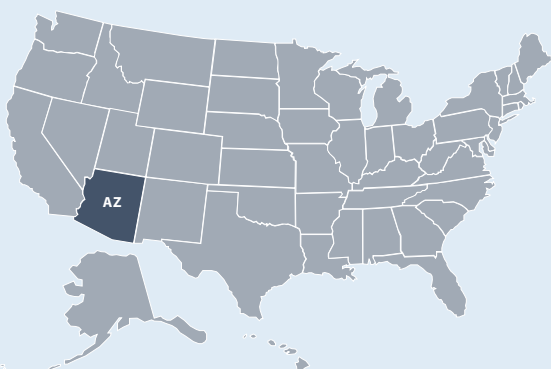




State of Arizona ENERGY SECTOR RISK PROFILE



Arizona State Facts



POPULATION

7.17 M



HOUSING UNITS

3.04 M



BUSINESS ESTABLISHMENTS

0.14 M

ENERGY EMPLOYMENT: 46,951 jobs
PUBLIC UTILITY COMMISSION: Arizona Corporation Commission
STATE ENERGY OFFICE: General Services Division - Arizona Department of Administration
EMERGENCY MANAGEMENT AGENCY: Arizona Division of Emergency Management
AVERAGE ELECTRICITY TARIFF: 10.85 cents/kWh
ENERGY EXPENDITURES: \$2,911/capita
ENERGY CONSUMPTION PER CAPITA: 209 MMBtu (44th highest out of 50 states and Washington, D.C.)
GDP: \$348.3 billion

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

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 78,350 GWh
COAL: 17,100 MSTN
NATURAL GAS: 453 Bcf
MOTOR GASOLINE: 71,000 Mbbbl
DISTILLATE FUEL: 25,300 Mbbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 150 plants, 113.6 TWh, 26.7 GW total capacity
Coal: 4 plants, 23.2 TWh, 3.6 GW total capacity
Hydro: 10 plants, 6.2 TWh, 2.7 GW total capacity
Natural Gas: 32 plants, 46.1 TWh, 16.9 GW total capacity
Nuclear: 1 plant, 31.9 TWh, 4.2 GW total capacity
Petroleum: 4 plants, 0.1 TWh, 0.1 GW total capacity
Wind & Solar: 87 plants, 5.8 TWh, 2.4 GW total capacity
Other sources: 12 plants, 0.2 TWh, 0.3 GW total capacity
COAL: 6,200 MSTN
NATURAL GAS: 0 Bcf
CRUDE OIL: 0 Mbbbl
ETHANOL: 1,200 Mbbbl

Data from EIA (2018, 2019).

This State Energy Risk Profile examines the relative magnitude of the risks that the state of Arizona’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.

Arizona Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Thunderstorms & Lightning** at \$306 million per year (2nd leading cause nationwide at \$2.8 billion per year).
- Arizona had 6 Major Disaster Declarations, 0 Emergency Declarations, and 13 Fire Management Assistance Declarations for 18 events between 2013 and 2019.
- Arizona registered 8% fewer Heating Degree Days and 11% greater Cooling Degree Days than average in 2019.
- There is 1 Fusion Center located in Phoenix.

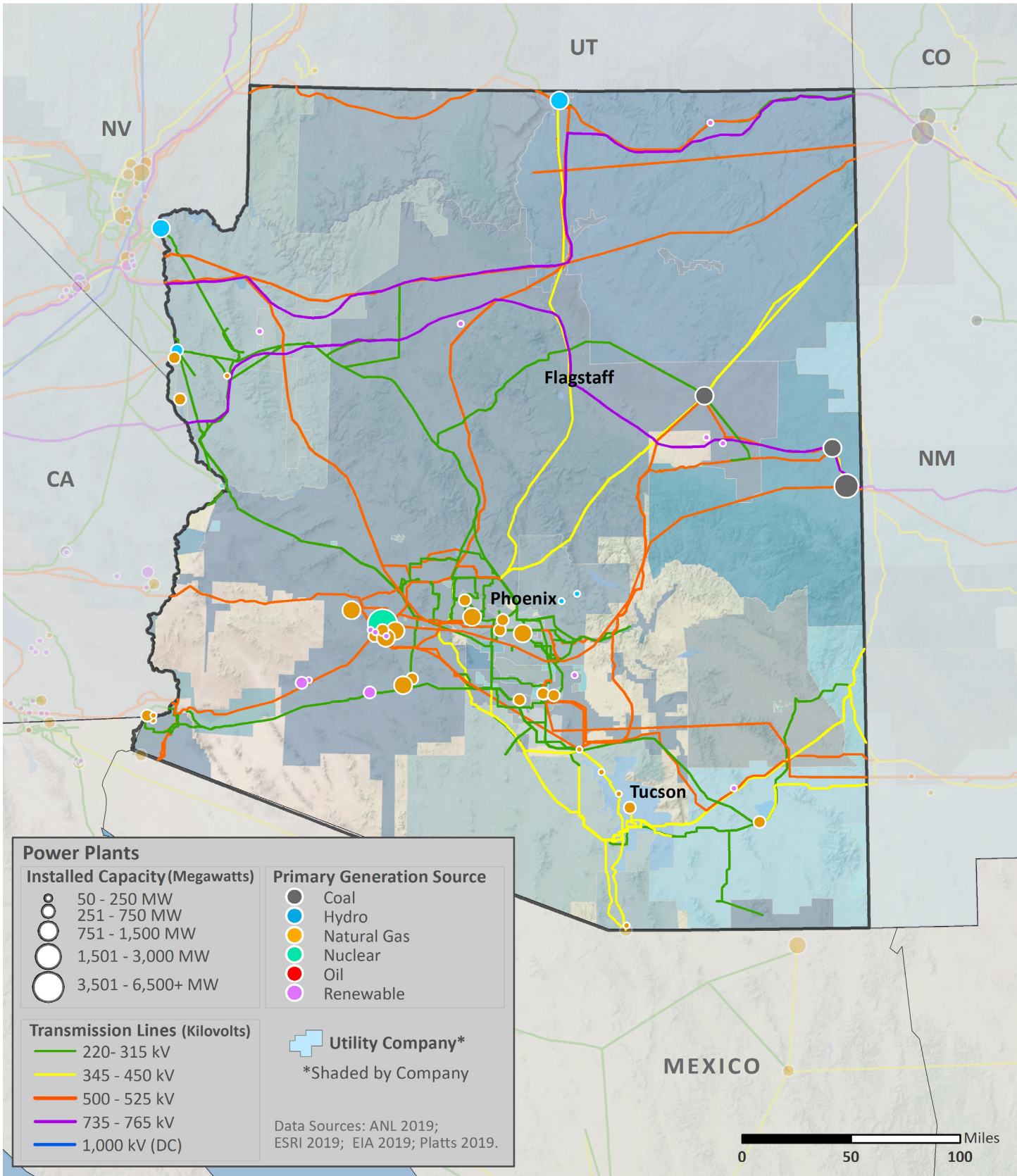
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	5	\$0
Earthquake (≥ 3.5 M)	2	\$0
Extreme Heat	6	\$0
Flood	65	\$9
Hurricane	0	\$0
Landslide	1	\$0
Thunderstorm & Lightning	121	\$306
Tornado	8	\$0
Wildfire	10	\$16
Winter Storm & Extreme Cold	16	\$16

Data Sources: NOAA and USGS



ELECTRIC









Electric Infrastructure

- Arizona has 46 electric utilities:
 - 5 Investor owned
 - 7 Cooperative
 - 23 Municipal
 - 11 Other utilities
- Plant retirements scheduled by 2025: 7 electric generating units totaling 2,854 MW of installed capacity.

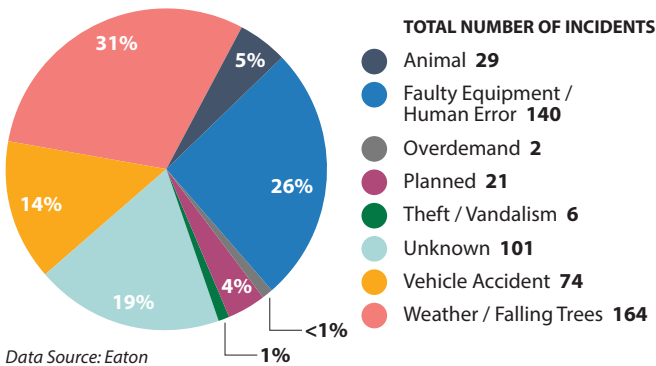
- In 2018, the average Arizona electric customer experienced 0.9 service interruptions that lasted an average of 1.9 hours.
- In Arizona, between 2008 and 2017:
 - The greatest number of electric outages occurred in **July** (leading month for outages nationwide)
 - The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 209,750 customers on average

Electric Customers and Consumption by Sector, 2018

	 CUSTOMERS	 CONSUMPTION
Residential 	89%	44%
Commercial 	10%	38%
Industrial 	<1%	18%
Transportation 	<1%	<1%

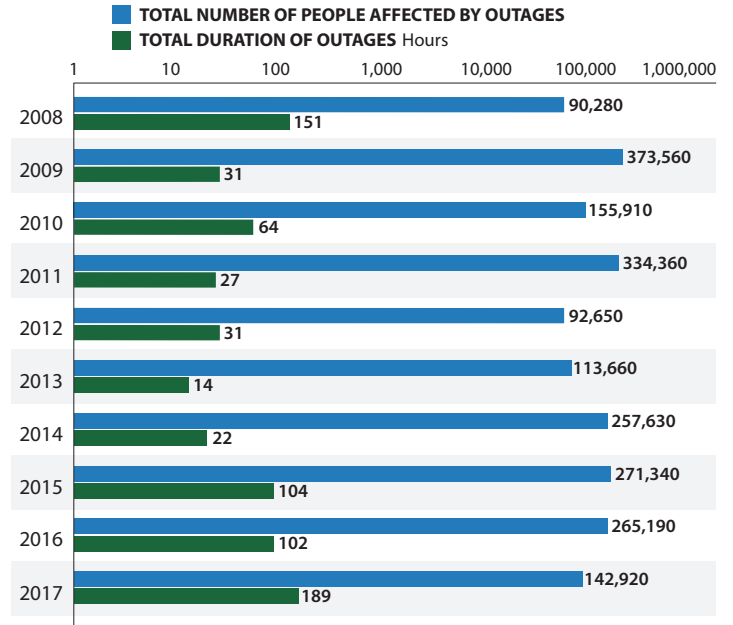
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



Data Source: Eaton

Electric Utility Outage Data, 2008 – 2017

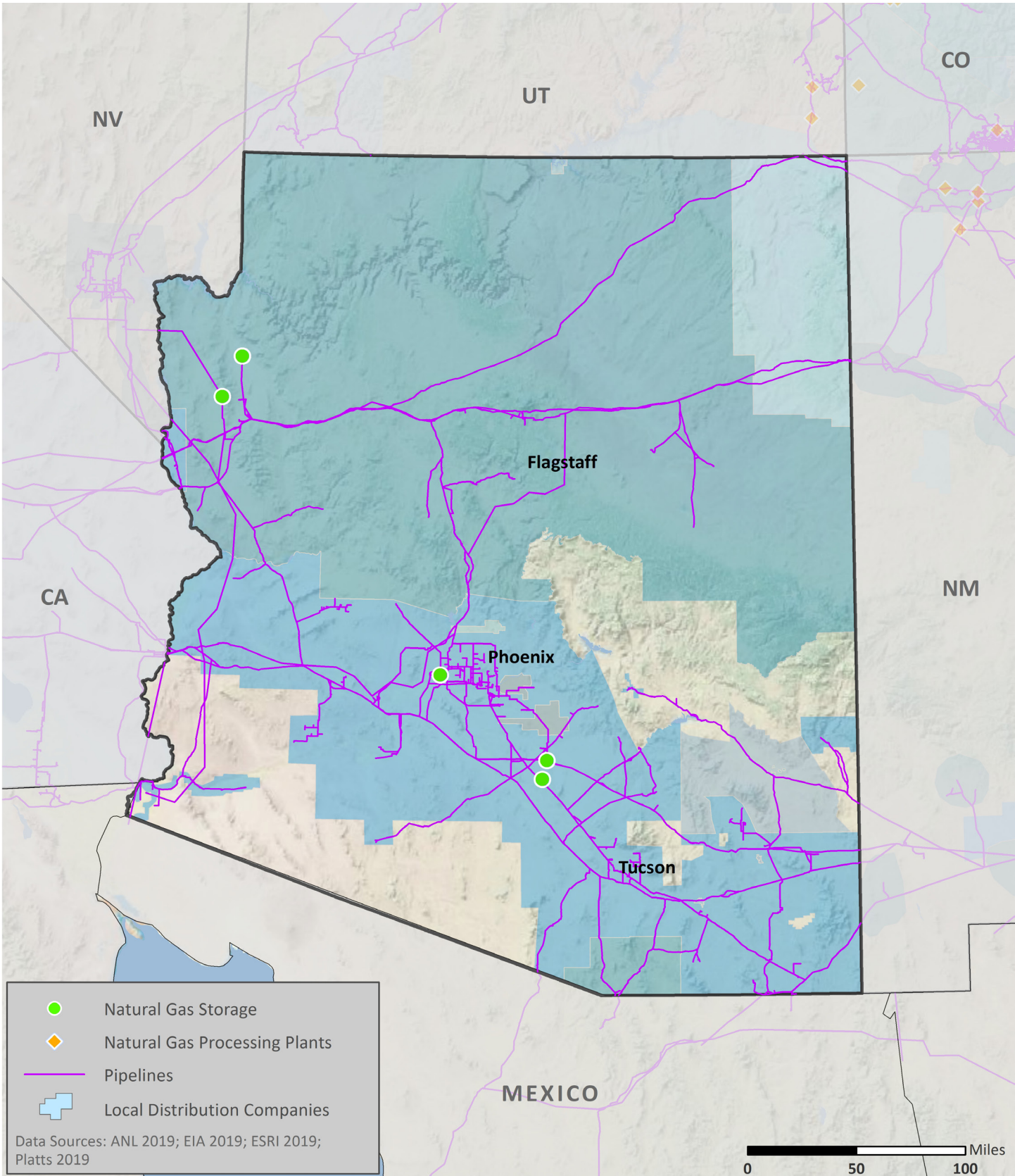


Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton



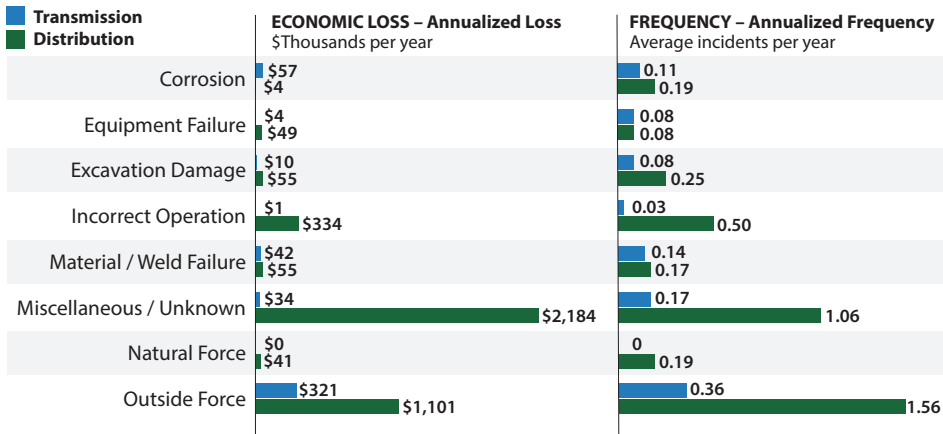


NATURAL GAS



Natural Gas Transport

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



Data Source: DOT PHMSA

- As of 2018, Arizona had:
 - 6,644 miles of natural gas transmission pipelines
 - 25,080 miles of natural gas distribution pipelines
- 70% of Arizona’s natural gas transmission system and 11% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Arizona’s natural gas supply was most impacted by:
 - Outside Forces** when transported by transmission pipelines (3rd leading cause nationwide at \$20.65M 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	96%	8%
Commercial	4%	8%
Industrial	<1%	5%
Transportation	<1%	<1%
Electric Power	<1%	79%
Other	<1%	<1%

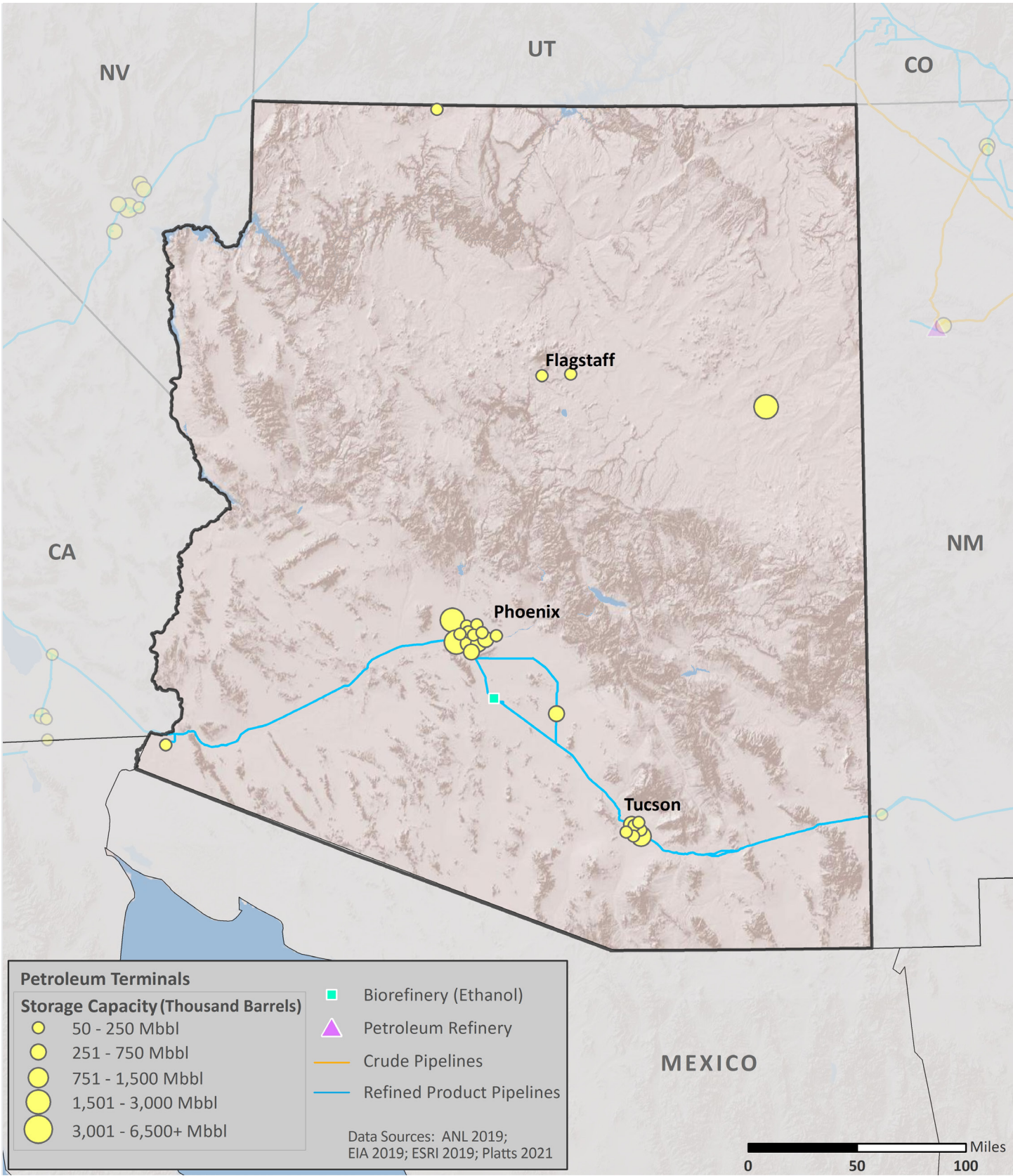
Data Source: EIA

- Arizona has 0 natural gas processing facilities.
- Arizona has 3 liquefied natural gas (LNG) facilities with a total storage capacity of 73,886 barrels.



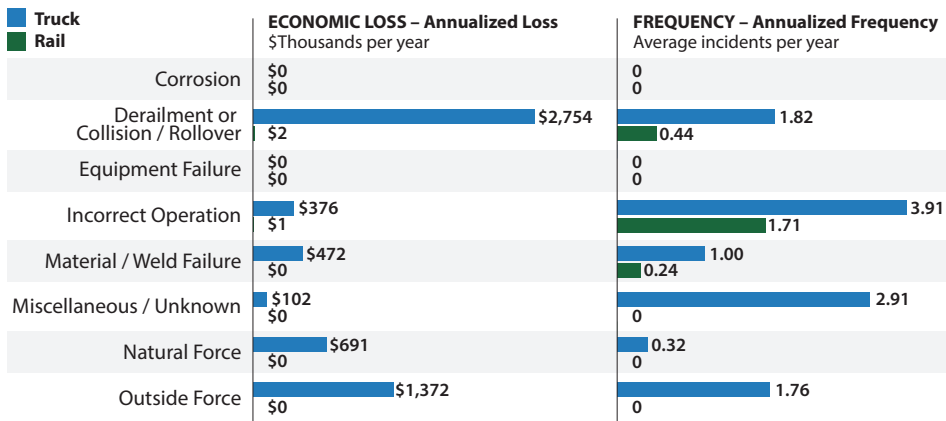


PETROLEUM



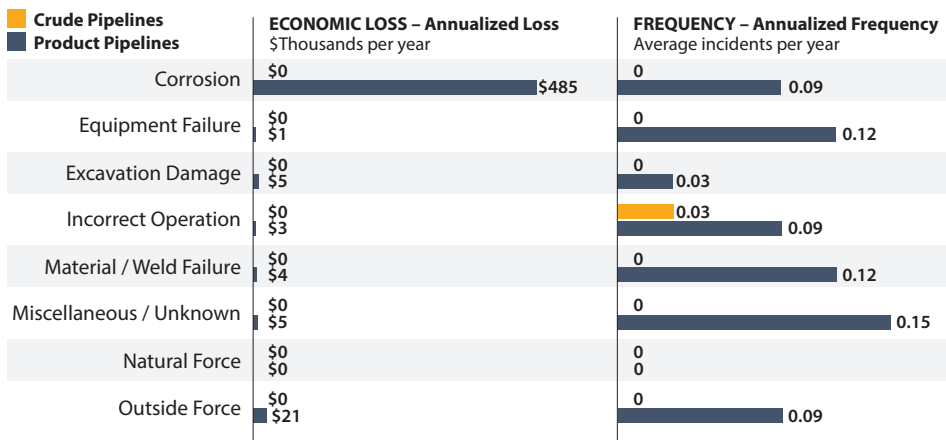
Petroleum Transport

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

- As of 2018, Arizona had:
 - 0 miles of crude oil pipelines
 - 574 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 26% of Arizona’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Arizona’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)
 - **Incorrect Operations** when transported by crude pipelines (6th leading cause nationwide at \$4.23M per year)
 - **Corrosion** when transported by product pipelines (2nd leading cause nationwide at \$15.20M per year)
- Disruptions in other states may impact supply.

Petroleum Refineries

- There are no operating petroleum refineries in Arizona.

