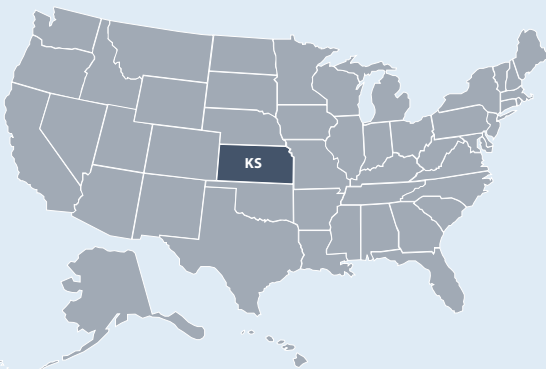




State of Kansas ENERGY SECTOR RISK PROFILE



Kansas State Facts



POPULATION

2.91 M



HOUSING UNITS

1.28 M



BUSINESS ESTABLISHMENTS

0.07 M

ENERGY EMPLOYMENT: 48,696 jobs
PUBLIC UTILITY COMMISSION: Kansas Corporation Commission
STATE ENERGY OFFICE: Kansas Energy Office
EMERGENCY MANAGEMENT AGENCY: Kansas Division of Emergency Management
AVERAGE ELECTRICITY TARIFF: 10.72 cents/kWh
ENERGY EXPENDITURES: \$3,841/capita
ENERGY CONSUMPTION PER CAPITA: 369 MMBtu (16th highest out of 50 states and Washington, D.C.)
GDP: \$168.3 billion

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

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 42,040 GWh

COAL: 13,300 MSTN

NATURAL GAS: 271 Bcf

MOTOR GASOLINE: 38,000 Mbbl

DISTILLATE FUEL: 27,300 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 168 plants, 50.9 TWh, 12.3 GW total capacity

Coal: 5 plants, 17.3 TWh, 4.9 GW total capacity

Hydro: 1 plant, 0.0 TWh, 0.0 GW total capacity

Natural Gas: 61 plants, 3.0 TWh, 4.2 GW total capacity

Nuclear: 1 plant, 9.2 TWh, 1.3 GW total capacity

Petroleum: 55 plants, 0.1 TWh, 0.6 GW total capacity

Wind & Solar: 42 plants, 21.1 TWh, 6.2 GW total capacity

Other sources: 3 plants, 0.1 TWh, 0.0 GW total capacity

COAL: 0 MSTN

NATURAL GAS: 180 Bcf

CRUDE OIL: 33,200 Mbbl

ETHANOL: 12,100 Mbbl

Data from EIA (2018, 2019).

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

Kansas Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Tornadoes** at \$60 million per year (4th leading cause nationwide at \$2 billion per year).
- Kansas had 267 Major Disaster Declarations, 33 Emergency Declarations, and 14 Fire Management Assistance Declarations for 16 events between 2013 and 2019.
- Kansas registered 1% greater Heating Degree Days and 2% greater Cooling Degree Days than average in 2019.
- There is 1 Fusion Center located in Topeka.

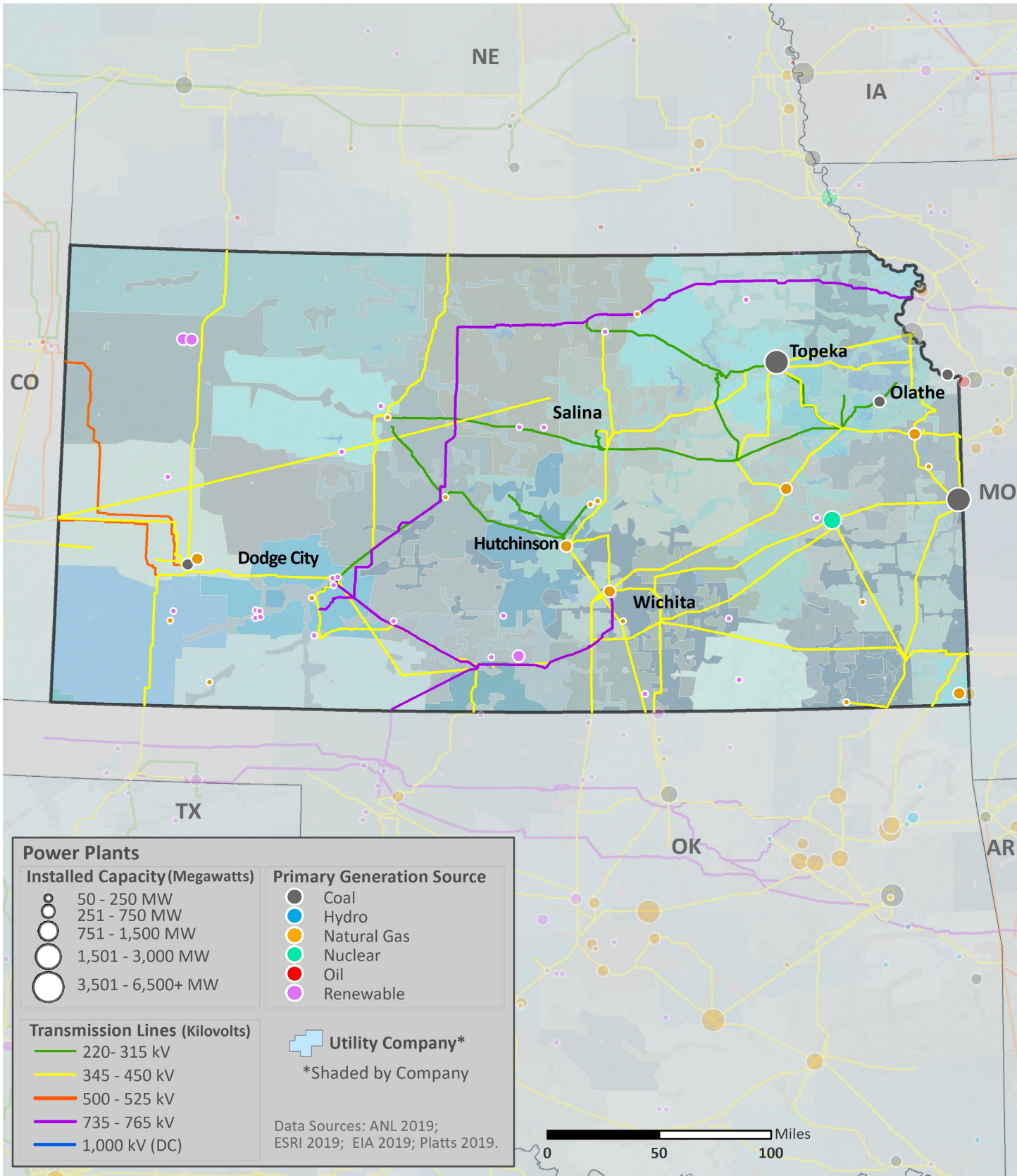
Annualized Frequency of and Property Damage Due to Natural Hazards, 2009–2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized (\$Million per year)
Drought	12	\$0
Earthquake (≥ 3.5 M)	5	\$0
Extreme Heat	3	\$0
Flood	56	\$5
Hurricane	0	\$0
Landslide	0	\$0
Thunderstorm & Lightning	231	\$35
Tornado	31	\$60
Wildfire	2	\$6
Winter Storm & Extreme Cold	28	\$4

Data Sources: NOAA and USGS









ELECTRIC



Electric Infrastructure

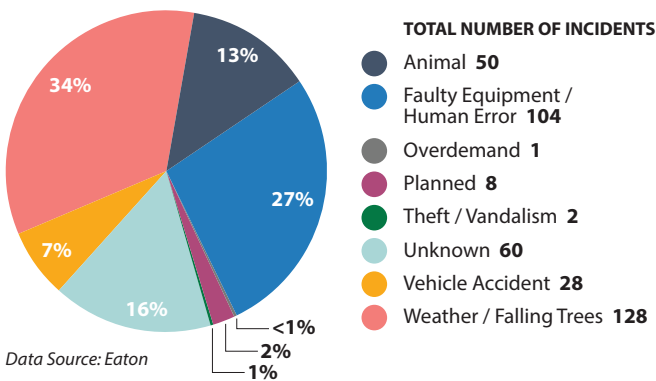
- Kansas has 146 electric utilities:
 - 2 Investor owned
 - 29 Cooperative
 - 113 Municipal
 - 2 Other utilities
- Plant retirements scheduled by 2025: None.
- In 2018, the average Kansas electric customer experienced 1.1 service interruptions that lasted an average of 2.6 hours.
- In Kansas, between 2008 and 2017:
 - The greatest number of electric outages occurred in **June** (2nd for outages nationwide)
 - The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)
 - Electric outages affected 79,094 customers on average

Electric Customers and Consumption by Sector, 2018

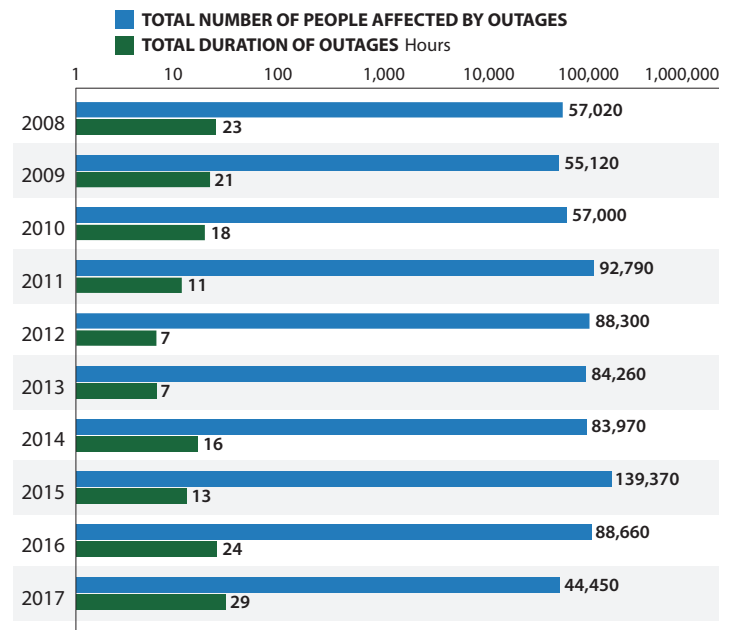
	 CUSTOMERS	 CONSUMPTION
Residential 	83%	34%
Commercial 	15%	38%
Industrial 	2%	28%
Transportation 	<1%	<1%

Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017

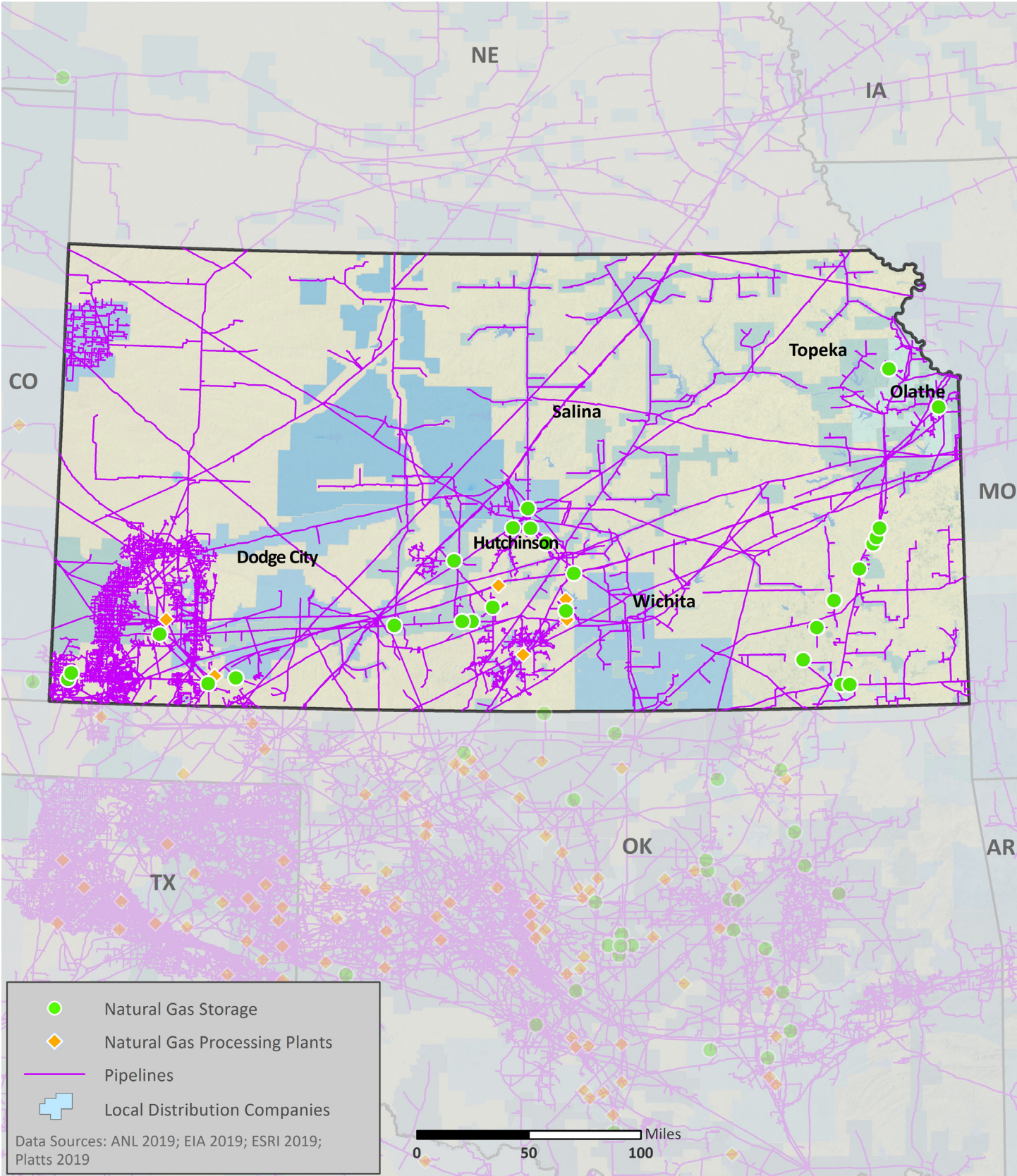


Electric Utility Outage Data, 2008 – 2017



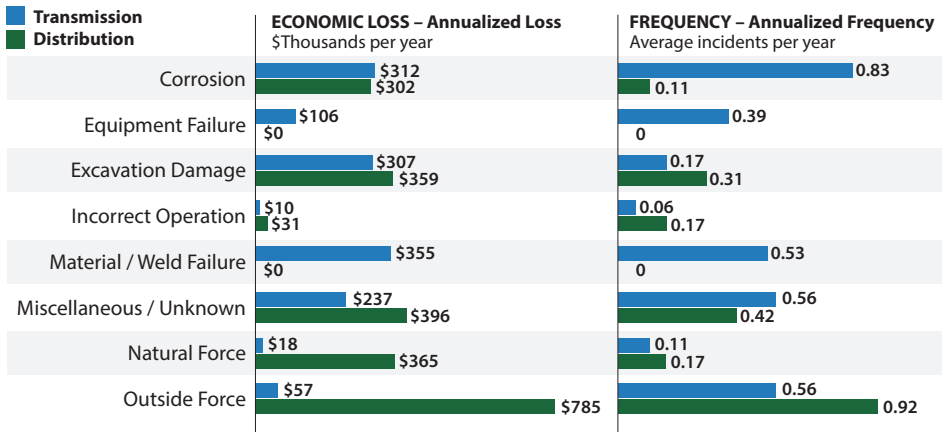


NATURAL GAS



Natural Gas Transport

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








Data Source: DOT PHMSA

- As of 2018, Kansas had:
 - 13,721 miles of natural gas transmission pipelines
 - 23,038 miles of natural gas distribution pipelines
- 71% of Kansas’s natural gas transmission system and 13% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Kansas’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

	CUSTOMERS	CONSUMPTION
Residential 	90%	25%
Commercial 	9%	15%
Industrial 	<1%	50%
Transportation 	<1%	<1%
Electric Power 	<1%	10%
Other	<1%	<1%

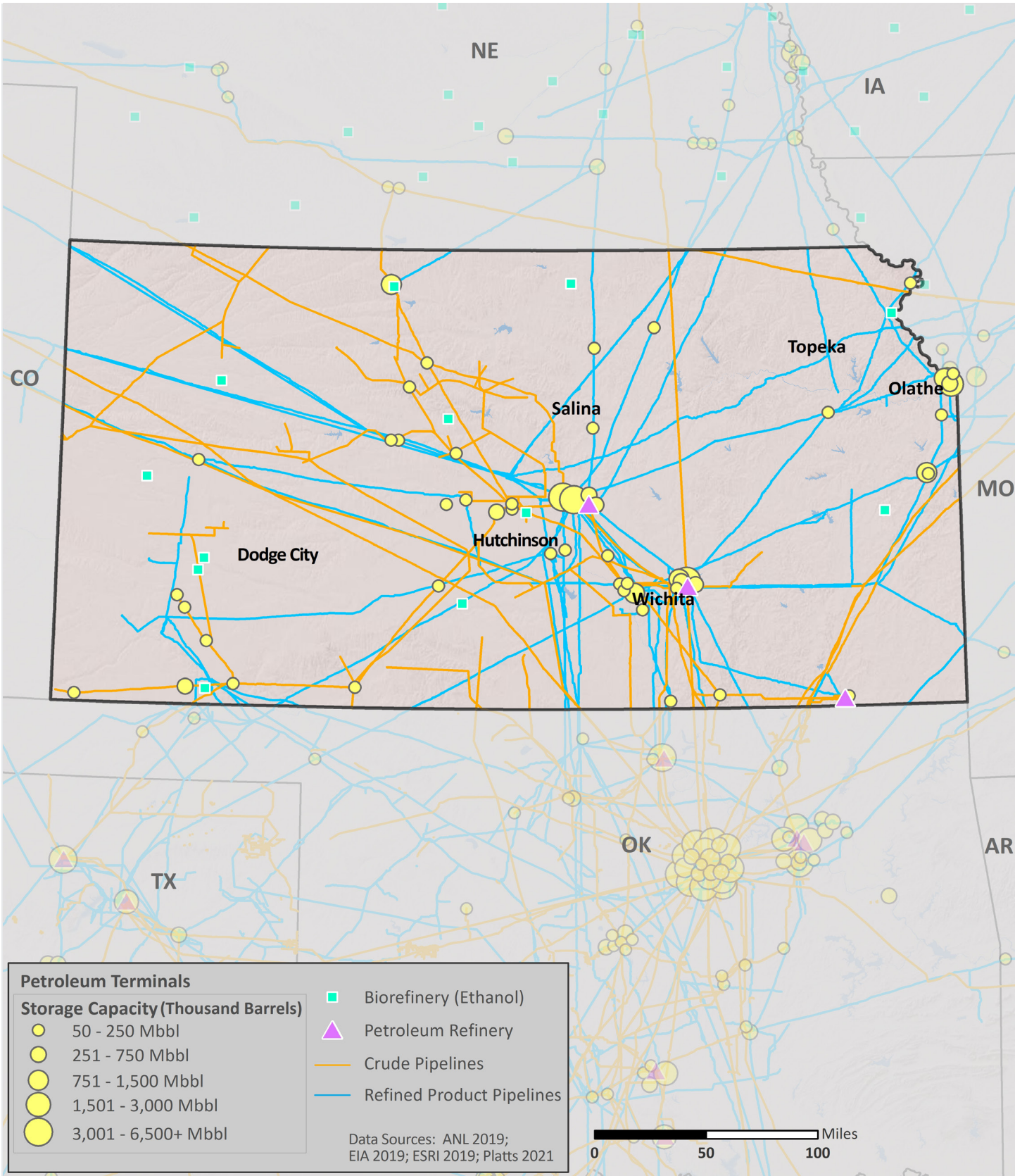
- Kansas has 6 natural gas processing facilities with a total capacity of 1,211 MMcf/d.
- Kansas has 0 liquefied natural gas (LNG) facilities.

Data Source: EIA



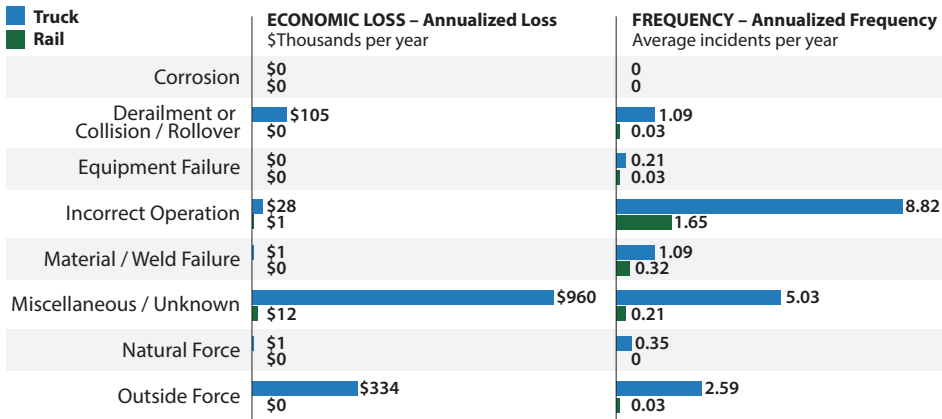


PETROLEUM



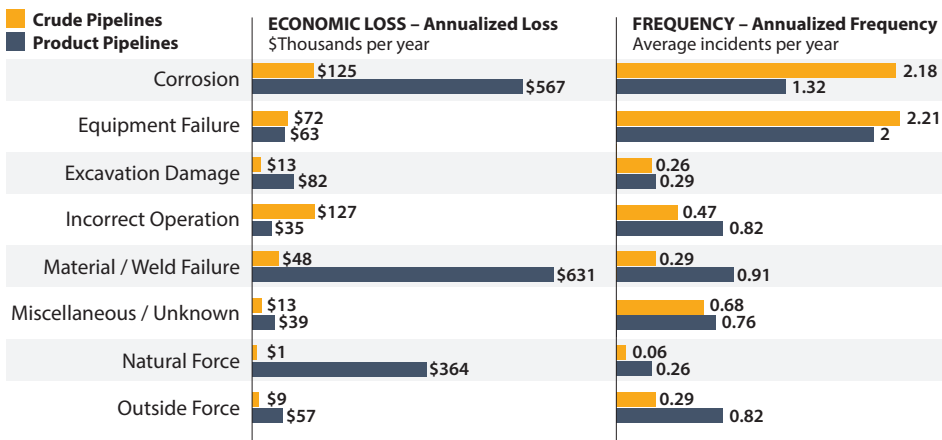
Petroleum Transport

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



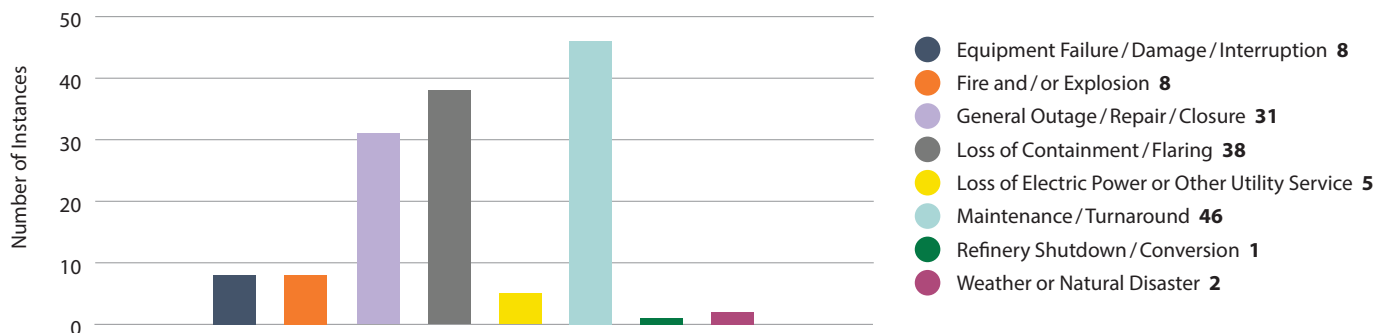
Data Source: DOT PHMSA

- As of 2018, Kansas had:
 - 3,729 miles of crude oil pipelines
 - 3,431 miles of refined product pipelines
 - 0 miles of biofuels pipelines
- 51% of Kansas’s petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Kansas’s petroleum supply was most impacted by:
 - **Miscellaneous or Unknown** events when transported by truck (3rd leading cause nationwide at \$52.87M per year)
 - **Miscellaneous or Unknown** events when transported by rail (3rd leading cause nationwide at \$6.11M per year)
 - **Incorrect Operations** when transported by crude pipelines (6th leading cause nationwide at \$4.23M per year)
 - **Material Failures** when transported by product pipelines (4th leading cause nationwide at \$9.47M per year)
- Disruptions in other states may impact supply.

Petroleum Refineries

- Kansas has 3 petroleum refineries with a total operable capacity of 393.7 Mb/d.
- Between 2009 and 2019, the leading cause of petroleum refinery disruptions in Kansas was:
 - **Maintenance** (2nd leading cause nationwide)

Causes and Frequency of Petroleum Refinery Disruptions, 2009 – 2019



Data Source: Hydrocarbon Publishing