State of Nebraska
ENERGY SECTOR RISK PROFILE

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

The Risk Profile highlights risk considerations relating to the electric, petroleum and natural gas infrastructures to become more aware of risks to these energy systems and assets.

NEBRASKA STATE FACTS

State Overview
Population: 1.87 million (1% total U.S.)
Housing Units: 0.81 million (1% total U.S.)
Business Establishments: 0.05 million (1% total U.S.)

Annual Energy Consumption
Electric Power: 30.8 TWh (1% total U.S.)
Coal: 15,900 MSTN (2% total U.S.)
Natural Gas: 72 Bcf (<1% total U.S.)
Motor Gasoline: 18,500 Mbarrels (1% total U.S.)
Distillate Fuel: 21,300 Mbarrels (2% total U.S.)

Annual Energy Production
Electric Power Generation: 34.2 TWh (1% total U.S.)
Coal: 25.0 TWh, 73% [4.3 GW total capacity]
Petroleum: 0 TWh, <1% [0.4 GW total capacity]
Natural Gas: 0.8 TWh, 2% [2.1 GW total capacity]
Nuclear: 5.8 TWh, 17% [1.3 GW total capacity]
Hydro: 1.3 TWh, 4% [0.3 GW total capacity]
Other Renewable: 1.3 TWh, 4% [0.5 GW total capacity]

Coal: 0 MSTN (0% total U.S.)
Natural Gas: 0 Bcf (0% total U.S.)
Crude Oil: 3,000 Mbarrels (<1% total U.S.)
Ethanol: 43,400 Mbarrels (14% total U.S.)

NATURAL HAZARDS OVERVIEW

Annual Frequency of Occurrence of Natural Hazards in Nebraska (1996–2014)

- According to NOAA, the most common natural hazard in Nebraska is Thunderstorm & Lightning, which occurs once every 2.6 day on the average during the months of March to October.
- The second-most common natural hazard in Nebraska is Flood, which occurs once every 12.6 days on the average.

Annualized Property Loss due to Natural Hazards in Nebraska (1996–2014)

- As reported by NOAA, the natural hazard in Nebraska that caused the greatest overall property loss during 1996 to 2014 is Thunderstorm & Lightning at $87.8 million per year.
- The natural hazard with the second-highest property loss in Nebraska is Drought at $47.4 million per year.
ELECTRIC

Electric Power Plants: 104 (1% total U.S.)
- Coal-fired: 10 (1% total U.S.)
- Petroleum-fired: 37 (2% total U.S.)
- Natural Gas-fired: 34 (1% total U.S.)
- Nuclear: 2 (2% total U.S.)
- Hydro-electric: 11 (<1% total U.S.)
- Other Renewable: 10 (<1% total U.S.)

Transmission Lines:
- High-Voltage (>230 kV): 2,330 Miles
- Low-Voltage (<230 kV): 7,487 Miles
Electric Transmission

- According to NERC, the leading cause of electric transmission outages in Nebraska is Severe Weather - Thunderstorm.
- Nebraska experienced 14 electric transmission outages from 1992 to 2009, affecting a total of 150,945 electric customers.
- Severe Weather - Other affected the largest number of electric customers as a result of electric transmission outages.


Number of NERC-Reported Electric Transmission Outages by Cause (1992–2009)

- Severe Weather - Thunderstorm
- Faulty Equipment / Human Error
- Severe Weather - Heat Wave
- Severe Weather - Other
- Severe Weather - Winter Storm
- All Other Causes

Electric Distribution

- Between 2008 and 2013, the greatest number of electric outages in Nebraska has occurred during the month of August.
- The leading cause of electric outages in Nebraska during 2008 to 2013 was Weather/Falling Trees.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in Nebraska was 83,002.
- The average duration of electric outages in Nebraska during 2008 to 2013 was 1,967 minutes or 32.8 hours a year.

Electric Utility Reported Power Outages by Month (2008–2013)


- NOTE: # of Incidents – The number within each pie slice is the number of event incidents attributable to each cause.
PETROLEUM

Petroleum Infrastructure Overview
- Refineries: 0 (0% total U.S.)
- Terminals: 20 (1% total U.S.)
- Crude Pipelines: 697 Miles (1% total U.S.)
- Product Pipelines: 7,140 Miles (1% total U.S.)
- Bio-Refineries (Ethanol): 24 (12% total U.S.)
Petroleum Transport

The leading event type affecting the transport of petroleum product by rail and truck in Nebraska during 1986 to 2014 was Incorrect Operation for rail transport and Miscellaneous/Unknown for truck transport, with an average 1.4 and 1.8 incidents per year, respectively.

Top Events Affecting Petroleum Transport by Truck and Rail (1986–2014)

The leading event type affecting crude oil pipeline and petroleum product pipelines in Nebraska during 1986 to 2014 was Equipment Failure for crude oil pipelines and Equipment Failure for product pipelines, with an average 0.21 and 0.66 incidents per year (or one incident every 4.8 and 1.5 years), respectively.

Top Events Affecting Crude Oil and Refined Product Pipelines in Nebraska (1986–2014)
NATURAL GAS

Natural Gas Infrastructure Overview
Gas Wells: 232 (0% total U.S.)
Processing Plants: 0 (0% total U.S.)
Storage Fields: 1 (<1% total U.S.)
Interstate Pipelines: 7,560 Miles (1% total U.S.)
Local Distribution Companies: 24 (1% total U.S.)
Natural Gas Transport

The leading event type affecting natural gas transmission and distribution pipelines in Nebraska during 1986 to 2014 was **Outside Force** for Transmission Pipelines and **Outside Force** for Distribution Pipelines, with an average **0.45** and **0.74** incidents per year (or one incident every 2.2 and 1.3 years), respectively.

**Top Events Affecting Natural Gas Transmission and Distribution in Nebraska (1986–2014)**

*Data Source: DOT PHMSA*
DATA SOURCES

Overview Information
- Census Bureau (2012) State and County QuickFacts [http://quickfacts.census.gov/qfd/download_data.html]

Production Numbers

Consumption Numbers

Electricity
- Platts (2014 Q2) Transmission Lines (Miles by Voltage Level)
- Platts (2014 Q2) Power Plants (Production and Capacity by Type)

Petroleum
- Argonne National Laboratory (2012) Petroleum Terminal Database
- Argonne National Laboratory (2014) Ethanol Plants
- NPMS (2011) Petroleum Product Pipeline (Miles of Interstate Pipeline)
- NPMS (2011) Crude Pipeline (Miles of Interstate Pipeline)

Natural Gas
- EIA (2013) Number of Producing Gas Wells [http://www.eia.gov/dnav/ng/ng_prod_wells_s1_a.htm]
- NPMS (2011) Natural Gas Pipeline (Miles of Interstate Pipeline)
- Platts (2014 Q2) Local Distribution Companies (LDCs)

Event Related
  *The NERC disturbance reports are not published after 2009.

Notes
- Natural Hazard, Other, includes extreme weather events such as astronomical low tide, dense smoke, frost/freeze, and rip currents.
- Each incident type is an assembly of similar causes reported in the data source. Explanations for the indescribable incident types are below.
  - Outside Force refers to pipeline failures due to vehicular accident, sabotage, or vandalism.
  - Natural Forces refers to damage that occurs as a result of naturally occurring events (e.g., earth movements, flooding, high winds, etc.)
  - Miscellaneous/Unknown includes releases or failures resulting from any other cause not listed or of an unknowable nature.
  - Overdemand refers to outages that occur when the demand for electricity is greater than the supply, causing forced curtailment.
- Number (#) of Incidents – The number within each pie chart piece is the number of outages attributable to each cause.

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