State of Arkansas
ENERGY SECTOR RISK PROFILE

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

ARKANSAS STATE FACTS

**State Overview**
- Population: 2.96 million (1% total U.S.)
- Housing Units: 1.33 million (1% total U.S.)
- Business Establishments: 0.06 million (1% total U.S.)

**Annual Energy Consumption**
- Electric Power: 46.9 TWh (1% total U.S.)
- Coal: 17,000 MSTN (2% total U.S.)
- Natural Gas: 320 Bcf (1% total U.S.)
- Motor Gasoline: 32,700 Mbarrels (1% total U.S.)
- Distillate Fuel: 21,600 Mbarrels (2% total U.S.)

**Annual Energy Production**
- Electric Power Generation: 65 TWh (2% total U.S.)
  - Coal: 28.4 TWh, 44% [5.5 GW total capacity]
  - Petroleum: 0 TWh, 0% [0 GW total capacity]
  - Natural Gas: 17.1 TWh, 26% [8.9 GW total capacity]
  - Nuclear: 15.5 TWh, 24% [1.8 GW total capacity]
  - Hydro: 2.2 TWh, 3% [1.3 GW total capacity]
  - Other Renewable: 0 TWh, <1% [0.4 GW total capacity]
- Coal: 100 MSTN (<1% total U.S.)
- Natural Gas: 1,150 Bcf (5% total U.S.)
- Crude Oil: 6,500 Mbarrels (<1% total U.S.)
- Ethanol: 0 Mbarrels (0% total U.S.)

NATURAL HAZARDS OVERVIEW

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

- Drought: 4
- Earthquake (M3.5+): 1
- Flood: 40
- Hurricane: 0
- Tornado: 12
- Winter Storm & Extreme Cold: 6
- Other: 13

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

- Drought: $0.3 million per year
- Earthquake: $0.0 million per year
- Flood: $31.8 million per year
- Hurricane: $3.5 million per year
- Tornado: $15.3 million per year
- Winter Storm & Extreme Cold: $59.7 million per year

According to NOAA, the most common natural hazard in Arkansas is Thunderstorm & Lightning, which occurs once every 3 days on the average during the months of March to October.

The second-most common natural hazard in Arkansas is Flood, which occurs once every 9.2 days on the average.

As reported by NOAA, the natural hazard in Arkansas that caused the greatest overall property loss during 1996 to 2014 is Winter Storm & Extreme Cold at $59.7 million per year.

The natural hazard with the second-highest property loss in Arkansas is Tornado at $51.5 million per year.

Data Source: NOAA

Produced by Department of Energy (DOE), Office of Electricity Delivery & Energy Reliability (OE)
Electric Power Plants: 58 (<1% total U.S.)
- Coal-fired: 5 (<1% total U.S.)
- Petroleum-fired: 4 (<1% total U.S.)
- Natural Gas-fired: 22 (1% total U.S.)
- Nuclear: 1 (1% total U.S.)
- Hydro-electric: 20 (1% total U.S.)
- Other Renewable: 6 (<1% total U.S.)

Transmission Lines:
- High-Voltage (>230 kV): 3,550 Miles
- Low-Voltage (<230 kV): 180 Miles
Electric Transmission

- According to NERC, the leading cause of electric transmission outages in Arkansas is Faulty Equipment/Human Error.
- Arkansas experienced 24 electric transmission outages from 1992 to 2009, affecting a total of 517,613 electric customers.
- Faulty Equipment/Human Error 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)

Data Source: NERC

Electric Distribution

- Between 2008 and 2013, the greatest number of electric outages in Arkansas has occurred during the month of April.
- The leading cause of electric outages in Arkansas during 2008 to 2013 was Weather/Falling Trees.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in Arkansas was 198,483.
- The average duration of electric outages in Arkansas during 2008 to 2013 was 2,027 minutes or 33.8 hours a year.

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

Data Source: Eaton


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

Petroleum Infrastructure Overview
- Refineries: 2 (1% total U.S.)
- Terminals: 21 (1% total U.S.)
- Crude Pipelines: 417 Miles (1% total U.S.)
- Product Pipelines: 5,400 Miles (1% total U.S.)
- Bio-Refineries (Ethanol): 0 (0% total U.S.)
Petroleum Transport

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

The leading event type affecting the transport of petroleum product by rail and truck in Arkansas during 1986 to 2014 was Incorrect Operation for rail transport and Miscellaneous/Unknown for truck transport, with an average 1.0 and 5.8 incidents per year, respectively.

Top Events Affecting Crude Oil and Refined Product Pipelines in Arkansas (1986–2014)

The leading event type affecting crude oil pipeline and petroleum product pipelines in Arkansas during 1986 to 2014 was Material/Weld Failures for crude oil pipelines and Equipment Failure for product pipelines, with an average 0.07 and 0.52 incidents per year (or one incident every 14.5 and 1.9 years), respectively.

Petroleum Refinery

The leading cause of petroleum refinery disruptions in Arkansas from 2003 to 2014 was Equipment Failure or Damage. Arkansas’s petroleum refineries experienced 9 major incidents from 2003 to 2014. The average production impact from disruptions of Arkansas’s refineries from 2003 to 2014 is 21.9 thousand barrels per day.


Average Production Impact (thousand barrels per day) from Petroleum Refinery Outages in Arkansas (2003–2014)
NATURAL GAS

Natural Gas Infrastructure Overview
Gas Wells: 9,787 (2% total U.S.)
Processing Plants: 2 (<1% total U.S.)
Storage Fields: 3 (1% total U.S.)
Interstate Pipelines: 11,520 Miles (2% total U.S.)
Local Distribution Companies: 19 (1% total U.S.)
Natural Gas Transport

The leading event type affecting natural gas transmission and distribution pipelines in Arkansas during 1986 to 2014 was **Corrosion** for Transmission Pipelines and **Outside Force** for Distribution Pipelines, with an average 0.52 and 0.42 incidents per year (or one incident every 1.9 and 2.4 years), respectively.

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

- **Corrosion**
- **Equipment Failure**
- **Excavation Damage**
- **Incorrect Operation**
- **Material/Weld Failure**
- **Miscellaneous/Unknown**
- **Natural Forces**
- **Outside Force**

### Economic Loss

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<th>Event</th>
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<th>Distribution</th>
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<tbody>
<tr>
<td>Corrosion</td>
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<td>$1,385</td>
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<tr>
<td>Equipment Failure</td>
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<tr>
<td>Excavation Damage</td>
<td>$180</td>
<td>$1,250</td>
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<tr>
<td>Incorrect Operation</td>
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<td>$277</td>
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<tr>
<td>Material/Weld Failure</td>
<td>$93</td>
<td>$930</td>
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<tr>
<td>Miscellaneous/Unknown</td>
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<td>$29</td>
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<tr>
<td>Natural Forces</td>
<td>$80</td>
<td>$80</td>
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<tr>
<td>Outside Force</td>
<td>$77</td>
<td>$77</td>
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### Frequency

<table>
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<tr>
<th>Event</th>
<th>Transmission</th>
<th>Distribution</th>
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<tbody>
<tr>
<td>Corrosion</td>
<td>0.03</td>
<td>0.29</td>
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<tr>
<td>Equipment Failure</td>
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<td>Excavation Damage</td>
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<td>Incorrect Operation</td>
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<td>Material/Weld Failure</td>
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<td>Miscellaneous/Unknown</td>
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<td>Natural Forces</td>
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<td>0.23</td>
</tr>
<tr>
<td>Outside Force</td>
<td>0.00</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Data Source: DOT PHMSA

Natural Gas Processing

Insufficient public data are available on major incidents affecting natural gas processing plants in this state.
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


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.

FOR MORE INFORMATION CONTACT:
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