State of South Dakota
ENERGY SECTOR RISK PROFILE

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

SOUTH DAKOTA STATE FACTS

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<tr>
<th>State Overview</th>
<th>Annual Energy Production</th>
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</thead>
<tbody>
<tr>
<td>Population: 0.84 million (&lt;1% total U.S.)</td>
<td>Electric Power Generation: 12 TWh (&lt;1% total U.S.)</td>
</tr>
<tr>
<td>Housing Units: 0.37 million (&lt;1% total U.S.)</td>
<td>Coal: 2.9 TWh, 24% [0.5 GW total capacity]</td>
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<tr>
<td>Business Establishments: 0.03 million (&lt;1% total U.S.)</td>
<td>Petroleum: 0 TWh, &lt;1% [0.3 GW total capacity]</td>
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<table>
<thead>
<tr>
<th>Annual Energy Consumption</th>
<th>Annual Energy Production</th>
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<tbody>
<tr>
<td>Electric Power: 11.7 TWh (&lt;1% total U.S.)</td>
<td>Natural Gas: 0.2 TWh, 2% [1.1 GW total capacity]</td>
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<tr>
<td>Coal: 2,000 MSTN (&lt;1% total U.S.)</td>
<td>Nuclear: 0 TWh, 0% [0 GW total capacity]</td>
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<tr>
<td>Natural Gas: 63 Bcf (&lt;1% total U.S.)</td>
<td>Hydro: 6 TWh, 50% [1.6 GW total capacity]</td>
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<tr>
<td>Motor Gasoline: 9,800 Mbarrels (&lt;1% total U.S.)</td>
<td>Other Renewable: 2.9 TWh, 24% [0.8 GW total capacity]</td>
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<tr>
<td>Distillate Fuel: 8,300 Mbarrels (1% total U.S.)</td>
<td>Coal: 0 MSTN (0% total U.S.)</td>
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</tbody>
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SOUTH DAKOTA NATURAL HAZARDS OVERVIEW

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

According to NOAA, the most common natural hazard in South Dakota is Thunderstorm & Lightning, which occurs once every 3.1 days on the average during the months of March to October.

The second-most common natural hazard in South Dakota is Winter Storm & Extreme Cold, which occurs once every 11.6 days on the average during the months of October to March.

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

As reported by NOAA, the natural hazard in South Dakota that caused the greatest overall property loss during 1996 to 2014 is Thunderstorm & Lightning at $10.8 million per year.

The natural hazard with the second-highest property loss in South Dakota is Winter Storm & Extreme Cold at $8.5 million per year.
ELECTRIC

Electric Power Plants: 37 (<1% total U.S.)
- Coal-fired: 2 (<1% total U.S.)
- Petroleum-fired: 14 (1% total U.S.)
- Natural Gas-fired: 8 (<1% total U.S.)
- Nuclear: 0 (0% total U.S.)
- Hydro-electric: 4 (<1% total U.S.)
- Other Renewable: 9 (<1% total U.S.)

Transmission Lines:
- High-Voltage (>230 kV): 631 Miles
- Low-Voltage (<230 kV): 4,614 Miles

Transmission Lines Data Sources:
ANL 2013; ESRI 2012; EIA 2014; Platts 2014.


Electric Transmission

- According to NERC, the leading cause of electric transmission outages in South Dakota is **Faulty Equipment/Human Error**.
- South Dakota experienced **11 electric transmission outages** from 1992 to 2009, affecting a total of **12,578 electric customers**.
- **Faulty Equipment/Human Error** affected the largest number of electric customers as a result of electric transmission outages.

![Electric Customers Disrupted by NERC-Reported Electric Transmission Outages by Cause (1992–2009)](image1)

![Number of NERC-Reported Electric Transmission Outages by Cause (1992–2009)](image2)

Data Source: NERC

Electric Distribution

- **Between 2008 and 2013**, the greatest number of electric outages in South Dakota has occurred during the month of **August**.
- The leading cause of electric outages in South Dakota during 2008 to 2013 was **Faulty Equipment/Human Error**.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in South Dakota was **22,455**.
- The average duration of electric outages in South Dakota during 2008 to 2013 was **400 minutes or 6.7 hours a year**.

![Electric-Utility Reported Power Outages by Month (2008–2013)](image3)

![Utility Outage Data (2008–2013)](image4)

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: 0 (0% total U.S.)
Terminals: 11 (1% total U.S.)
Crude Pipelines: 197 Miles (<1% total U.S.)
Product Pipelines: 2,400 Miles (<1% total U.S.)
Bio-Refineries (Ethanol): 15 (7% total U.S.)
Petroleum Transport

The leading event type affecting the transport of petroleum product by rail and truck in South Dakota during 1986 to 2014 was Incorrect Operation for rail transport and Miscellaneous/Unknown for truck transport, with an average 0.02 (or one incident every 50 years) and 1.1 incidents per year, respectively.

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

- Corrosion: Economic Loss $37, Frequency 1.1
- Derailment or Collision / Rollover: Economic Loss $2, Frequency 1.1
- Natural Forces: Economic Loss $3, Frequency 0.1
- Miscellaneous / Unknown: Economic Loss $100, Frequency 0.0
- Material / Weld Failures: Economic Loss $1, Frequency 0.0
- Incorrect Operation: Economic Loss $3, Frequency 0.3
- Equipment Failure: Economic Loss $1, Frequency 0.9
- Outside Force: Economic Loss $2, Frequency 0.9

Data Source: DOT PHMSA

The leading event type affecting crude oil pipeline and petroleum product pipelines in South Dakota during 1986 to 2014 was Equipment Failure for crude oil pipelines and Corrosion for product pipelines, with an average 0.07 and 0.14 incidents per year (or one incident every 14.5 and 6.9 years), respectively.

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

- Corrosion: Economic Loss $249.9, Frequency 0.07
- Natural Forces: Economic Loss $30.7, Frequency 0.03
- Incorrect Operation: Economic Loss $8.8, Frequency 0.00
- Excavation Damage: Economic Loss $16.0, Frequency 0.00
- Miscellaneous / Unknown: Economic Loss $9.3, Frequency 0.00
- Material / Weld Failures: Economic Loss $8.6, Frequency 0.00
- Equipment Failure: Economic Loss $2.8, Frequency 0.00
- Outside Force: Economic Loss $8.5, Frequency 0.00

Data Source: DOT PHMSA
NATURAL GAS

Natural Gas Infrastructure Overview
Gas Wells: 65 (<1% total U.S.)
Processing Plants: 0 (0% total U.S.)
Storage Fields: 0 (0% total U.S.)
Interstate Pipelines: 6,240 Miles (1% total U.S.)
Local Distribution Companies: 10 (1% total U.S.)
Natural Gas Transport

The leading event type affecting natural gas transmission and distribution pipelines in South Dakota during 1986 to 2014 was Excavation Damage for Transmission Pipelines and Outside Force for Distribution Pipelines, with an average 0.06 and 0.32 incidents per year (or one incident every 15.5 and 3.1 years), respectively.

Top Events Affecting Natural Gas Transmission and Distribution in South Dakota (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.

FOR MORE INFORMATION CONTACT:
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