State of New Hampshire ENERGY SECTOR RISK PROFILE

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

NEW HAMPSHIRE STATE FACTS

State Overview
- Population: 1.32 million (<1% total U.S.)
- Housing Units: 0.62 million (<1% total U.S.)
- Business Establishments: 0.04 million (1% total U.S.)

Annual Energy Consumption
- Electric Power: 10.9 TWh (<1% total U.S.)
- Coal: 500 MSTN (<1% total U.S.)
- Natural Gas: 648 Bcf (3% total U.S.)
- Motor Gasoline: 12,600 Mbarrels (<1% total U.S.)
- Distillate Fuel: 5,500 Mbarrels (<1% total U.S.)

Annual Energy Production
- Electric Power Generation: 19.3 TWh (<1% total U.S.)
- Coal: 1.3 TWh, 7% [0.6 GW total capacity]
- Petroleum: 0 TWh, <1% [0.5 GW total capacity]
- Natural Gas: 7.0 TWh, 37% [1.5 GW total capacity]
- Nuclear: 8.2 TWh, 43% [1.2 GW total capacity]
- Hydro: 1.3 TWh, 7% [0.4 GW total capacity]
- Other Renewable: 0.2 TWh, 1% [0.3 GW total capacity]

NATURAL HAZARDS OVERVIEW


- Thunderstorm & Lightning: 29 times
- Winter Storm & Extreme Cold: 18 times
- Other: 1 time

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

- Flood: $4.6 million per year
- Winter Storm & Extreme Cold: $3.2 million per year

- According to NOAA, the most common natural hazard in New Hampshire is Thunderstorm & Lightning, which occurs once every 12.5 days on the average during the months of March to October.
- The second-most common natural hazard in New Hampshire is Winter Storm & Extreme Cold, which occurs once every 20.1 days on the average during the months of October to March.
- As reported by NOAA, the natural hazard in New Hampshire that caused the greatest overall property loss during 1996 to 2014 is Flood at $4.6 million per year.
- The natural hazard with the second-highest property loss in New Hampshire is Winter Storm & Extreme Cold at $3.2 million per year.
Electric Power Plants: 58 (<1% total U.S.)
- Coal-fired: 2 (<1% total U.S.)
- Petroleum-fired: 9 (<1% total U.S.)
- Natural Gas-fired: 3 (<1% total U.S.)
- Nuclear: 1 (1% total U.S.)
- Hydro-electric: 34 (1% total U.S.)
- Other Renewable: 9 (<1% total U.S.)

Transmission Lines:
- High-Voltage (>230 kV): 273 Miles
- Low-Voltage (<230 kV): 110 Miles
Electric Transmission

- According to NERC, the leading cause of electric transmission outages in New Hampshire is Faulty Equipment/Human Error.
- New Hampshire experienced 21 electric transmission outages from 1992 to 2009, affecting a total of 349,124 electric customers.
- Severe Weather - Ice Storm 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)

Electric Distribution

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

- Between 2008 and 2013, the greatest number of electric outages in New Hampshire has occurred during the month of October.
- The leading cause of electric outages in New Hampshire during 2008 to 2013 was Weather/Falling Trees.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in New Hampshire was 309,907.
- The average duration of electric outages in New Hampshire during 2008 to 2013 was 988 minutes or 16.5 hours a year.


- 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: 5 (<1% total U.S.)
- Crude Pipelines: 78 Miles (<1% total U.S.)
- Product Pipelines: 60 Miles (<1% total U.S.)
- Bio-Refineries (Ethanol): 0 (0% total U.S.)

Data Sources: ACE 2012; ANL 2013; EIA 2014; ESRI 2012; NPMS 2011.
Petroleum Transport

- The leading event type affecting the transport of petroleum product by rail and truck in New Hampshire during 1986 to 2014 was Incorrect Operation for rail transport and Miscellaneous/Unknown for truck transport, with an average 0.1 (or one incident every 10 years) and 1.0 incidents per year, respectively.

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

- The leading event type affecting crude oil pipeline in New Hampshire during 1986 to 2014 was Corrosion, with an average 0.03 incidents per year (or one incident every 33 years). There are product pipelines in the State of New Hampshire.

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

Natural Gas Infrastructure Overview
Gas Wells: 0 (0% total U.S.)
Processing Plants: 0 (0% total U.S.)
Storage Fields: 0 (0% total U.S.)
Interstate Pipelines: 360 Miles (<1% total U.S.)
Local Distribution Companies: 7 (<1% total U.S.)
Natural Gas Transport

The leading event type affecting natural gas distribution pipelines in New Hampshire during 1986 to 2014 was Outside Force, with an average 0.10 incidents per year (or one incident every 10 years). There are no natural gas transmission pipelines in the State of New Hampshire.


<table>
<thead>
<tr>
<th>Event Type</th>
<th>Economic Loss ($ Thousands per Year)</th>
<th>Frequency (Average per Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosion</td>
<td>0</td>
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<tr>
<td>Equipment Failure</td>
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<tr>
<td>Incorrect Operation</td>
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<tr>
<td>Material / Weld Failures</td>
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<td>0.00</td>
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<tr>
<td>Miscellaneous / Unknown</td>
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<tr>
<td>Natural Forces</td>
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<tr>
<td>Outside Force</td>
<td>$4</td>
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</tbody>
</table>

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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