State of Maine
ENERGY SECTOR RISK PROFILE

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

MAINE STATE FACTS

State Overview
Population: 1.33 million (<1% total U.S.)
Housing Units: 0.72 million (1% total U.S.)
Business Establishments: 0.04 million (1% total U.S.)

Annual Energy Consumption
Electric Power: 11.6 TWh (<1% total U.S.)
Coal: 0 MSTN (0% total U.S.)
Natural Gas: 413 Bcf (2% total U.S.)
Motor Gasoline: 16,100 Mbarrels (1% total U.S.)
Distillate Fuel: 10,800 Mbarrels (1% total U.S.)

Annual Energy Production
Electric Power Generation: 14.4 TWh (<1% total U.S.)
Coal: 0 TWh, <1% [0.1 GW total capacity]
Petroleum: 0.1 TWh, <1% [1 GW total capacity]
Natural Gas: 6 TWh, 42% [1.9 GW total capacity]
Nuclear: 0 TWh, 0% [0 GW total capacity]
Hydro: 3.7 TWh, 26% [0.7 GW total capacity]
Other Renewable: 0.9 TWh, 6% [1 GW total capacity]
Coal: 0 MSTN (0% total U.S.)
Natural Gas: 0 Bcf (0% total U.S.)
Crude Oil: 0 Mbarrels (0% total U.S.)
Ethanol: 0 Mbarrels (0% total U.S.)

NATURAL HAZARDS OVERVIEW

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

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

▶ According to NOAA, the most common natural hazard in Maine is Thunderstorm & Lightning, which occurs once every 9.5 days on the average during the months of March to October.

▶ The second-most common natural hazard in Maine is Winter Storm & Extreme Cold, which occurs once every 13.8 days on the average during the months of October to March.

▶ As reported by NOAA, the natural hazard in Maine that caused the greatest overall property loss during 1996 to 2014 is Winter Storm & Extreme Cold at $15.7 million per year.

▶ The natural hazard with the second-highest property loss in Maine is Flood at $6.8 million per year.
Electric Power Plants: 103 (1% total U.S.)
   Coal-fired: 1 (<1% total U.S.)
   Petroleum-fired: 11 (<1% total U.S.)
   Natural Gas-fired: 8 (<1% total U.S.)
   Nuclear: 0 (0% total U.S.)
   Hydro-electric: 58 (2% total U.S.)
   Other Renewable: 25 (1% total U.S.)

Transmission Lines:
   High-Voltage (>230 kV): 437 Miles
   Low-Voltage (<230 kV): 1,500 Miles
Electric Transmission

- According to NERC, the leading cause of electric transmission outages in Maine is Faulty Equipment/Human Error.
- Maine experienced 24 electric transmission outages from 1992 to 2009, affecting a total of 501,446 electric customers.
- Severe Weather – High Winds 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)](image)

Data Source: NERC

Electric Distribution

- Between 2008 and 2013, the greatest number of electric outages in Maine has occurred during the month of October.
- The leading cause of electric outages in Maine during 2008 to 2013 was Weather/Falling Trees.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in Maine was 334,007.
- The average duration of electric outages in Maine during 2008 to 2012 was 1,293 minutes or 21.6 hours a year.*

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

Data Source: Eaton

### Causes of Electric-Utility Reported Outages (2008–2013)

- Animal: 13
- Faulty Equipment / Human Error: 23
- Overdemand: 0
- Planned: 9
- Theft / Vandalism: 1
- Unknown: 1
- Vehicle Accident: 24
- Weather / Falling Trees: 78

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

### Utility Outage Data (2008–2013)

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

Data Source: Eaton

*Data not available for Maine in 2013. Data averaged over 5 years.*
PETROLEUM

Petroleum Infrastructure Overview
Refineries: 0 (0% total U.S.)
Terminals: 16 (1% total U.S.)
Crude Pipelines: 143 Miles (<1% total U.S.)
Product Pipelines: 120 Miles (<1% total U.S.)
Bio-Refineries (Ethanol): 0 (0% total U.S.)
Petroleum Transport

The leading event type affecting the transport of petroleum product by rail and truck in Maine during 1986 to 2014 was Incorrect Operation for rail transport and Incorrect Operation for truck transport, with an average 0.4 (or one incident every 2.5 years) and 2.4 incidents per year, respectively.

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

- **Economic Loss**
  - Outside Force: $0
  - Natural Forces: $11
  - Miscellaneous / Unknown: $9
  - Material / Weld Failures: $1
  - Incorrect Operation: $1
  - Equipment Failure: $1
  - Derailment or Collision / Rollover: $1
  - Corrosion: $0

- **Frequency**
  - Rail: 0.09, 0.2
  - Truck: 0.2, 0.1

Data Source: DOT PHMSA

The leading event type affecting crude oil pipeline in Maine during 1986 to 2014 was Natural Forces, with an average 0.04 incidents per year (or one incident every 26.4 years). There are no refined product pipelines in the State of Maine.

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

- **Economic Loss**
  - Corrosion: $8.7
  - Natural Forces: $0.1
  - Incorrect Operation: $0
  - Excavation Damage: $0
  - Miscellaneous / Unknown: $0
  - Material / Weld Failures: $0
  - Equipment Failure: $0
  - Outside Force: $0

- **Frequency**
  - Crude Pipelines: 0.04
  - Product Pipelines: 0.03

Data Source: DOT PHMSA
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: 300 Miles (<1% total U.S.)
Local Distribution Companies: 4 (<1% total U.S.)
Natural Gas Transport

The leading event type affecting natural gas transmission and distribution pipelines in Maine during 1986 to 2014 was Equipment Failure for Transmission Pipelines and Excavation Damage for Distribution Pipelines, with an average 0.03 and 0.03 incidents per year (or one incident every 31 and 31 years), respectively.

Top Events Affecting Natural Gas Transmission and Distribution in Maine (1986–2014)
Overview Information

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

Production Numbers


Consumption Numbers


Electricity

- Platt's (2014 Q2) Transmission Lines (Miles by Voltage Level)
- Platt's (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)
- Platt's (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.

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