State of Florida
ENERGY SECTOR RISK PROFILE

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

FLORIDA STATE FACTS

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<th>State Overview</th>
<th>Annual Energy Production</th>
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<tbody>
<tr>
<td>Population: 19.55 million (6% total U.S.)</td>
<td>Electric Power Generation: 221.1 TWh (5% total U.S.)</td>
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<td>Housing Units: 9.05 million (7% total U.S.)</td>
<td>Coal: 44.3 TWh, 20% [11.4 GW total capacity]</td>
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<td>Business Establishments: 0.50 million (7% total U.S.)</td>
<td>Petroleum: 1.4 TWh, &lt;1% [10.7 GW total capacity]</td>
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Annual Energy Consumption

| Electric Power: 220.7 TWh (6% total U.S.) | Natural Gas: 149.7 TWh, 68% [39.6 GW total capacity] |
| Coal: 20,400 MSTN (2% total U.S.) | Nuclear: 17.9 TWh, 8% [4.8 GW total capacity] |
| Natural Gas: 1,306 Bcf (6% total U.S.) | Hydros: 0.2 TWh, <1% [0.1 GW total capacity] |
| Motor Gasoline: 168,400 Mbarrels (6% total U.S.) | Other Renewable: 0 TWh, 0% [0.5 GW total capacity] |
| Distillate Fuel: 44,400 Mbarrels (3% total U.S.) | Coal: 0 MSTN (0% total U.S.) |
| Natural Gas: 20 Bcf (<1% total U.S.) | Natural Gas: 20 Bcf (<1% total U.S.) |
| Crude Oil: 2,100 Mbarrels (<1% total U.S.) | Crude Oil: 2,100 Mbarrels (<1% total U.S.) |
| Ethanol: 0 Mbarrels (0% total U.S.) | Ethanol: 0 Mbarrels (0% total U.S.) |

NATURAL HAZARDS OVERVIEW

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

According to NOAA, the most common natural hazard in Florida is Thunderstorm & Lightning, which occurs once every 2 days on the average during the months of March to October.

The second-most common natural hazard in Florida is Other, which occurs once every 3.9 days on the average.

As reported by NOAA, the natural hazard in Florida that caused the greatest overall property loss during 1996 to 2014 is Hurricane at $237.6 million per year.

The natural hazard with the second-highest property loss in Florida is Tornado at $181.9 million per year.
Electric Power Plants: 135 (1% total U.S.)
- Coal-fired: 15 (1% total U.S.)
- Petroleum-fired: 27 (1% total U.S.)
- Natural Gas-fired: 73 (2% total U.S.)
- Nuclear: 3 (2% total U.S.)
- Hydro-electric: 2 (<1% total U.S.)
- Other Renewable: 15 (1% total U.S.)

Transmission Lines:
- High-Voltage (>230 kV): 5,083 Miles
- Low-Voltage (<230 kV): 2,178 Miles
Electric Transmission

- According to NERC, the leading cause of electric transmission outages in Florida is **Natural Disaster - Hurricane/Tropical Storm**.
- Florida experienced **34 electric transmission outages** from 1992 to 2009, affecting a total of **11,953,762 electric customers**.
- **Natural Disaster - Hurricane/Tropical Storm** affected the largest number of electric customers as a result of electric transmission outages.

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- Natural Disaster - Hurricane / Tropical Storm: 10,531,256
- Faulty Equipment / Human Error: 465,500
- Severe Weather - Lightning: 262,884
- Protection System Misoperation: 42,122
- Made Public Appeals: 50,000
- All Other Causes: 602,000

Data Source: NERC

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Electric Distribution

- Between 2008 and 2013, the greatest number of electric outages in Florida has occurred during the month of **August**.
- The leading cause of electric outages in Florida during 2008 to 2013 was **Weather/Falling Trees**.
- On average, the number of people affected annually by electric outages during 2008 to 2013 in Florida was **1,356,328**.
- The average duration of electric outages in Florida during 2008 to 2013 was **3,935 minutes or 65.6 hours a year**.

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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: 72 (4% total U.S.)
- Crude Pipelines: 44 Miles (<1% total U.S.)
- Product Pipelines: 2,160 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 Florida during 1986 to 2014 was Incorrect Operation for rail transport and Incorrect Operation for truck transport, with an average 1.0 and 20.6 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 Florida during 1986 to 2014 was Corrosion for crude oil pipelines and Outside Force for product pipelines, with an average 0.03 and 0.21 incidents per year (or one incident every 29 and 4.8 years), respectively.

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

Natural Gas Infrastructure Overview
Gas Wells: 0 (0% total U.S.)
Processing Plants: 1 (<1% total U.S.)
Storage Fields: 0 (0% total U.S.)
Interstate Pipelines: 4,560 Miles (1% total U.S.)
Local Distribution Companies: 47 (3% total U.S.)

Data Sources: ANL 2013; EIA 2014; ESRI 2012; Platts 2014; NPMS 2011.
Natural Gas Transport

The leading event type affecting natural gas transmission and distribution pipelines in Florida during 1986 to 2014 was Outside Force for Transmission Pipelines and Outside Force for Distribution Pipelines, with an average 0.39 and 0.58 incidents per year (or one incident every 2.6 and 1.7 years), respectively.

Top Events Affecting Natural Gas Transmission and Distribution in Florida (1986-2014)

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.

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