January 2014 Cold Weather Events
Generation Outages

GESTF
May 21, 2014
January 2014 Forced Outage Rate

PJM saw 22% forced outage rate on Jan. 7, 2014.

~7% Historical Winter Average
Generation Outages – January 2014

[Graph showing generation outages over January 2014 with categories: Forced, Planned, Maintenance]
January 7, 1900 hrs Forced Outage Causes

- Gas Interruptions: 24%
- Weather Related: 15%
- Boiler Internals, Tube Leaks & Structures: 15%
- Misc. (Gas Turbine, Balance of Plant & Steam Turbine): 7%
- Boiler Air, Gas & Control systems: 6%
- Electrical: 5%
- Auxiliary Systems: 5%
- Economic: 5%
- Storm Damage, Emissions, Staffing: 5%
- Fuel Ignition & Combustion Systems: 4%
- Wind-Forced Out: 3%
- Ambient Corrections: 2%
- Fuel Supply, Not Gas: 2%
January 7, 1900 hrs Outages by Primary Fuel

Total Forced Outages: 40,200 MW (22% Total PJM Capacity)

- Coal: 13,700 MW
- Nuclear: 1,400 MW
- Natural Gas Interruption: 9,300 MW
- Gas Plant Outages: 9,700 MW
- Other: 6,100 MW
January 7, 1900 hrs Forced Outages by Geographic Areas

<table>
<thead>
<tr>
<th>Geographic Location</th>
<th>Average % Generation on Force Outage</th>
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<tbody>
<tr>
<td>East: AE, DPL, JC, ME, PE, PL, PS</td>
<td>25%</td>
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<tr>
<td>Central: DUQU, FE-S, PN</td>
<td>24%</td>
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<tr>
<td>South: BC, DOM, PEP</td>
<td>16%</td>
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<tr>
<td>West: AEP, COMED, DAY, DEOK, EKPC, FE-W</td>
<td>22%</td>
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• PJM analyzed the performance of approximately 14000 MW of generation pending retirement during the Polar Vortex peak.
• PJM determined that the generators pending retirement were producing at a level of approximately 52% of their capability.
Cold Weather Lessons Learned

Gas – Electric Coordination
- Continue Increased Coordination and Transparency
- Align Business Rules
- Discuss changes to PJM’s capacity/energy structure

Winter Operations Preparation
- Address Unit Performance & Start Failure Rate
- Improve Dual Fuel & Fuel Limited Resource Tracking
- Continue Improved Communications & Enhancements to Emergency Procedures