Polar Vortex 2014

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Minimum Temperature for each day in January 2014
Columbus, Philadelphia, Chicago and Richmond

Shortage Pricing was triggered by the Voltage Reduction ACTION on the evening of Jan. 6 and by a reserve shortage on the morning of Jan. 7.
Slide 6: PJM RTO Highest Historic Winter Demands

Megawatts

142,000
140,000
138,000
136,000
134,000
132,000
130,000

141,846

1/7/2014 p.m.
1/7/2014 a.m.
1/24/2014 a.m.
1/29/2014 p.m.
1/30/2014 a.m.
2/5/2007 p.m.
1/29/2014 a.m.
1/22/2014 p.m.
1/23/2014 p.m.
2/6/2007 a.m.
Slide 2: January 7 – Peak Load vs. Typical Load

January 7: Hourly MW Load (Preliminary)

- **138,733** Megawatts: Morning Peak
- **141,312** Megawatts: Evening Peak

Typical January Demand Curve

- **100,801** Megawatts: Morning Peak
- **106,182** Megawatts: Evening Peak

Hour Ending
2014 Morning Peak Outaged ICAP%

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

-7% Historical Winter Average
Jan 7 - Gas Interruption/Forced Outage – 7 p.m.

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

Gas Plant Outages
9,700 MW

Natural Gas Interruption
9,300 MW

Coal
13,700 MW

Other
7,500 MW
Detailed Outage Causes

- Gas Interruptions: 24%
- Weather Related: 15%
- Boiler Internals, Tube Leaks & Structures: 15%
- Misc. (Gas Turbine, Balance of Plant & Steam Turbine): 7%
- Electrical: 5%
- Boiler Air, Gas & Control systems: 6%
- Economic: 5%
- Auxiliary Systems: 5%
- Storm Damage, Emissions, Staffing: 4%
- Fuel Ignition & Combustion Systems: 4%
- Wind-Forced Out: 3%
- Ambient Corrections: 3%
- Fuel Supply, Not Gas: 2%
Jan 2014 PJM Load-Weighted LMPs

Average of Real-Time LMP

Average of Day-Ahead LMP
Net Scheduled & Projected Interchange - Jan. 7

- Net Scheduled Interchange: 8,604 MW
- Projected Interchange: 5,655 MW
- 2,949 MW
January 2014 Total Balancing Operating Reserve Credits January 2014

$ Millions

- Total Deviation Credit
- Total Reliability Credit

Winter Storm

Polar Vortex Advance Preparation

**PJM**

- **Fri. Jan. 17**: 130,000 MW expected peak
- **Sat. Jan. 18**: 127,270 MW expected peak
- **Sun. Jan. 19**: 125,610 MW expected peak
- **Mon. Jan. 20**: 131,000 MW expected peak (MLK Holiday)
- **Tue. Jan. 21**: 129,213 MW actual peak

**GAS**

- **Generators purchasing gas commodity**

**Buying for delivery on Jan. 20 & 21**

- **10 a.m. Monday**: Gas Day
- **10 a.m. Tuesday**
Future Capacity

Megawatts

Procured Reserve Level

Target Reserve Level

Retirements
Expected New Generation*
Imports
Demand Response
Cumulative Net Generation Reduction

2014/2015
2015/2016
2016/2017

*Numbers adjusted based on actual expected in service dates.
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