

Winter Operations and Market Performance

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FERC Winter Operations Panel October 20, 2016



Polar Vortex Analysis

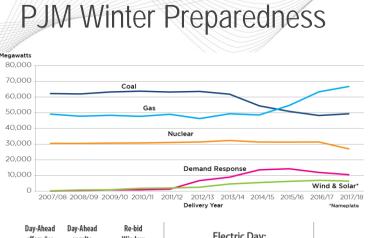
PJM staff conducted an event analysis on the 2014 Winter Operations to include the Polar Vortex operations

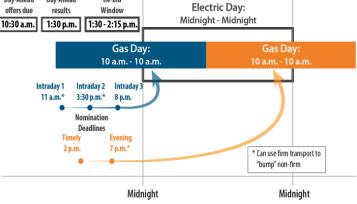
Key recommendations were as follows:

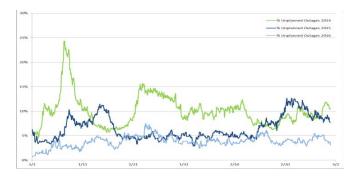
- Capacity Performance (CP) Improve generator availability during extreme weather events,
- Testing of generation in advance of winter operations,
- Improve natural gas and electricity market alignment,
- Implement market incentives for ensuring fuel availability or dual-fuel capability, and



- Implement Capacity Performance
- Enhanced gas/electric coordination
- Enhanced Generator Requirements
 - Winter Generation Testing Program
 - Winter Readiness preparation training
 - Winterization checklist
- Tools which provide better information on unit performance
 - Generation Database development to track unit performance real-time provides system operators with better unit performance metrics









Capacity Performance (CP)

CP Resources are expected to be available and perform with more flexible parameters during Emergency Conditions

- Penalties assessed for during Emergency conditions
- PJM Operator and Member Training and Drills conducted prior to prepare for new CP rules, processes and tools
- Unit Specific Parameters implemented based on the resources' physical operating abilities
- Tool enhancements implemented to support communications to members during Performance Assessment Hours
- Summer performance evaluations in progress, additional analysis will be conducted after winter to consider further enhancements



Gas – Electric Coordination

PJM team formed to:

- Analyze data related to gas delivery to units
- Provide operational info that allows operators to make better decisions
- Improve coordination with pipelines and LDCs
- Develop tools to support processes



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Winter 2016 – 2017 Outlook

| Winter Peak Load Base Case | |
|----------------------------|--------------------|
| Load Forecast | 135,548 MW |
| RTO Net Interchange | Importing 5,175 MW |
| PJM RTO Installed Capacity | 183,665 MW |
| Studied Generator Outages | 20,230 MW |

- No reliability issues identified for base and N-1 analysis.
- Re-dispatch and switching required to control local thermal or voltage violations in some areas.
- All networked transmission voltage violations were controlled by capacitors. All other voltage violations were caused by radial load.



Winter 2016/2017 - Gas Electric Coordination

Pipeline inspection / maintenance activity - Summer 2016

- Vast majority of pipelines are well prepared for winter
- Major exception currently is Texas Eastern (TE) pipeline
 - TE Penn Jersey line rupture and explosion April 29, 2016
 - Line runs from Pittsburgh to New Jersey
 - Currently running at 50% of design capacity
 - TE currently inspecting entire length of line for anomalies - Anticipated completion and return to full service – Nov. 1, 2016

• PJM believes that given current pace of inspection that TE will meet their November 1, 2016 in service date



Winter 2016/2017 - Gas/Electric Coordination

TE incident highlights the importance of midstream pipeline projects designed to take shale supplies to market

- These projects (e.g. PennEast designed to transport 1 Bcf/day of natural gas from Northeastern PA to the southeastern PA and NJ demand centers) are being held up by significant local opposition
- Buildout of these pipeline projects would expand capacity and supply options and improve grid reliability

