

Winter 2013-2014 Cold Weather Operating Performance

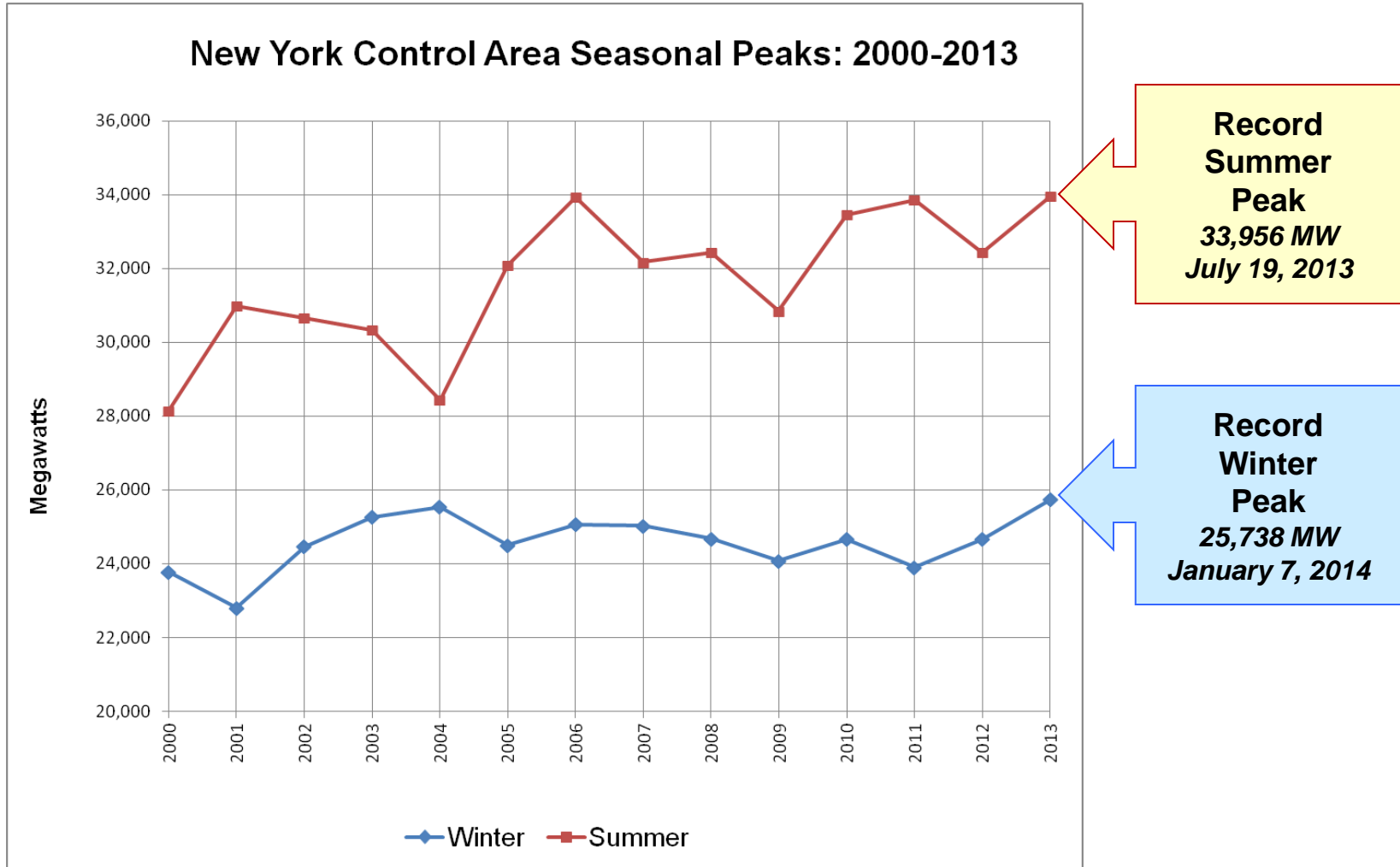
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Joint Electric Gas Coordination Working Group & MIWG
March 13, 2014
Rensselaer, NY

Executive Summary

- ◆ Winter 2013-2014 has included five major “Cold Snaps” -- including three Polar Vortexes that extended across much of the country.
- ◆ On January 7, the NYISO set a new record Winter Peak load of **25,738 MW**. (*This is the actual physical load, not adjusted for Demand Response, which had been activated at the time.*)
 - **25,541 MW -- Prior record winter peak load set in 2004**
 - **24,709 MW -- “1 in 2” Forecast Winter Peak for 2013-14**
 - **26,307 MW -- “1 in 10” Forecast Winter Peak for 2013-14**
- ◆ Many other ISOs and utilities set record Winter Peaks, including PJM, MISO, TVA, and Southern Company.



Cold Day Interchange, Derates, Wind

Date	Peak	HQ +in	NE + in	OH +in	PJM +in	Total Gen Derate	Fuel & Cold	Non Fuel Non Weather	Wind
12-17-13	24,460	-305	-1128	500	3,289	489	286	203	194
1-3-14	24,413	-140	-658	1,050	2877	2,549	918	1631	372
1-7-14	25,738	314	980	705	-682	4,135	2,233	1,902	1,115
1-22-14	25,000	-285	-57	676	441	1,162	418	744	285
1-28-14	24,696	36	-184	1,400	-395	282	110	172	778

Definition of “Derate”: The amount of capacity scheduled in the day ahead market that was not available in real time operations.

December 14 – 17 Cold Snap

◆ Preparation

- *Participated in several NPCC/PJM conference calls during the Cold Snap*
- *NYISO worked with the NY Transmission Owners to cancel some transmission outages*

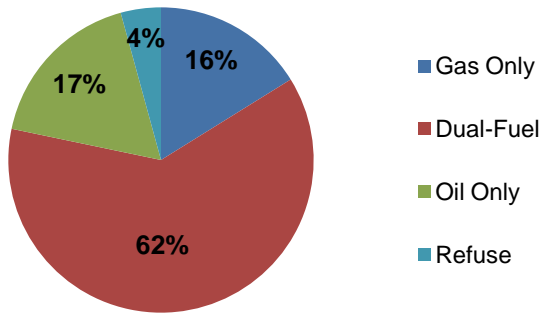
◆ Electric Operations – December 17

- *489 MW of generator derates*
- *Supplemental commitments*
 - Saranac Energy to secure north country transmission
- *December 17 peak load was 24,460 MW*
- *No need for Demand Response resources*

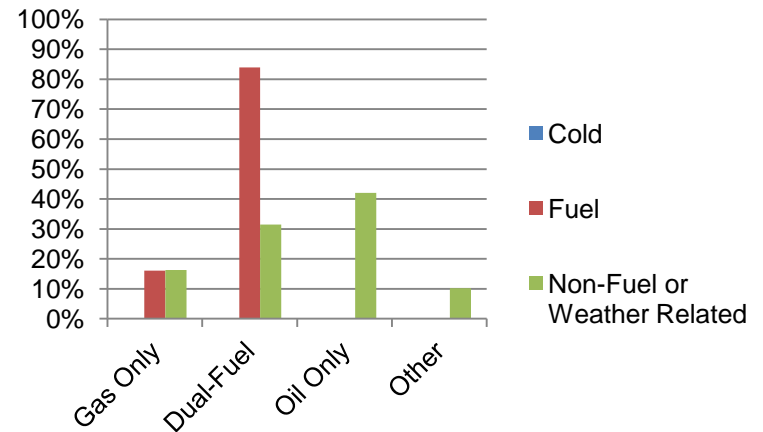
Dec. 17, 2013

Peak Load 24,460 MW
Total Derates 489 MW

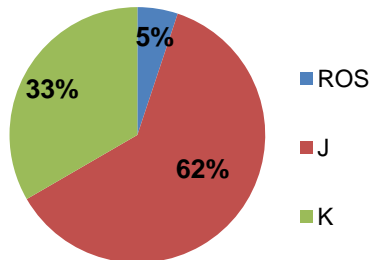
Derates by Type



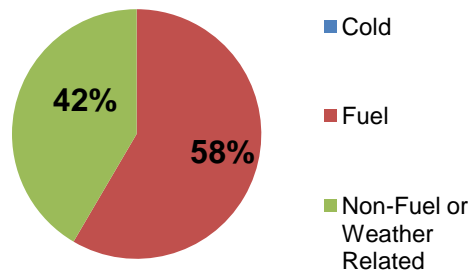
Derate Category by Unit Type



Zone



Category



Gas Only Units with Fuel-Related Derate

Behind LDC: 100%
Direct Connect: 0%

NYISO does not know what amount of these derates had confirmed gas nominations

January 1-3 Cold Snap

◆ Preparation

- *Participated in several NPCC/PJM conference calls during the Cold Snap.*
- *NYISO worked with the NY Transmission Owners to cancel some transmission outages.*
- *NYISO invoked its “Cold Weather Protocol” to confirm day-ahead gas nominations and oil inventories with NY generation owners.*

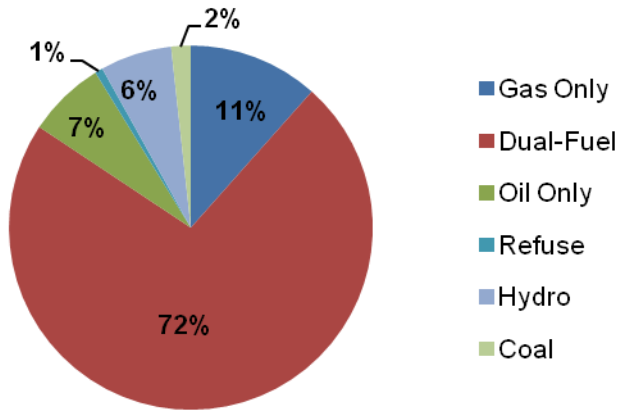
◆ Electric Operations

- *2549 MW of generator derates*
- *Supplemental Commitments:*
 - *Roseton 1, Empire, Saranac Energy*
- *January 3 peak load was 24,413 MW*
- *No need for Demand Response resources*

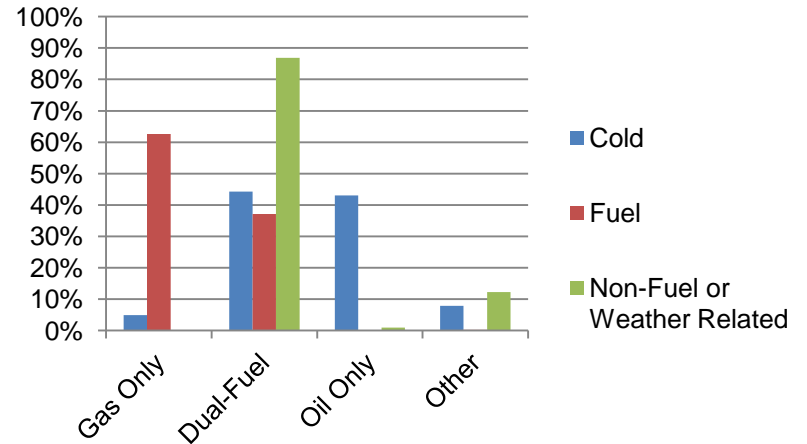
Jan. 3, 2013

Peak Load 24,413 MW
Total Derates 2,549 MW

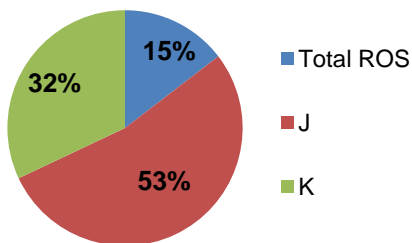
Derates by Type



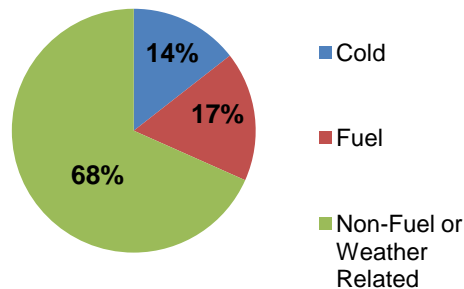
Derate Category by Unit Type



Zone



Category



Gas Only Units with Fuel-Related Derate

Behind LDC: 100%

Direct Connect: 0%

NYISO does not know what amount of these derates had confirmed gas nominations

January 6-8 Cold Snap

Monday - January 6

◆ Preparation

- *Participated in several NPCC/PJM conference calls during the Cold Snap.*
- *NYISO worked with the NY Transmission Owners to cancel some transmission outages.*
- *NYISO invoked its “Cold Weather Protocol” to confirm day-ahead gas nominations and oil inventories with NY generation owners.*

◆ Electric System Operations – Monday, January 6

- *NYPA 345kV Y49 cable tripped early in morning and remained out-of-service through January 16*
- *Monday evening PJM reported the loss of 3,000 MW of Western Pennsylvania and Ohio generation and load conditions were 5,000 MW over forecast*
- *At 21:00 PJM declared a NERC Energy Emergency Level 1 & 2*
- *At 21:15 Indian Point 3 tripped loaded at 1050 MW*

January 6-8 Cold Snap

Tuesday - January 7

◆ Regional Electric Conditions

- *PJM: Reports additional generator derates and predicted export curtailments to NY and predicted the possible need for voltage reduction over the peak*
- *IESO: Predicted higher loads and export curtailments to NY*
- *ISO-NE: Predicted 500 MW of emergency assistance if needed*

◆ Regional Pipeline Conditions

- *The Texas Eastern pipeline company lost their Delmont Compressor Station in Western PA early Tuesday morning creating gas curtailments which impacted some generation capability in PJM, NYC, Long Island, and ISO-NE*

January 6-8 Cold Snap

Tuesday - January 7

◆ Electric Operations

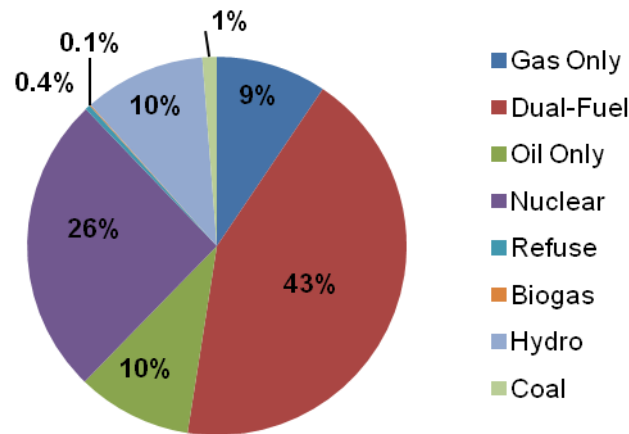
- *At 08:15 six breakers at the 345 kV Beck Station tripped on low pressure resulting in the 345 kV PA-302 Beck-Niagara to open. Imports were curtailed*
- *The NYISO experienced 4,135 MW of generator derates over the peak hour*
- *4,135 MW of generator derates*
- *Supplemental Commitments:*
 - *Oswego 5, Bethlehem, Ravenswood 2, Athens, Saranac Energy*
- *January 7 peak load was 25,738 MW (New record winter peak)*
- *The NYISO activate Demand Response resources in all zones to maintain operating reserve criteria. The 21-hour notification was not provided*
- *The NYISO issued a NERC Energy Emergency Alert 1 indicating that the NYISO is just meeting reserve requirements*
- *The NYISO issued public appeals for customers to curtail non-essential use*
- *PJM purchased 500 MW of emergency power from ISO-NE and activated PJM Demand Response*
- *Actual wind generation was over 1,000 MW for most of the day*

Jan. 7, 2014

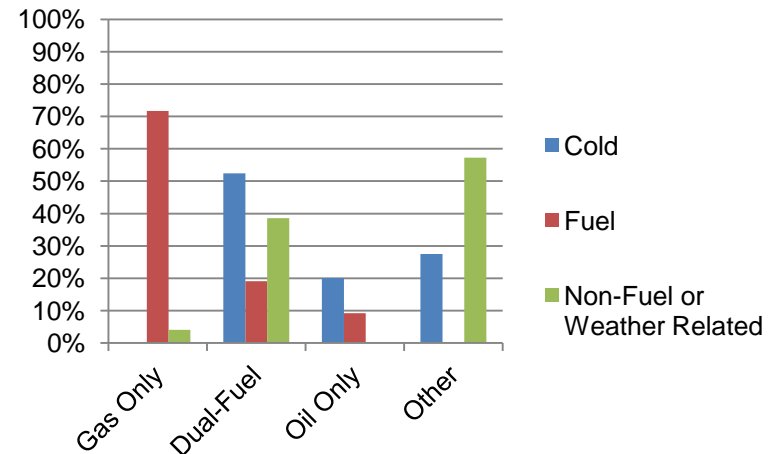
Peak Load
Total Derates

25,738 MW
4,135 MW

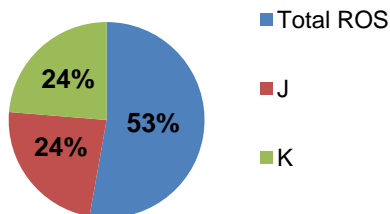
Derates by Type



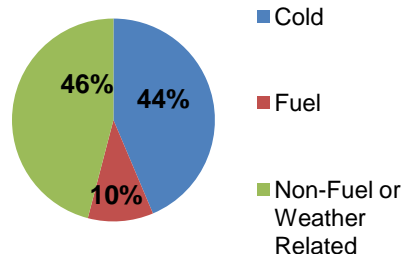
Derate Category by Unit Type



Zone



Category



Gas Only Units with Fuel-Related Derate

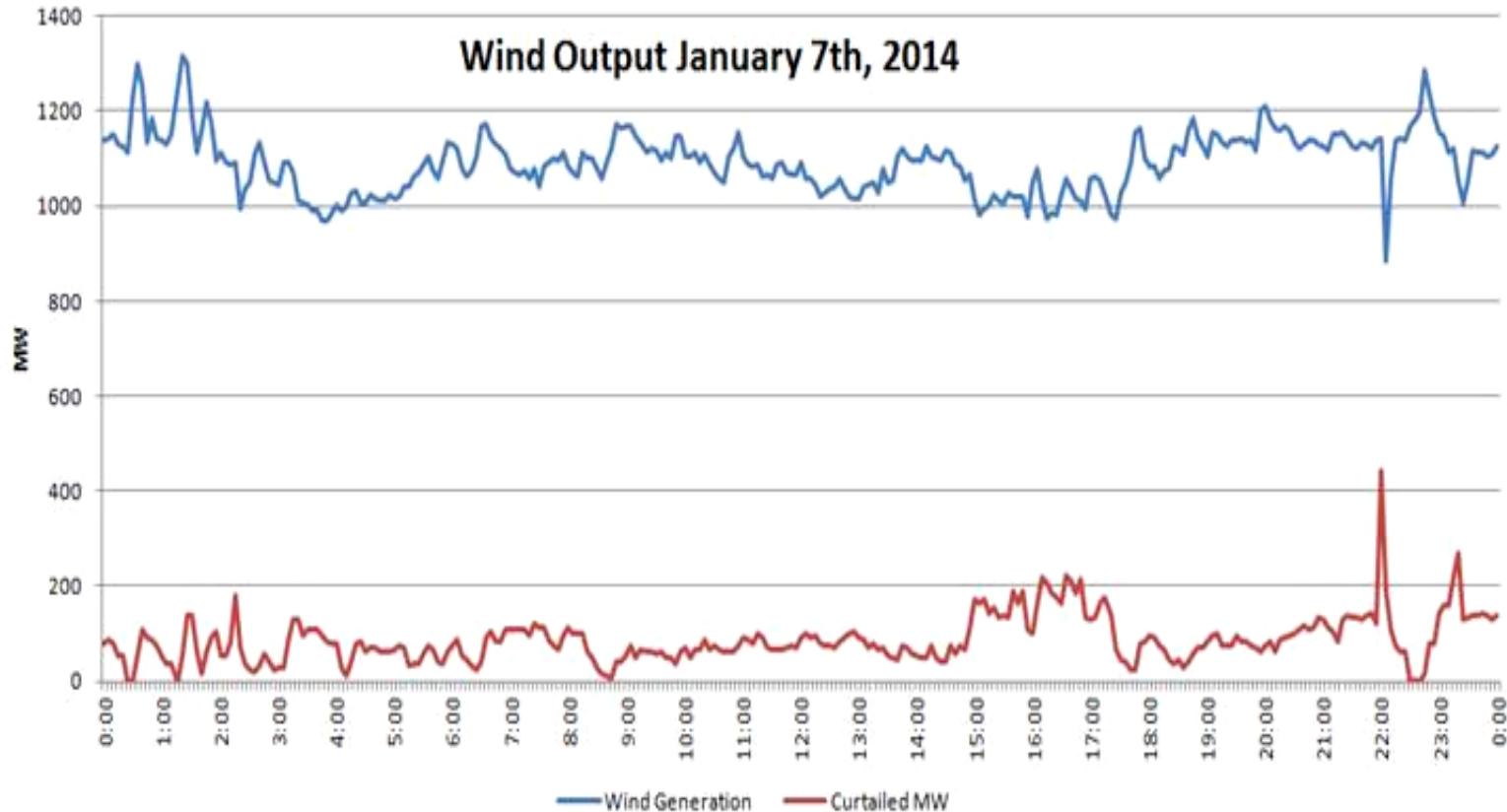
Behind LDC: 100%*

Direct Connect: 0%

NYISO does not know what amount of these derates had confirmed gas nominations

**Force Majeure on Texas Eastern pipeline impacted National Grid LDC*

January 7 Wind Performance



January 20-24 Cold Snap

◆ Preparation

- *NYISO participated in several NPCC/PJM conference calls during the Cold Snap and NYISO worked with the NY Transmission Owners to cancel some transmission outages. NYISO invoked its “Cold Weather Protocol” to confirm day-ahead gas nominations and oil inventories with NY generation owners.*
- *On January 21 the NYISO requested a temporary waiver from the FERC of the current offer rules in order to pay suppliers, in the form of a BPCG, if they incurred actual costs in excess of the \$1,000/Mwh offer cap. The FERC granted this request and the waiver was effective January 22 – February 28.*

◆ Regional Electric Conditions

- *Some adjacent RTO’s reported taking out-of-merit actions to preserve oil inventories.*

◆ Electric Operations – Wednesday, January 22

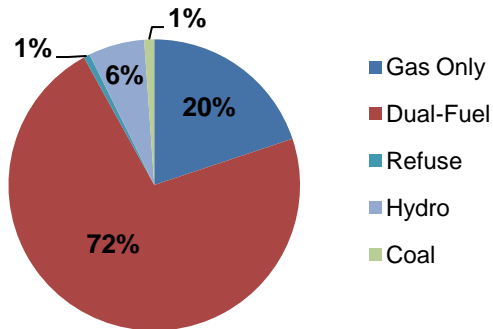
- *1,162 MW of generator derates*
- *Supplemental Commitments:*
 - *Empire, Astoria Energy 2 CC4, Saranac Energy*
- *January 22 peak load was 25,000 MW*
- *NYISO took out-of-merit operations to manage fuel for reliability*
- *No need for Demand Response resources*

Jan. 21, 2014

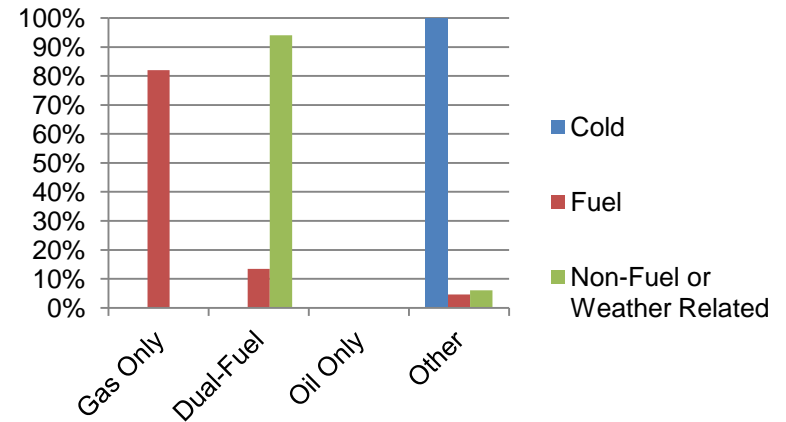
Peak Load
Total Derates

24,356 MW
900 MW

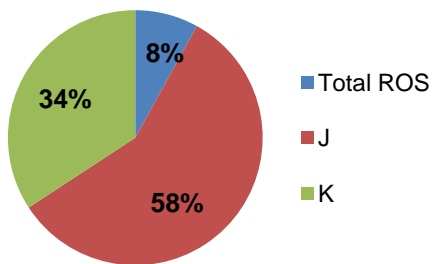
Derates by Type



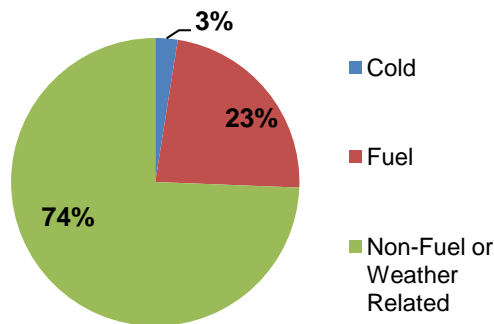
Derate Category by Type of Unit



Zone



Category



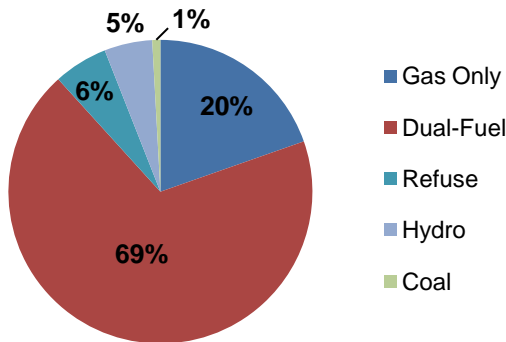
Gas Only Units with Fuel-Related Derate Behind LDC: 100%
Direct Connect: 0%

NYISO does not know what amount of these derates had confirmed gas nominations

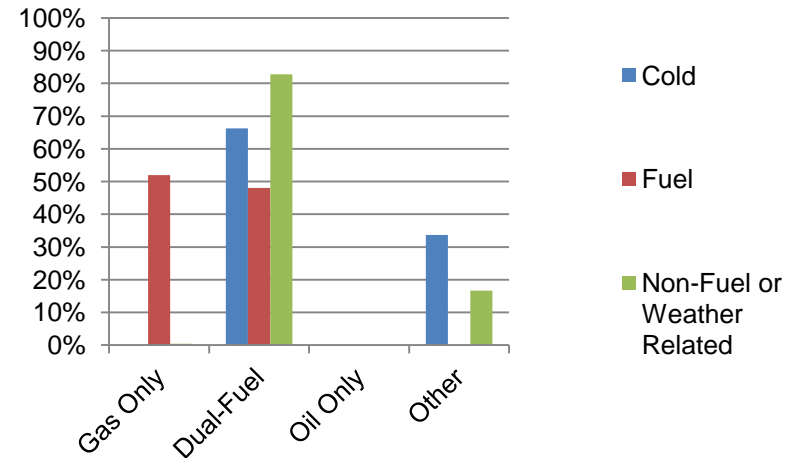
Jan. 22, 2014

Peak Load 25,000 MW
Total Derates 1,162 MW

Derates by Type

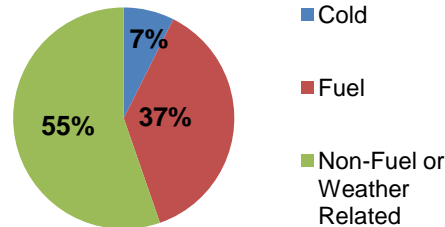
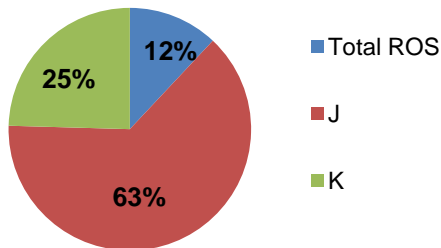


Derate Category by Type of Unit



Zone

Category



Gas Only Units with Fuel-Related Derate
Behind LDC: 100%
Direct Connect: 0%

NYISO does not know what amount of these derates had confirmed gas nominations

January 27-31 Cold Snap

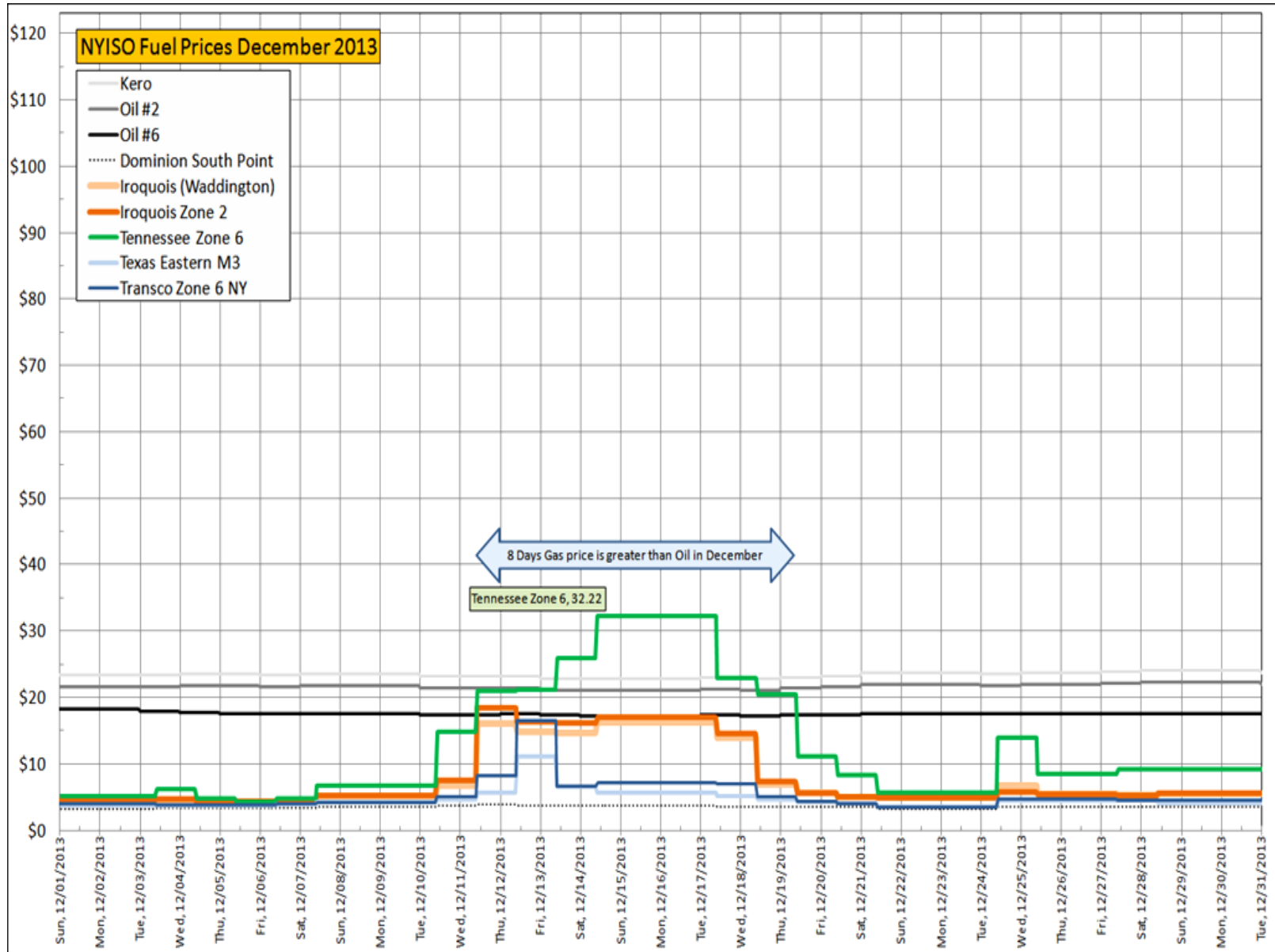
◆ Preparation

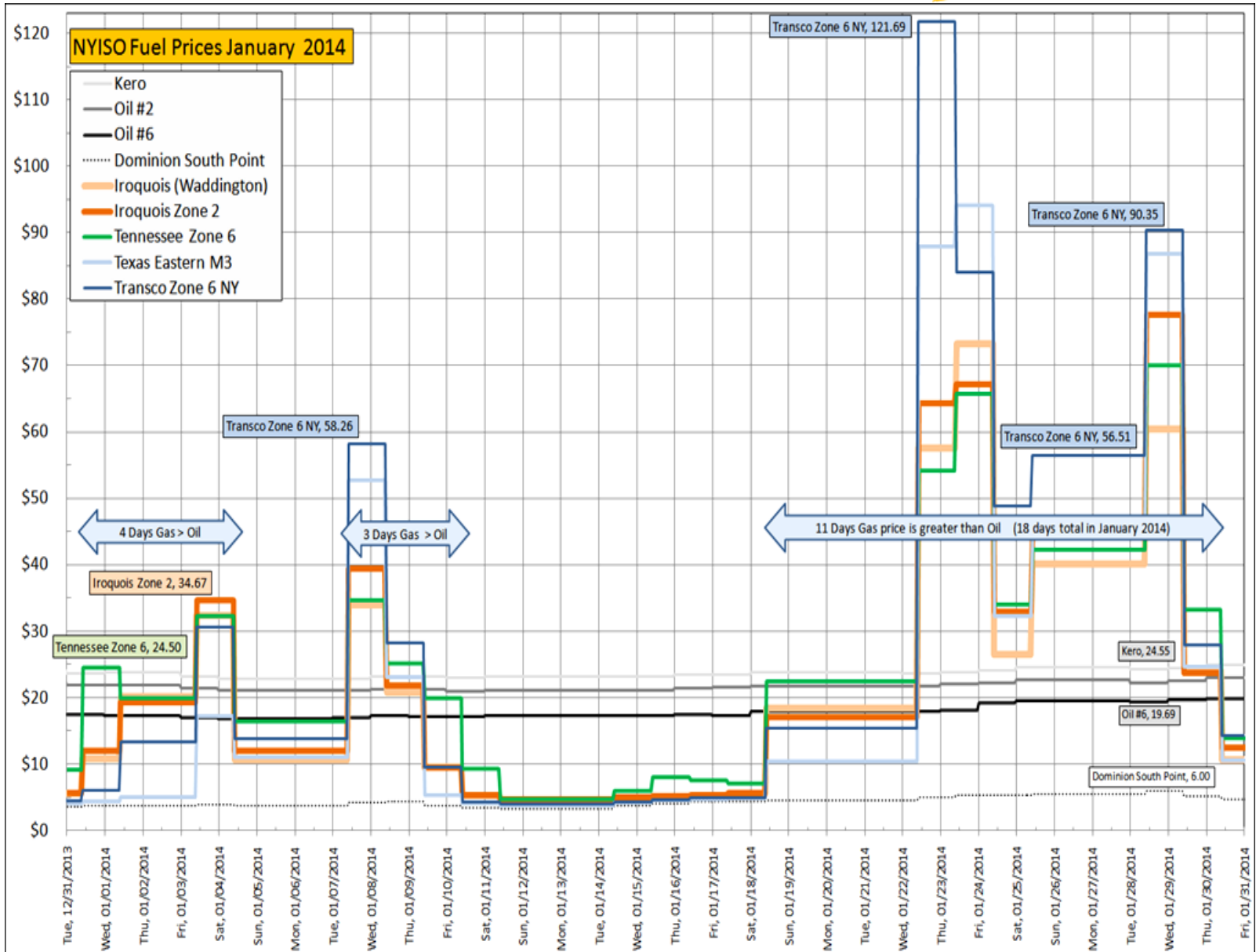
- *NYISO participated in several NPCC/PJM conference calls during the Cold Snap and NYISO worked with the NY Transmission Owners to cancel some transmission outages. NYISO invoked its “Cold Weather Protocol” to confirm day-ahead gas nominations and oil inventories with NY generation owners.*
- *Initially, weather forecasts beginning January 23 projected another Polar Vortex for the week of January 27-31. Preliminary load forecasting projections were for a 26,000 MW -- a new record winter peak -- by Tuesday, January 28. This did not occur.*
- *On Friday, January 24, information provided by some generator owners indicated the possibility of full oil depletion by Monday, January 27, and predicted an inability to purchase gas over January 27-28 time periods.*
- *There were some instances of reported difficulty receiving fuel deliveries (barges and trucks) as well as difficulties purchasing certain fuels that meet permit requirements.*
- *NYISO did schedule additional out-of-merit actions due to the uncertainty of oil deliveries and the uncertainty of nominating gas.*

January 27-31 Cold Snap

♦ Electric Operations

- *282 MW of generator derates*
- *Supplemental Commitments (RT forecast 850 MW higher than DAM reliability forecast and projected import curtailments)*
 - *Northport 4, Empire, Bethlehem, Ravenswood 4, Saranac Energy*
- *January 28 peak load was 24,696 MW*
- *NYISO took out-of-merit operations to manage fuel for reliability.*
- *On Monday the NYISO did issue a Zone J DR notification for Tuesday as a reliability precautionary action for providing additional in-city capacity in anticipation of fuel-related generator derates and to ensure sufficient in-city capacity to support NYC transmission for contingencies.*
- *On January 28-29, the NYISO did receive a high level of IESO and HQ imports in the real time market.*
- *Some dual-fueled NYC generators were (unexpectedly) successful in procuring small amounts of gas to operate at minimum generation with the capability to quickly co-fire on oil in the event NYISO needed additional NYC generation.*
- *TVA Transmission Loading Relief (TLR) impacted some Northeast transactions.*





Fuel Adequacy Monitoring

- ◆ For each Cold Snap, NYISO managed a process of monitoring fuel inventory
 - + *Starting Daily Oil Inventory*
 - *Projected Oil Burn Rates Out Seven Days (reflective of gas projections)*
 - + *Projected Oil Replacement Deliveries*
 -
 - = *Forecast Inventories Out Seven Days)*

- ◆ The primary challenges were:
 - *Evaluating generator fuel purchasing uncertainty*
 - *Evaluating the accuracy of gas capability in the event oil deliveries were not achievable*

Winter 2013-14 Observations

- ◆ Winter 2013-2014
 - *Characterized by many days of gas prices exceeding oil prices*
 - *Resulting in high levels of economic scheduling and dispatch of oil-fired generation.*
- ◆ Load weighted electric LBMP for January was \$183/MWh
 - *176% increase over December 2013*
- ◆ Natural gas prices (as indexed at Transco Zone 6 for NYC area) averaged \$27.43/MMBTU
 - *nearly 400% increase over December 2013*
- ◆ LBMP energy increases at less than half the natural gas price increases is indicative of NYISO market systems selecting lower-cost resources -- primarily the dual fuel units capable of operating on oil (*with oil priced similar to December 2013*)

Winter 2013-14 Observations

- ♦ Majority of oil-fired generation was capable of being replenished by either barge or truck deliveries at rates close to their oil-burn rates. This became extremely challenging beginning around Friday, January 24 because the cold weather conditions had extended beyond seven consecutive days
 - *There were a few instances -- beginning around January 22 and extending through January 29 -- where a few oil-only units and a few dual fuel units were not able to keep up with oil replenishment rates.*
- ♦ The majority of gas-only generation connected to interstate pipelines east of the Central East interface were not economically scheduled during these five cold snaps due to the extremely high gas prices, but were capable of securing gas in response to the ISOs supplemental requests for generation
 - *This does not necessarily apply in all hours. Late evenings, for example, arranging a gas purchase, not necessarily a gas nomination, can be challenging.*

Winter 2013-14 Observations

Pipeline-related Observations...

- ◆ **Generally, the generators connected directly to the interstate pipelines with confirmed gas nominations were successful generating on gas to their schedules, including during times of declared Operational Flow Orders (OFOs) or System Alerts.**
 - *Once gas is nominated and confirmed on a day ahead basis, it is the NYISO's understanding that the gas schedule is considered "firm" on the interstate regardless of the type of transportation contract.*
 - *If the generator did not have a day ahead confirmed nomination, often times they were still successful arranging and receiving a confirmation for intra-day gas purchases.*

- ◆ **OFOs on the Interstate Pipelines**
 - *During Winter 2013-14 cold snaps, the interstate pipelines often declared OFOs which required daily balancing of nominated schedules. In electric operations this allowed some flexibility*

Winter 2013-14 Observations

LDC Pipeline-related Observations

- ◆ While it is the NYISO's understanding that all gas LDCs reserve the right to interrupt gas schedules with confirmed nominations to gas customers with interruptible service, in many instances the gas delivery to generators with confirmed nominations with interruptible service was excellent during the various cold snaps including during times of declared OFOs or System Alerts.
 - *If the generator did not have a day ahead confirmed purchase, during times of hourly OFOs, not surprisingly, it was difficult for the generator to purchase intra-day gas on the LDC systems.*
- ◆ OFOs on the Gas LDCs
 - *During Winter 2013-14 cold snaps, there were many instances where the Gas LDCs declared OFO's which reduced daily balancing and required hourly burn limitations. At times this limited flexibility in electric operations.*

Next Steps

NGC Proposal

National Gas Council Proposal

- ♦ Retain the 10a.m. ET (9a.m. CT) start of the gas day
- ♦ Extend Timely Cycle Nomination Deadline to 2p.m. ET (1p.m. CT)
- ♦ Add a third, intraday cycle for early morning gas flow
- ♦ Provide two bump-able intra-day cycles during business day

NYISO Initial Thoughts

- ♦ *Would still like to see Operating Day alignment*
- ♦ *If additional intra-day nominating cycles and a later timely cycle nomination close are likely to bring more liquidity to the gas market, then this is a step in the right direction.*

Next Steps

Market

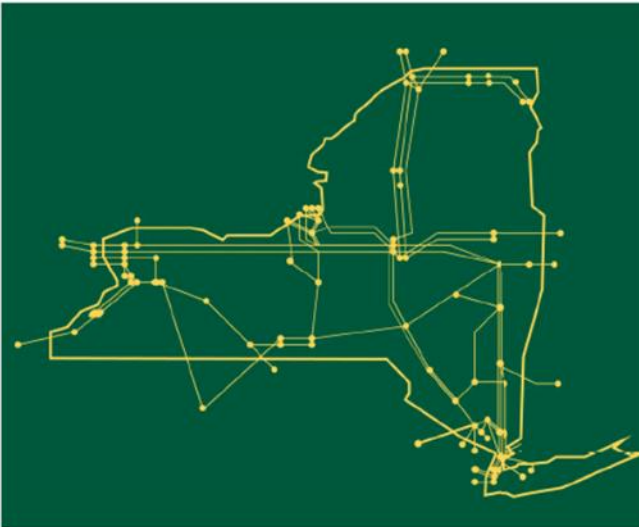
- ◆ **Explore fuel assurance market rule changes to help assure fuel availability during cold weather conditions**
- ◆ **Report back to stakeholders on the FERC filing regarding the waiver on minimum generation and variable generation cost recovery in excess to \$999/MW**

Next Steps

Improved Coordination

- ◆ **Implement improvements to the seasonal and daily generation fuel inventory reporting requirements and daily replenishment schedules during “cold weather events”**
- ◆ **Work with NY State regulatory agencies to develop a formal process for the NYISO to identify reliability needs that would be mitigated by generator requests for certain waivers**

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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