

Winter 2015 Cold Weather Operations

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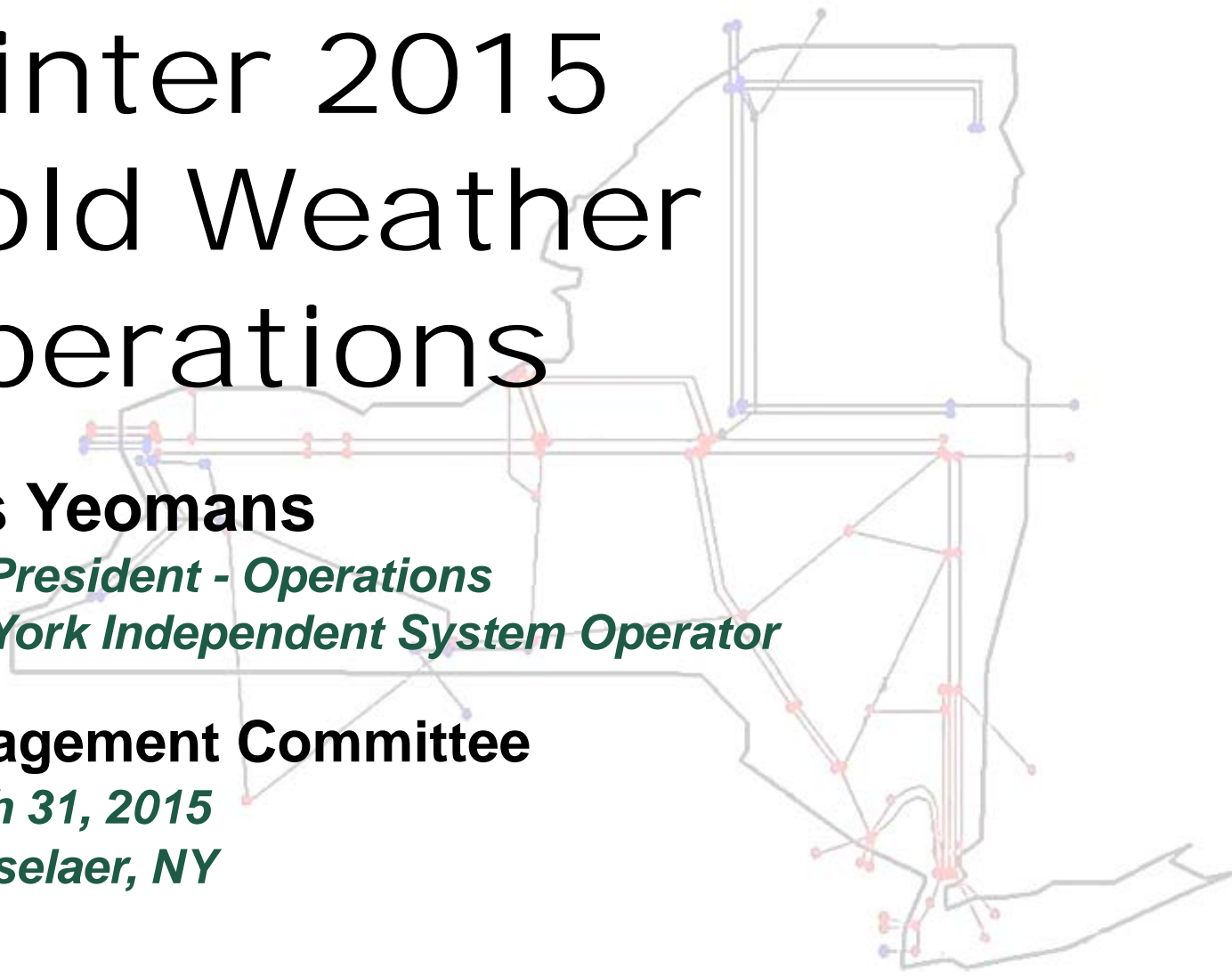
Vice President - Operations

New York Independent System Operator

Management Committee

March 31, 2015

Rensselaer, NY



Agenda

- ◆ **Cold Weather Preparations**
- ◆ **Winter 2015 Peak Load -- January 7, 2015**
- ◆ **Winter 2015 Operations**
- ◆ **LNG Prices, LNG Deliveries, Gas Storage**
- ◆ **Gas & Electric Prices**
- ◆ **Recommendations**

Cold Weather Preparations

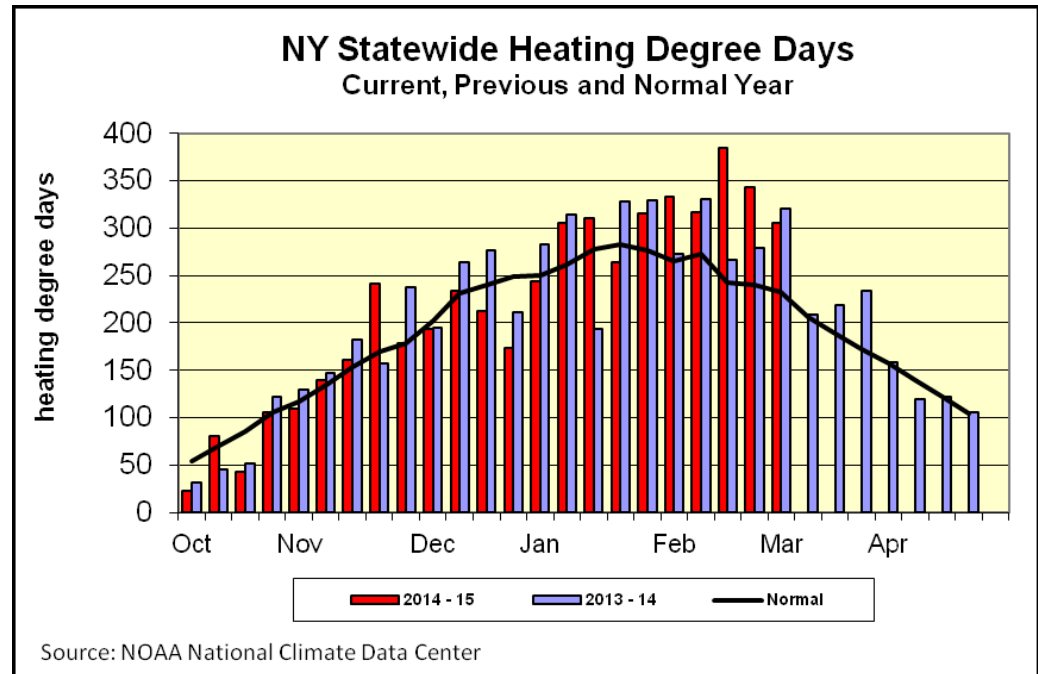
- ◆ **NYISO participated in several NPCC/PJM/MISO coordination conference calls during the winter cold weather conditions**
 - *More regional coordination calls in February than January*
- ◆ **The NY Transmission Owners rescheduled transmission outages prior to cold weather conditions**
- ◆ **NYISO invoked its “Cold Weather Fuel Inventory Protocol” to monitor and verify gas nominations and oil inventories with generation asset owners on a daily basis before each cold day**
 - *Daily fuel updates in February were critical -- due to the high number of days that gas prices exceeded oil prices*
 - *Cooperation and accuracy of the information was excellent*

2015 Winter Peak Load

- ◆ **NYISO experienced a Winter 2015 peak load of 24,648 MW on January 7, 2015**
- ◆ **2015 conditions were not quite as cold as those of January 7, 2014 -- when New York set new, all-time winter peak load**
 - *25,738 MW - Winter all-time peak load set January 7, 2014*
 - *24,737 MW - “1 in 2” Forecast Winter Peak for 2014-15*
 - *26,333 MW - “1 in 10” Forecast Winter Peak for 2014-15*
- ◆ **NYISO met all operating reliability criteria over the Winter 2015 peak**
 - *No need for state-wide Supplemental Capacity Commitments*
 - *No need for Demand Response Notifications or Activations*

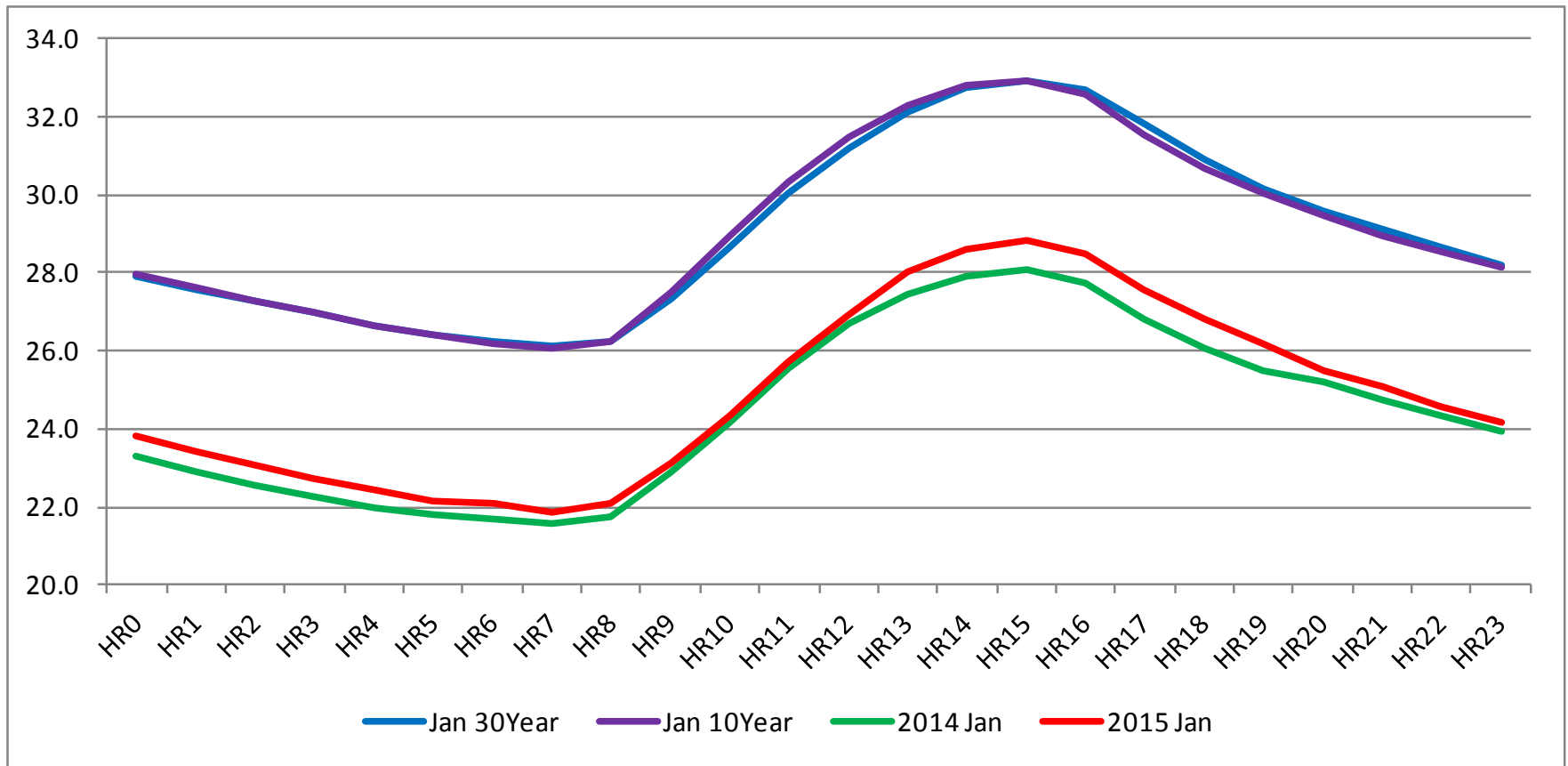
Winter 2015 Conditions

- ◆ **January and February were both colder than the 10-year average and 30-year average (*next slides*)**
 - **Coldest February for New York State since 1941 (74 years)**
 - **Average temperature for February 2015 was 12 degrees below normal**



SOURCE: NYSERDA Heating Fuels Report - March 9, 2015

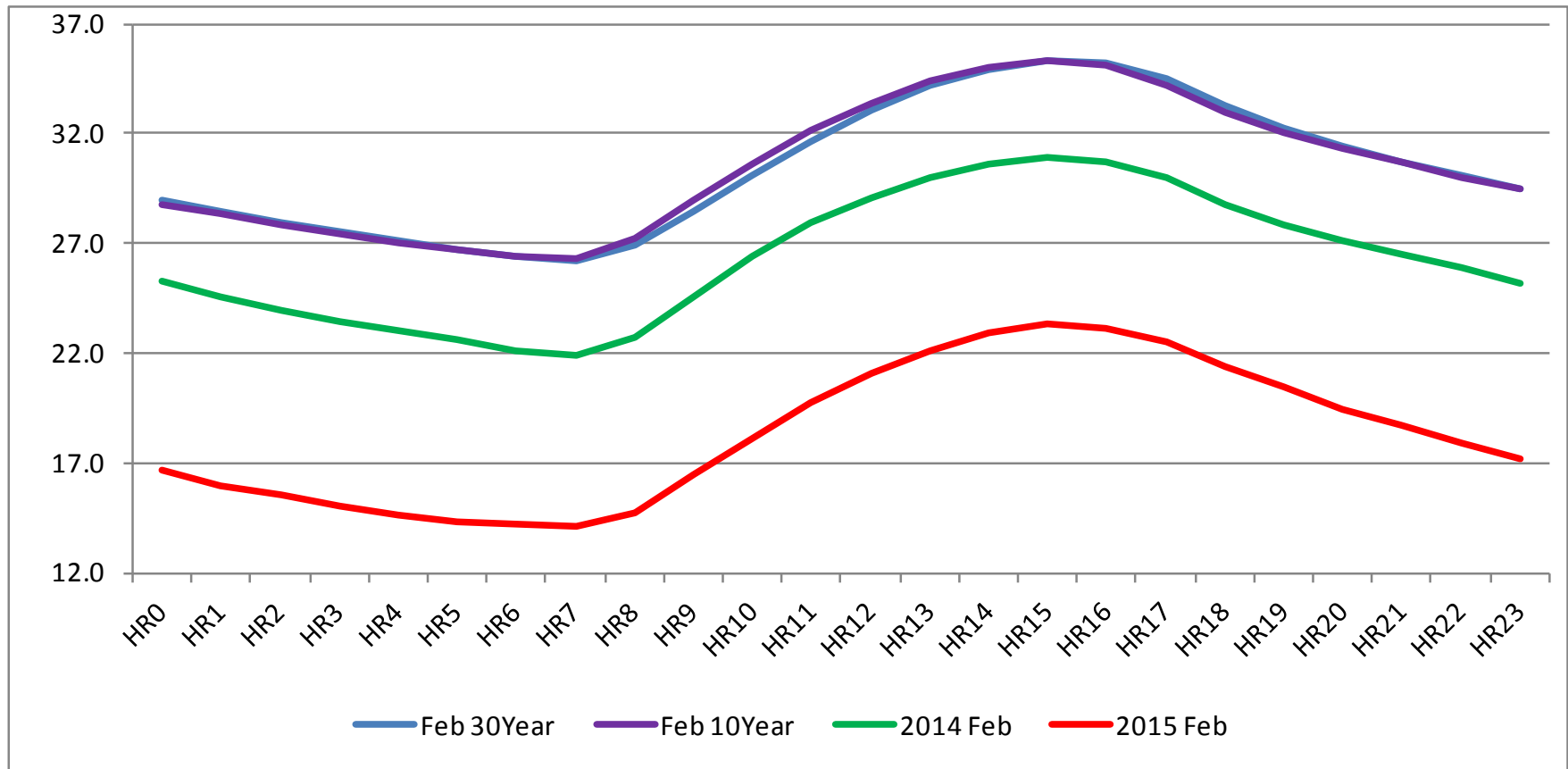
Average Hourly Temperatures (°F) – January 30-Year Average, 10-Year Average, 2014 & 2015



**January’s 30-year average and 10-year average NYCA temperature is 29.1°F.
January 2014 was well below average, at 24.4°F. January 2015 was almost as low at 24.9°F.**

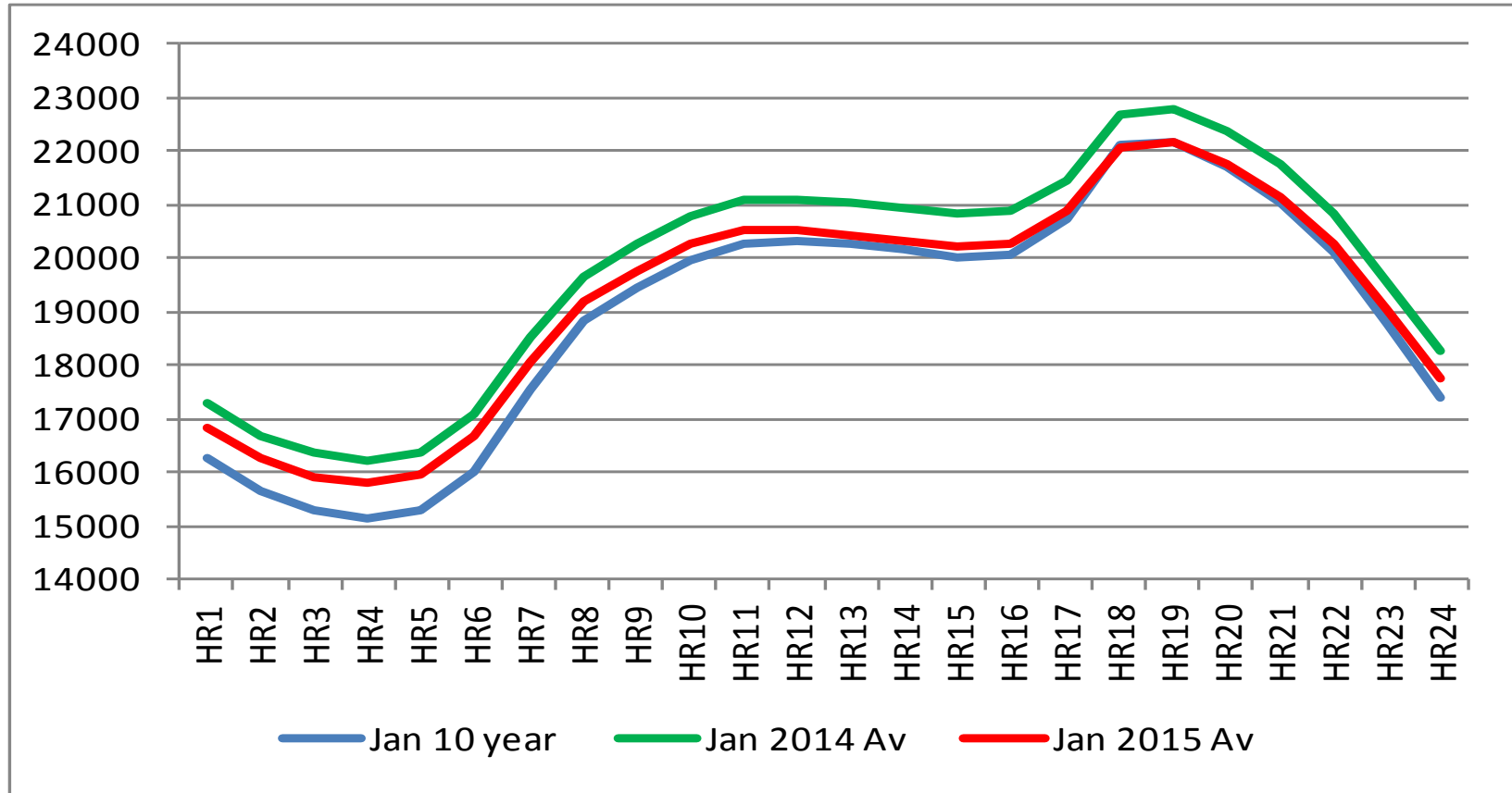
Average Hourly Temperatures (°F) – February

30-Year Average, 10-Year Average, 2014 & 2015



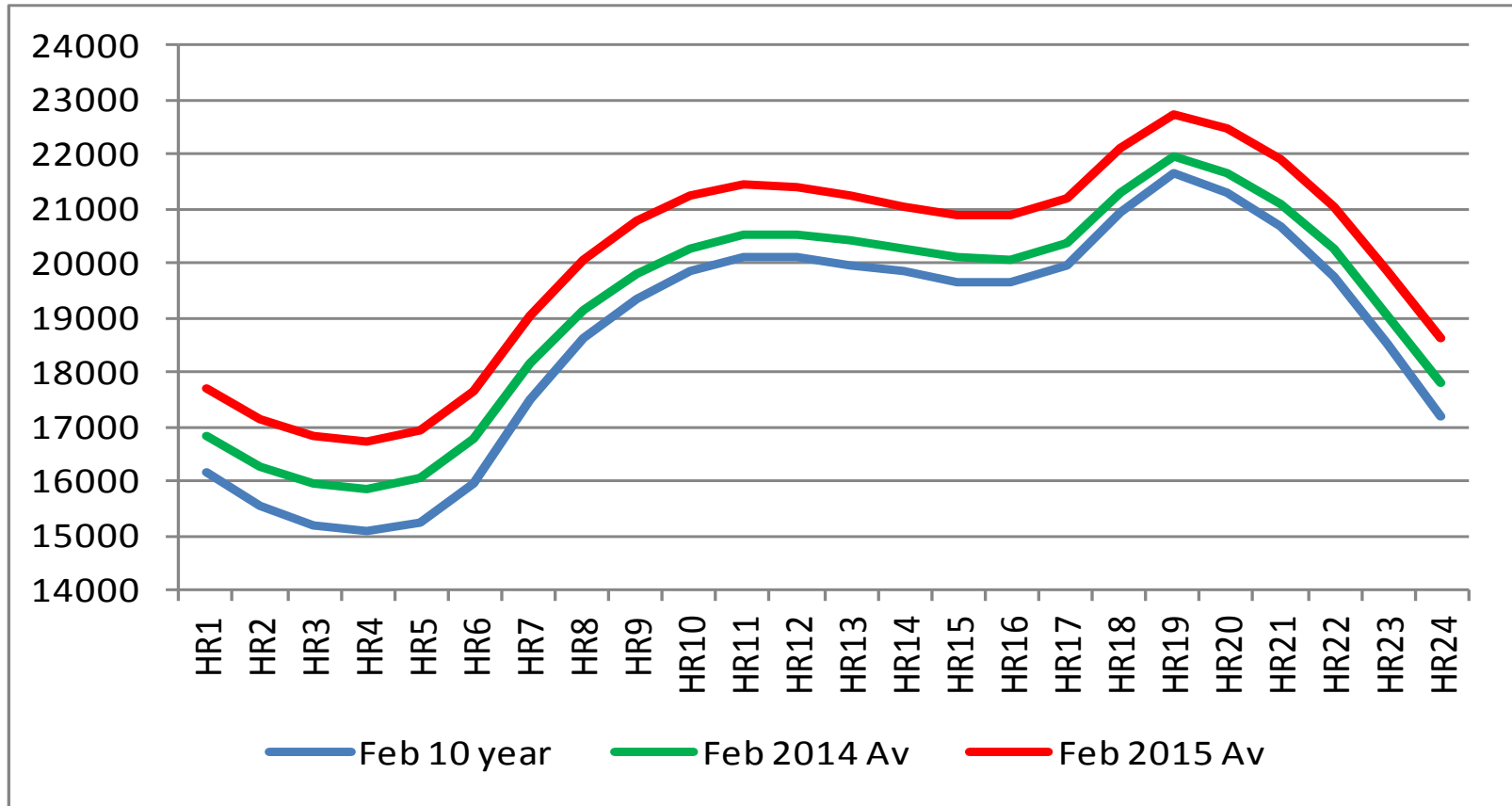
**February’s 30-year average is 30.4 °F and the 10-year average is 30.5°F.
February 2014 average was 26.3°F. February 2015 average was well below at 18.3 F.**

Average Hourly Loads (MW) – January 10-Year Average, 2014 & 2015



January's 10-year average peak was 22,220 MW. In January 2014, the average peak was 22,820 MW, with an all-time winter peak of 25,738 MW recorded on Jan. 7. In January 2015, the average peak was 22,190 MW. Monthly energy in January 2014 was 14,719 GWh. Monthly energy in January 2015 was 14,325 GWh.

Average Hourly Loads (MW) – February 10-Year Average, 2014 & 2015



February's 10-year average peak was 21,660 MW. In February 2014, the average peak was 21,950 MW. In February 2015, the average peak was 22,750 MW. Monthly energy in February 2014 was 12,894 GWh. Monthly energy in February 2015 was 13,467 GWh.

Cold Weather Operations Winter 2015

◆ Statewide Supplemental Capacity Commitments

- *On February 18, NYISO committed Oswego 5 for reliability purposes all hours for Feb 19, following the forced outage of the Nine Mile 2 nuclear plant (1,310 MW) and 600 MW of other upstate gas-fired generation capacity*

◆ Demand Response

- *On February 18, NYISO provided the 21-hour notification to Demand Response resources but an actual activation was not needed*

◆ Market Outcomes

- *January and February state-wide uplift were relatively low*
- *February BRM congestion & CTS savings were \$5 million*

◆ Transmission Performance

- *Very few transmission forced outages during Winter 2015*

Cold Weather Operations Winter 2015

◆ Fuel Inventories

- *Alternative oil fuel supplies were sufficient throughout most of the winter -- although supplies became tighter in mid to late February*
- *NYISO initiated the state-agency communication protocol on February 24 due to low inventory at one station*

◆ Regional Electric Conditions

- *Fewer generator derates across neighboring regions*
- *PJM set new all-time winter peak of 143,800 MW on the morning of February 20*

◆ Regional Pipeline Conditions

- *Majority of the Northeast interstate pipelines and LDCs issued Gas Alerts and Operational Flow Orders during most of the cold weather conditions during January and February*

Cold Weather Operations

Winter 2015

- ◆ **Gas prices in Eastern NY exceeded #2 oil prices on the following days:**

	<u># Days</u>
<i>Dec 2014</i>	<i>0</i>
<i>Jan 2015</i>	<i>5</i>
<i>Feb 2015</i>	<i>21</i>
<i>Mar 2015</i>	<i>2</i>

- ◆ **Generator Forced Outages (Highest 5 peak loads)**

<u>Date</u>	<u>Forced Outages Unavailable to DAM</u>	<u>DAM Schedules Forced Outage in Real Time</u>
1-7-2015	2,864 MW	712 MW
1-8-2015	2,585	649
2-19-2015	2,859	474
2-23-2015	2,852	2,885
2-24-2015	2,520	889

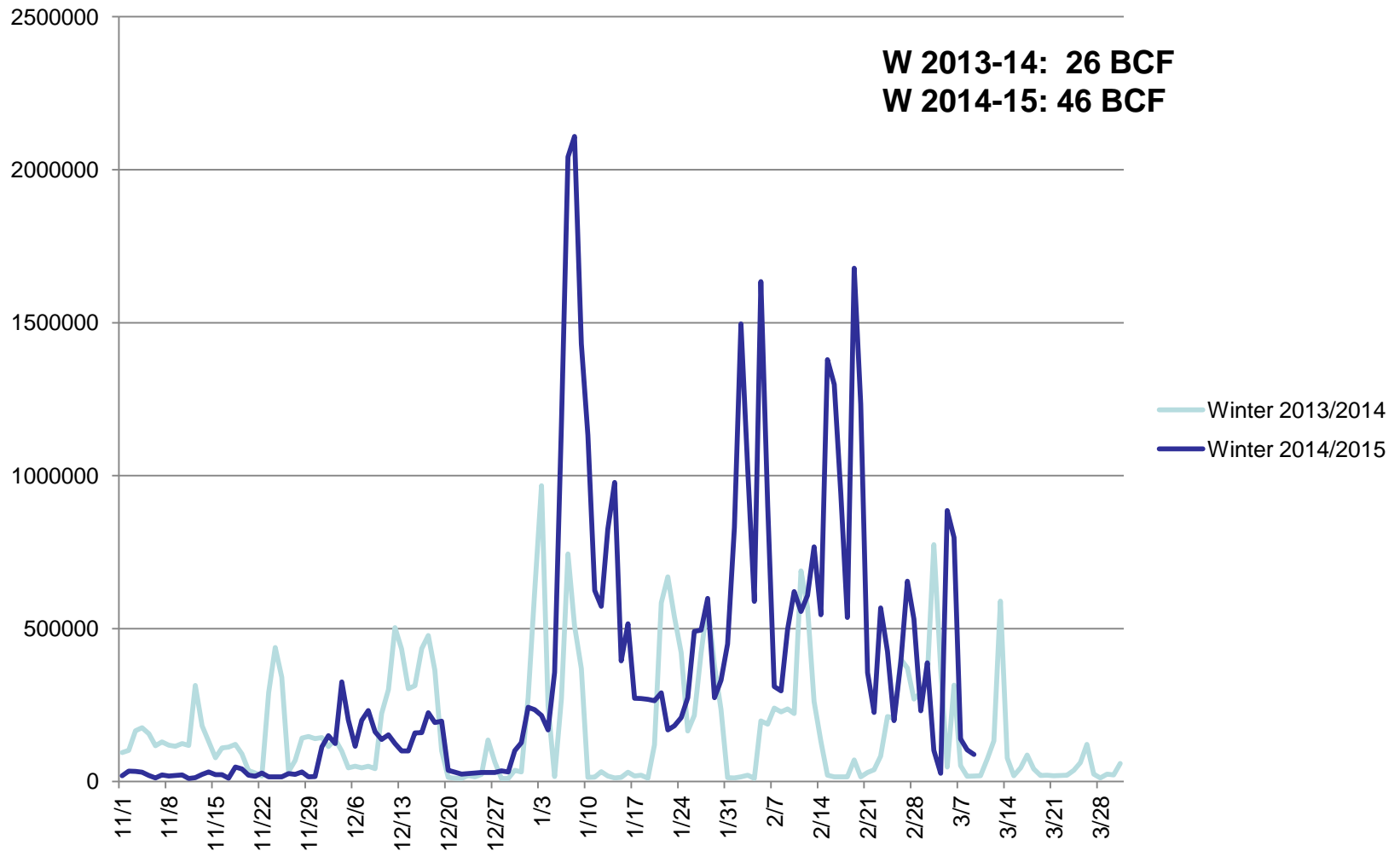
World LNG Prices Fall 2013



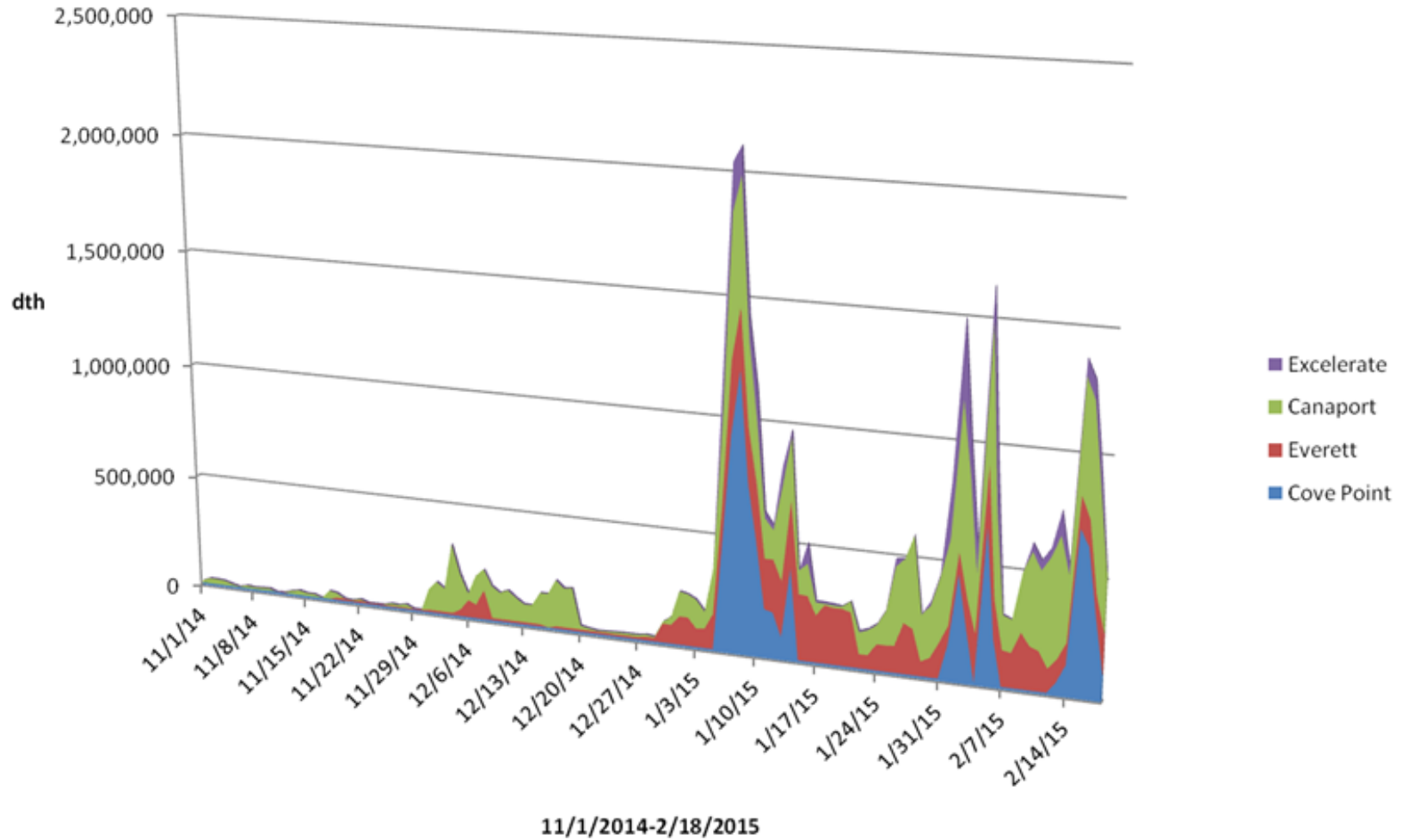
World LNG Estimated Dec. 2014 Landed Prices



Year-on-Year LNG Deliveries



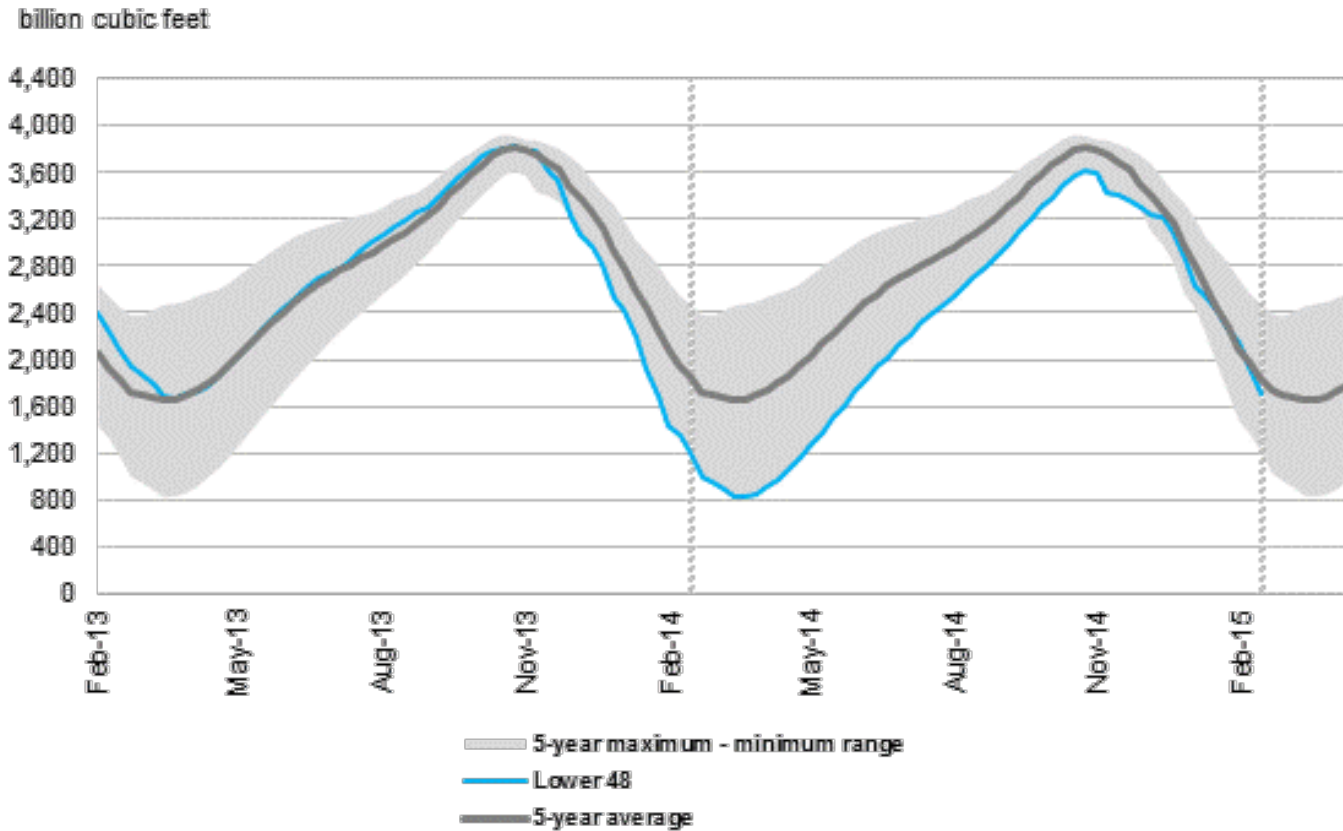
Northeast US LNG Imports



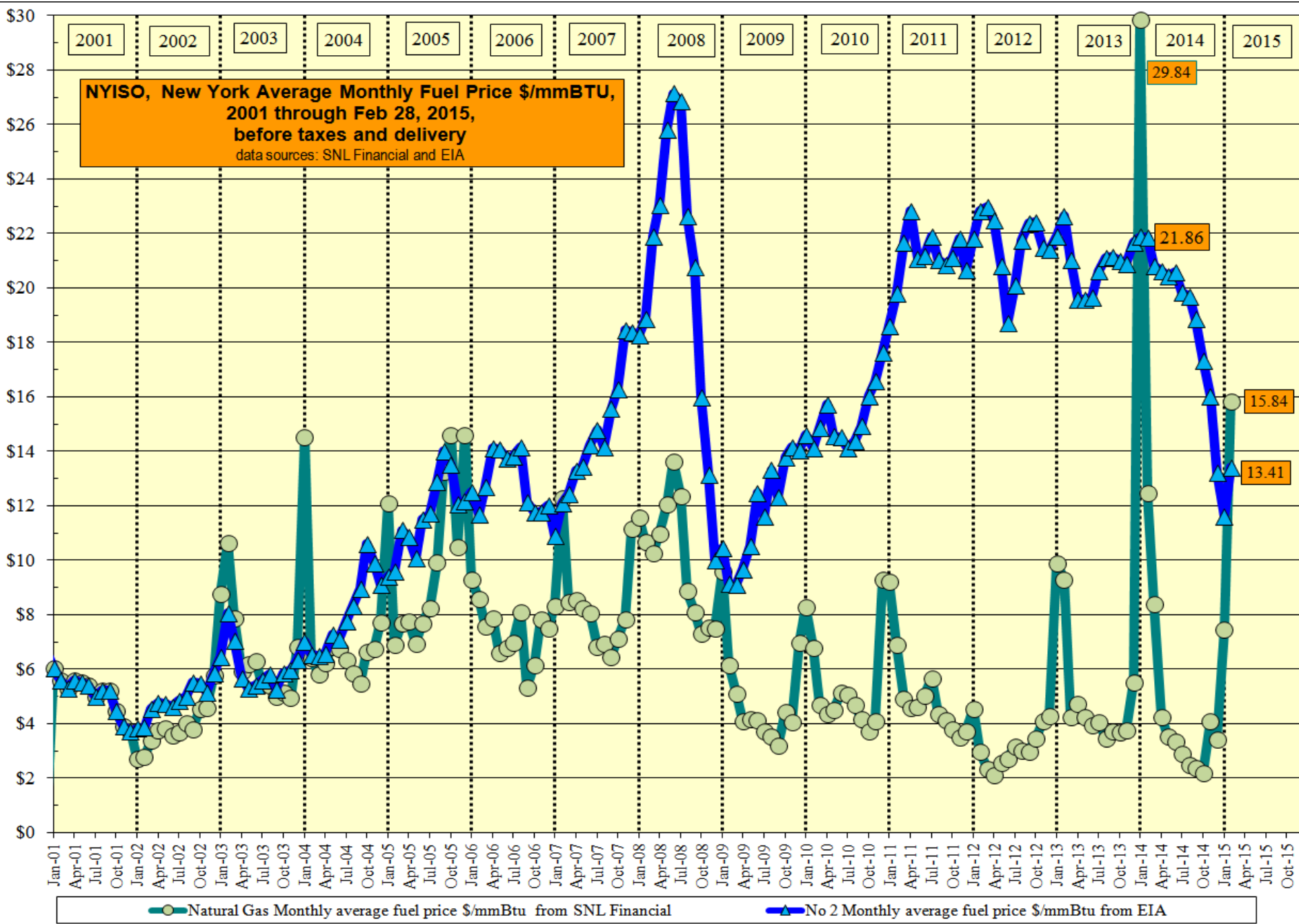
11/1/2014-2/18/2015

Winter Storage Comparison

Working gas in underground storage compared with the 5-year maximum and minimum

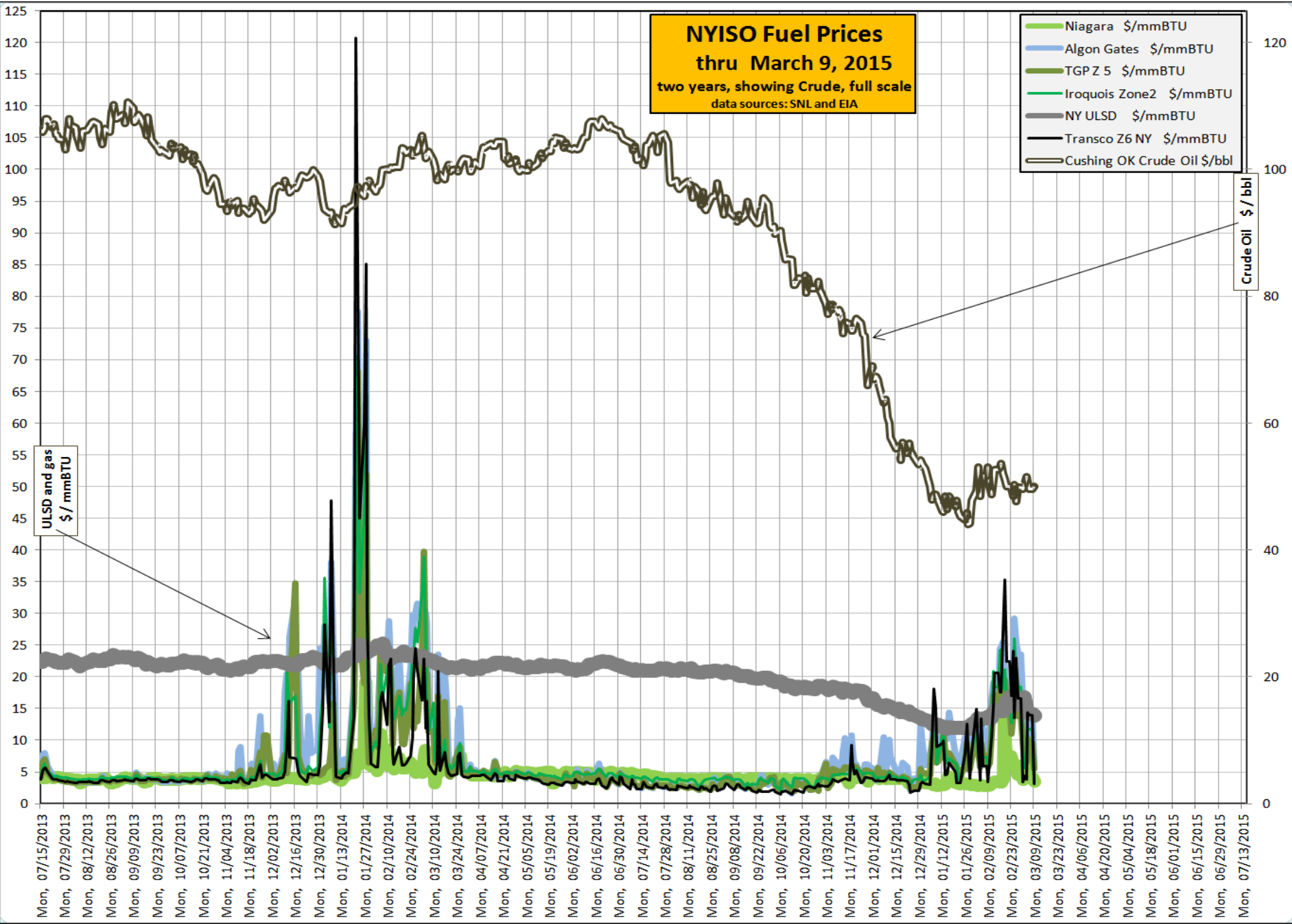


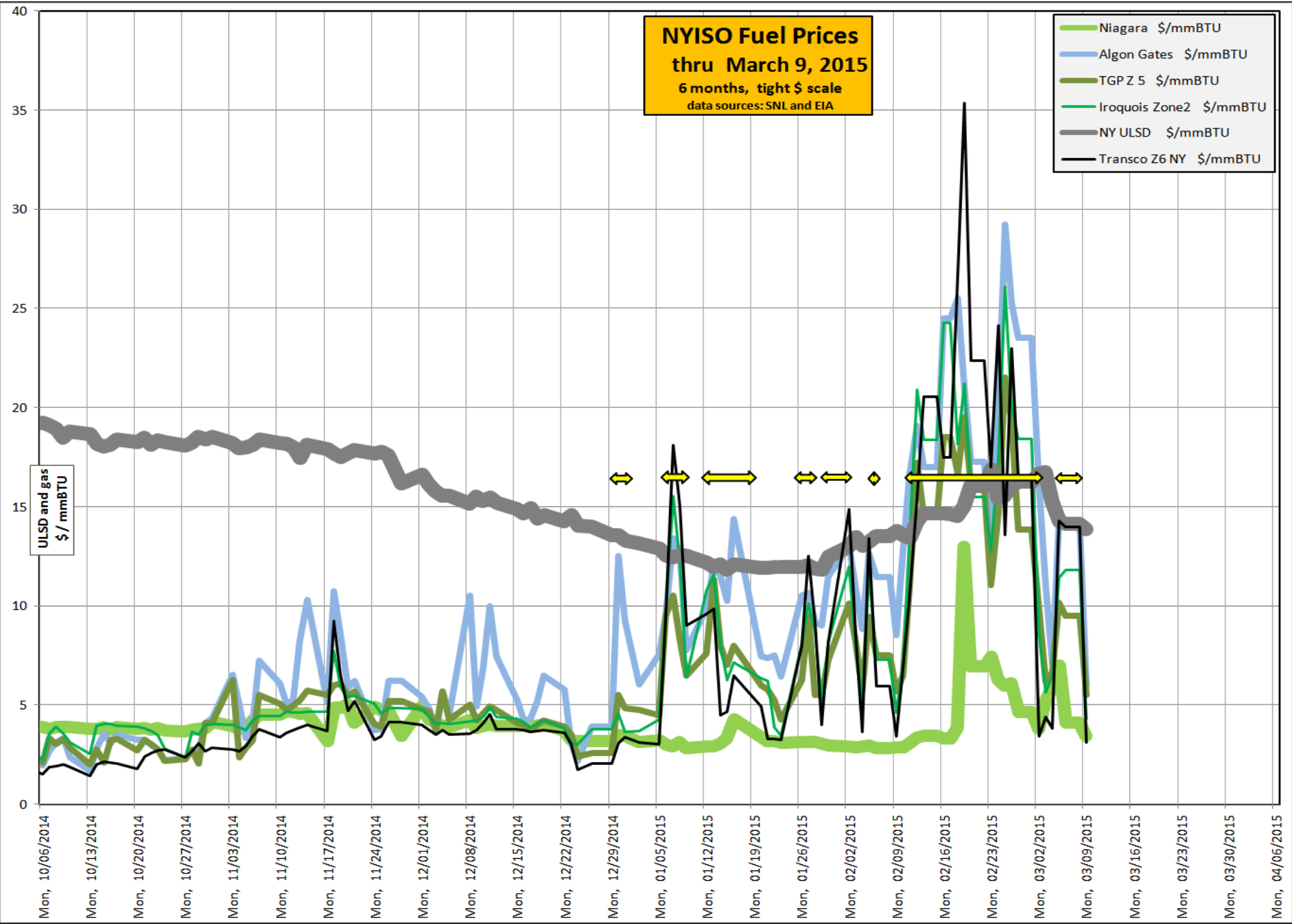
 Source: U.S. Energy Information Administration



**NYISO Fuel Prices
thru March 9, 2015**
two years, showing Crude, full scale
data sources: SNL and EIA

- Niagara \$/mmBTU
- Algon Gates \$/mmBTU
- TGP Z 5 \$/mmBTU
- Iroquois Zone2 \$/mmBTU
- NY ULSD \$/mmBTU
- Transco Z6 NY \$/mmBTU
- Cushing OK Crude Oil \$/ bbl

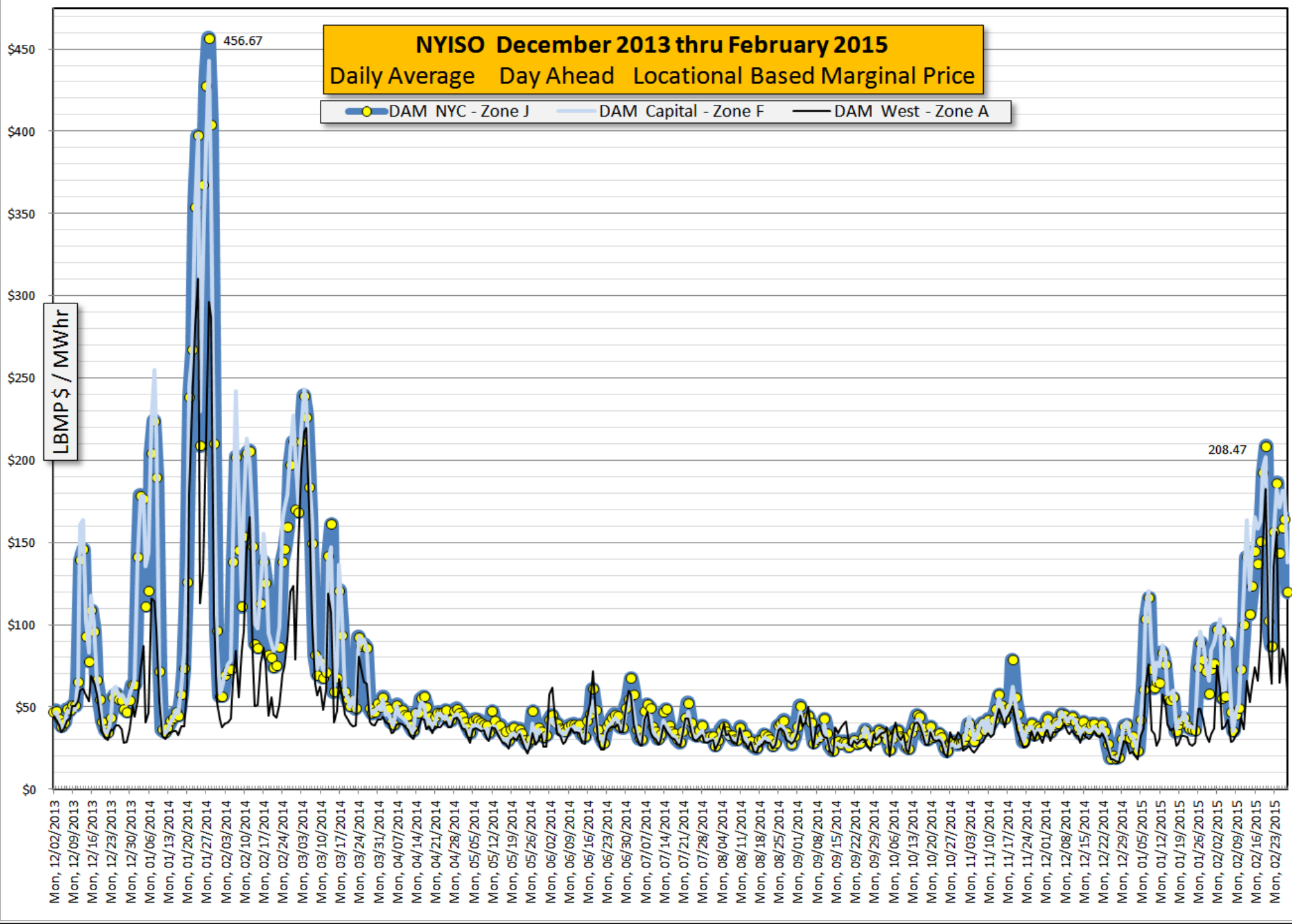




NYISO December 2013 thru February 2015

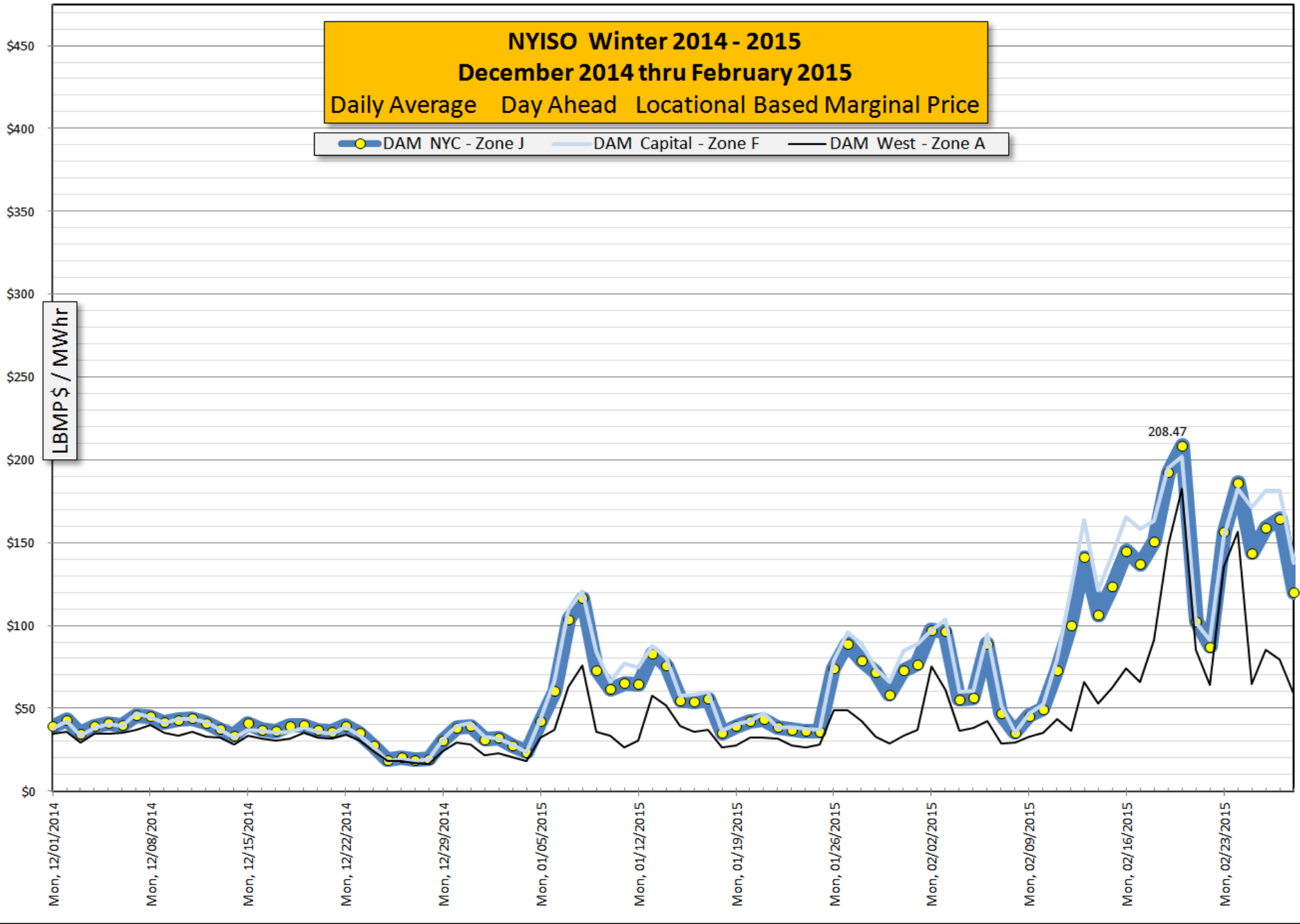
Daily Average Day Ahead Locational Based Marginal Price

● DAM NYC - Zone J
 — DAM Capital - Zone F
 — DAM West - Zone A



NYISO Winter 2014 - 2015
December 2014 thru February 2015
 Daily Average Day Ahead Locational Based Marginal Price

● DAM NYC - Zone J
 — DAM Capital - Zone F
 — DAM West - Zone A



208.47

Marginal Energy Prices

- ◆ **Variables that may have impacted Winter 2015 marginal electric energy prices relative to Winter 2014**
 - *Lower Global Oil Prices*
 - *Lower Global LNG Prices*
 - *Higher LNG Gas Injections into Eastern-Side of Pipeline Infrastructure*
 - *Higher Gas Storage Levels*
 - *Increased Total Marcellus & Utica Shale Production*
 - *Improved generators performance across neighboring regions*
 - *Milder temperatures across the middle and southern United States*

Cold Weather Reliability Concerns

◆ Gas Availability

- *Gas LDC retail load has gas transportation priority across the Gas LDC's system during cold weather. This makes it difficult for gas-fired generation to procure gas during cold weather and especially difficult to procure gas on short notice to react to real time market signals during Gas Operational Flow Orders*

◆ Generator Derates

- *Higher than ordinary levels of generator forced outages can be caused by fuel unavailability (gas and oil), equipment failures related to cold weather, or random non-cold weather equipment failures*

◆ Extended Cold Weather

- *Burn rates of alternative fuels can exceed replacement rates of alternative fuels during extended cold weather and result in reduced generation capacity*

◆ NOx Restrictions

- *Generator switching from gas to oil in some instances result in capacity limitations due to newer, more restrictive NOx emission limitations*

Recommendations

- ◆ **November 2015 implementation of enhanced reserve shortage curves for the purpose of increasing the value of energy during tight operating conditions**
 - *The proposed, enhanced shortage curves reflect an increase in Total Operating Reserve from 1,965 MW to 2,620 MW and enhanced pricing*
- ◆ **Continue to work with stakeholders to evaluate capacity market enhancements that would apply when operating conditions are expected to be tight; due to increased reliance on natural gas, or for other reasons.**

Recommendations

- ◆ **Continue gas-electric coordination initiatives**
 - *Continue quarterly review of gas & electric infrastructure maintenance schedules*
 - *Continue seasonal fuel assessments*
 - *Complete Generator Fuel Reporting web-based application*
 - *Comment on Gas-Day business practice definition*
 - *Continue MIWG discussion of gas balancing & gas penalty cost recovery*
 - *Participate & review EIPC Gas Adequacy Studies*
 - *NY State Agency communications protocol*
 - *Improved emissions monitoring*

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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