

Winter 2018-2019

Cold Weather Operations

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NYSRC

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Two noteworthy periods of Cold Weather Conditions

MLK Weekend 1/19/19 - 1/22/19

- **Forecasted winter storm occurred Saturday night into Sunday followed by arctic cold conditions on Monday and into Tuesday.**
 - Advanced coordination with the TOs, neighboring ISOs, and the Northeast Power Coordinating Council occurred. Transmission that was out of service on maintenance that could be recalled, was returned to service.
 - NYISO fuel survey inventories indicated sufficient alternate fuel inventory
 - Monday 1/21/19 - Day ahead 50/50 forecast was 23,760MW, 90/10 forecast was 24,330MW
 - Minimum temperatures were -3 degrees in Syracuse, 0 degrees in Albany and 6 degrees in NYC

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Two noteworthy periods of Cold Weather Conditions

1/30/19 – 2/2/19

- **Arctic front arrived Wednesday (1/30/19) and stretched into Saturday (2/2/19).**
 - Coordination with the TOs and neighboring ISOs
 - NYISO fuel surveys indicated sufficient alternate fuel inventory
 - Restrictive OFO's in place by Con Ed and National Grid LDC's
 - Thursday 1/31/19 - Day ahead 50/50 forecast was 24,570MW, 90/10 forecast was 25,130MW
 - Lows were -2 degrees in Syracuse, -2 degrees in Albany and 4 degrees in NYC
 - Record natural gas consumption in the United States as well as many NY LDC and pipelines

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Temperature and Peak Load Statistics for 2018 and 2019 Cold Snaps

| Date | DOW | AM Low Temp | Aft High Temp | HB18 Temp | Avg Temp | Peak Load (MW) |
|------------|-----|-------------|---------------|-----------|----------|----------------|
| 12/31/2017 | Sun | 5.0 | 12.9 | 7.5 | 9.3 | 23,553 |
| 1/1/2018 | Mon | 1.6 | 13.6 | 12.9 | 8.0 | 23,435 |
| 1/2/2018 | Tue | 9.6 | 22.2 | 20.3 | 15.5 | 24,471 |
| 1/3/2018 | Wed | 11.7 | 25.5 | 22.9 | 19.0 | 23,531 |
| 1/4/2018 | Thu | 20.1 | 23.3 | 21.3 | 20.9 | 23,857 |
| 1/5/2018 | Fri | 5.9 | 10.1 | 9.0 | 8.7 | 25,081 |
| 1/6/2018 | Sat | 3.2 | 8.5 | 6.4 | 5.5 | 24,303 |
| 1/7/2018 | Sun | -0.7 | 17.1 | 16.1 | 8.8 | 23,757 |
| 1/21/2019 | Mon | 1.0 | 10.3 | 9.1 | 6.2 | 24,728 |
| 1/22/2019 | Tue | 7.7 | 24.7 | 23.1 | 16.3 | 23,135 |
| 1/30/2019 | Wed | 15.4 | 22.6 | 12.5 | 17.2 | 24,062 |
| 1/31/2019 | Thu | 0.7 | 13.1 | 11.5 | 6.8 | 24,580 |
| 2/1/2019 | Fri | 5.0 | 18.2 | 15.9 | 11.3 | 23,158 |

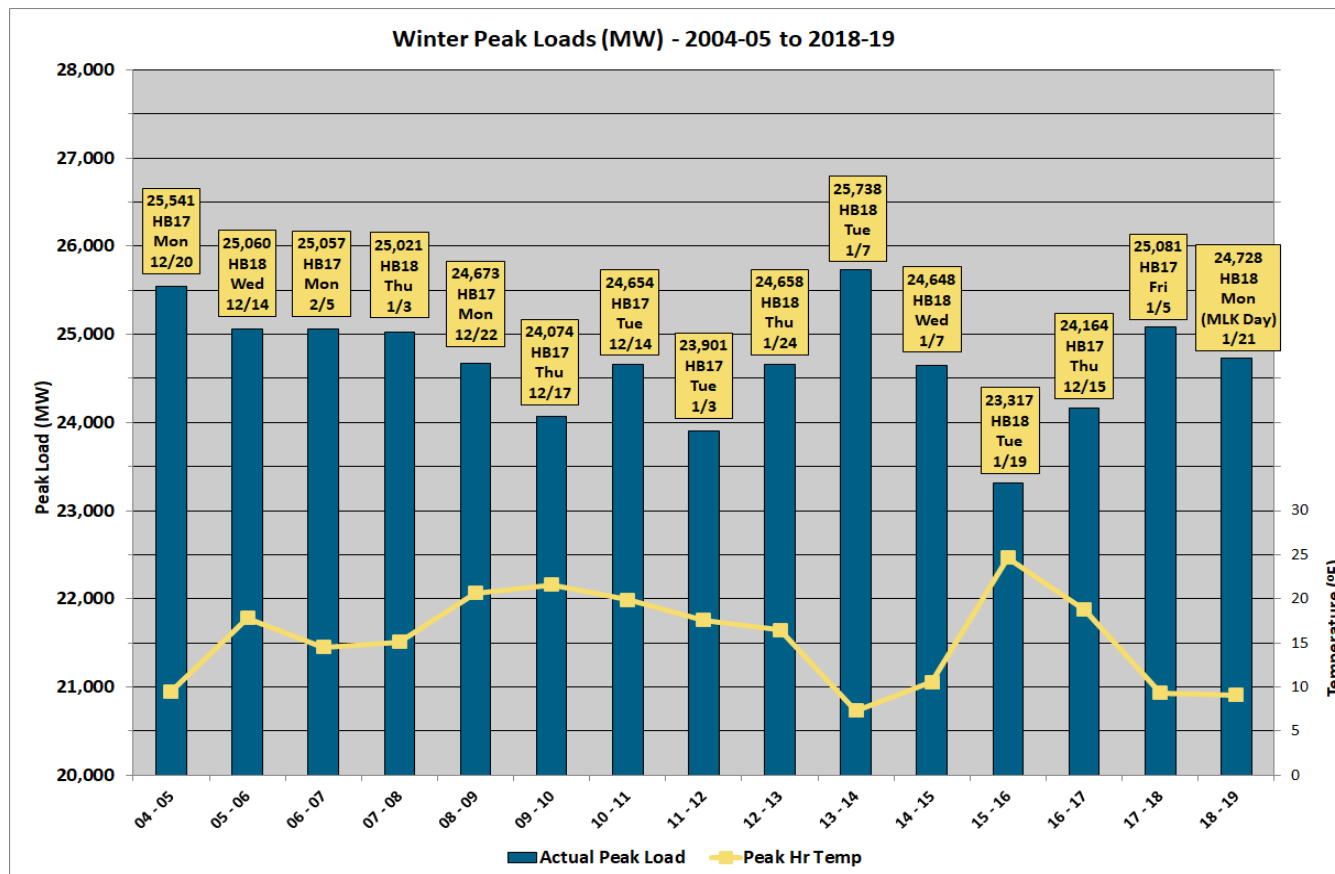
Peak Loads

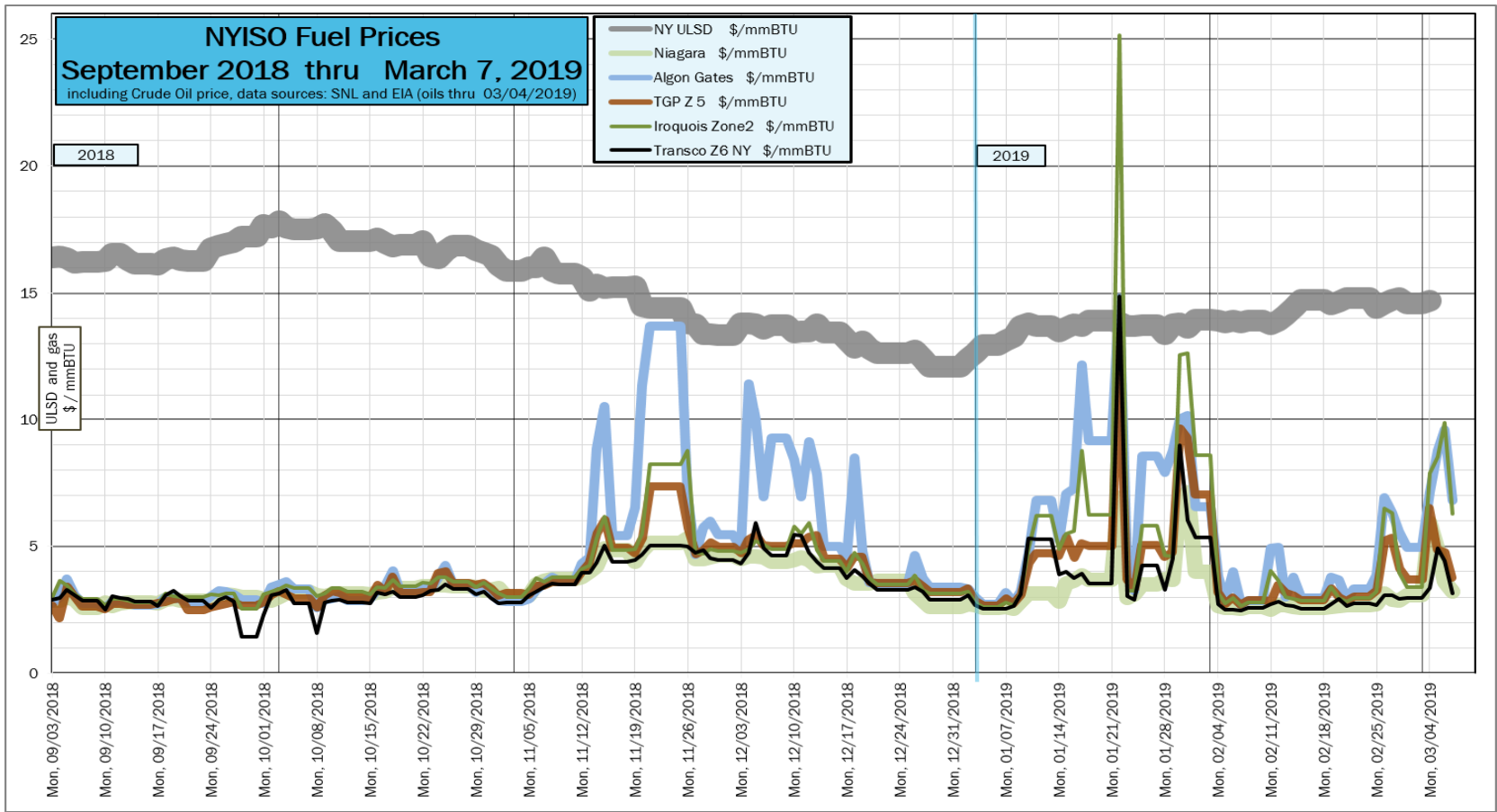
- NY all-time Winter Electric Peak Load was 25,738 MW on January 7, 2014
- NYISO Seasonal 50-50 Forecast was 24,269 MW for Winter 2018/2019
- This Winter's Actual Peak is 24,728 MW on Monday, January 21
 - This was the MLK Jr. holiday

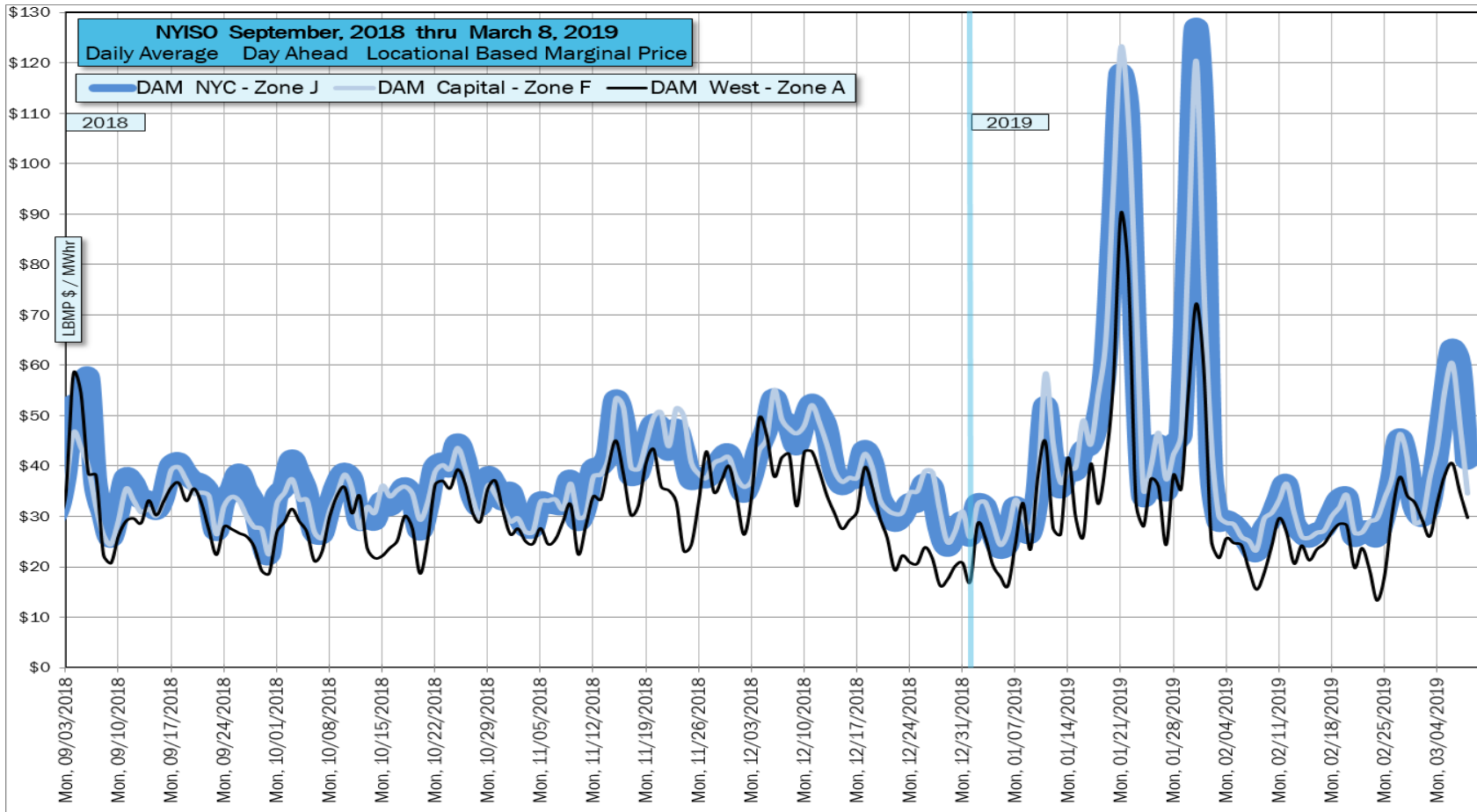
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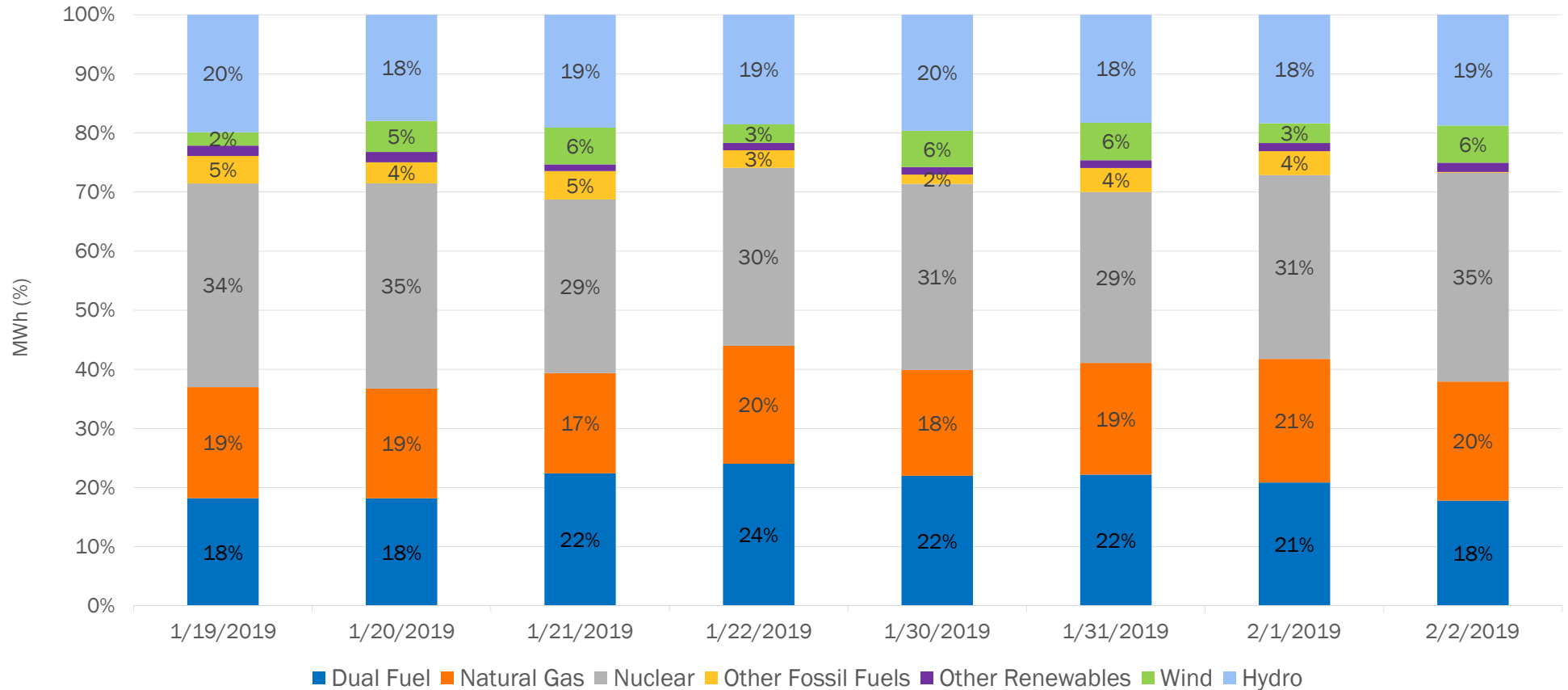
Winter Peak Loads in MW - 2004 to 2019







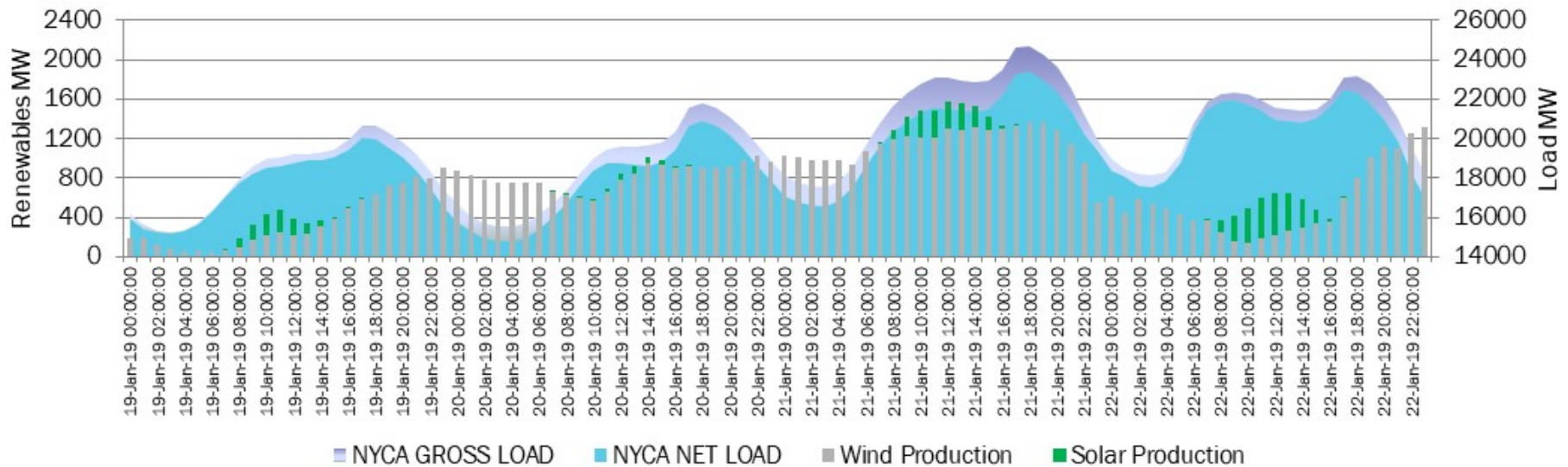
Total Actual Generation by Fuel Mix Across Day



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Renewable Generator Performance

Hourly Wind & Solar Production 01/19/2019 - 01/22/2019

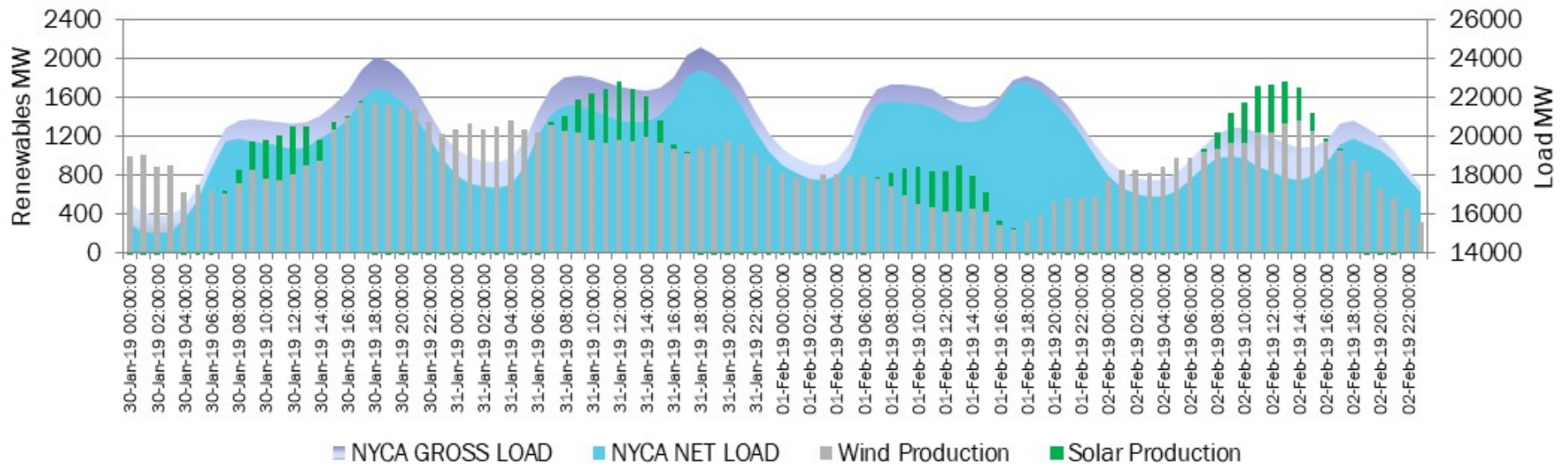


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Renewable Generator Performance

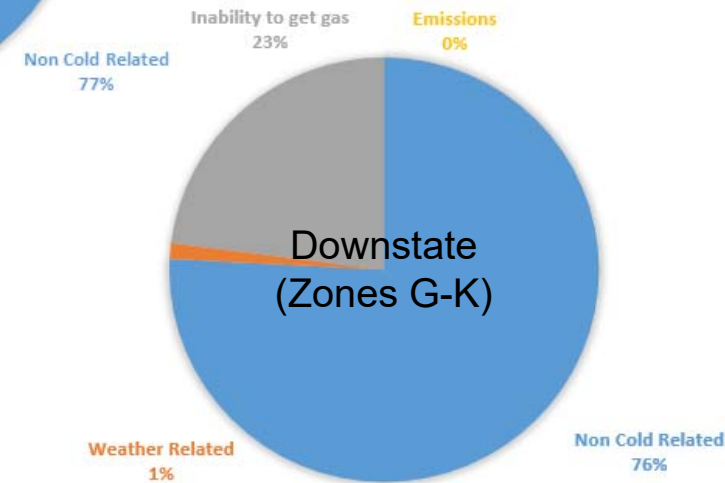
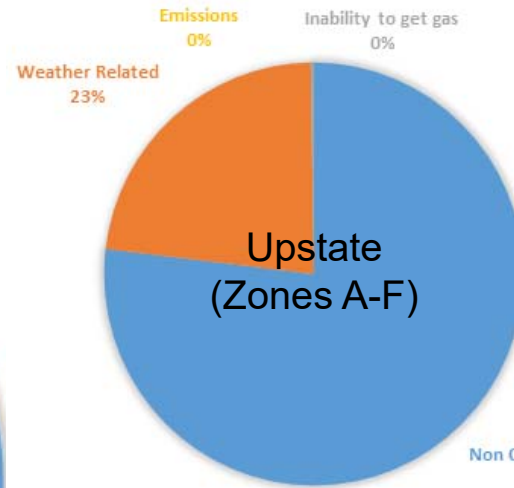
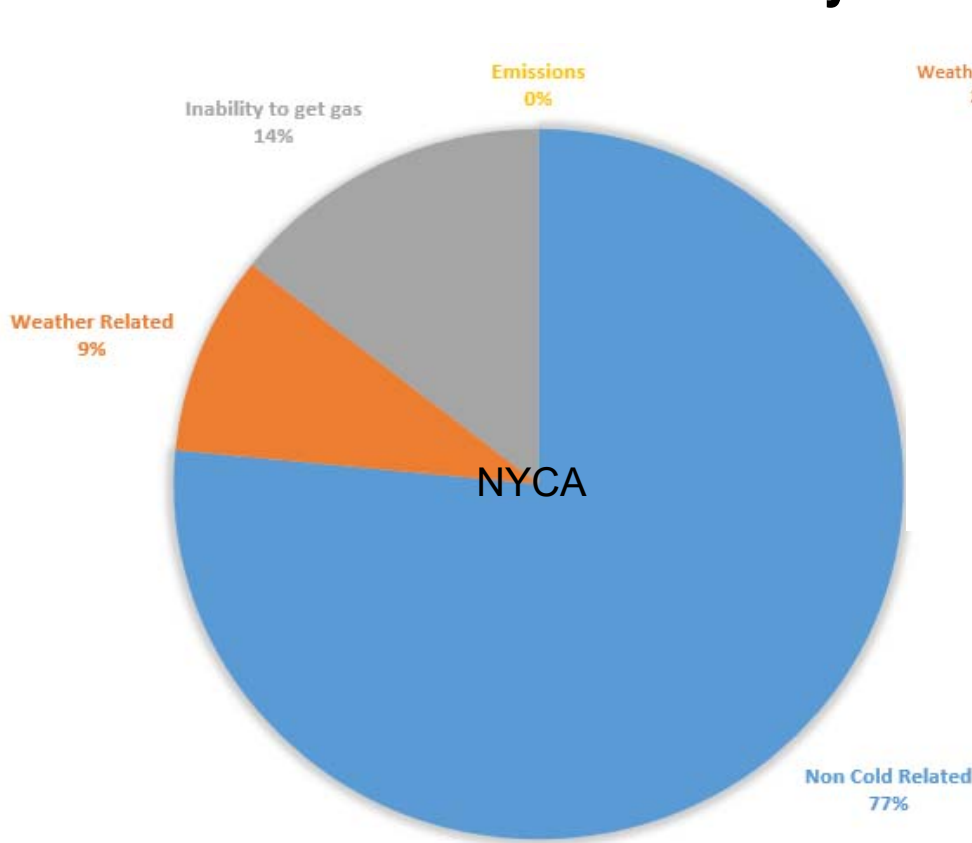
Hourly Wind & Solar Production 01/30/2019 - 02/02/2019



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Overall Distribution of Thermal and Hydro Forced Outages and Derates for 8 Days over Peak Hours



Operations

- **Market systems worked well**
- **No need for statewide supplemental capacity commitments (SREs or DARUs)**
- **No need for Demand Response**
- **No need for Emergency actions (voltage reduction, public appeals, etc.)**
- **No need for emergency purchases**

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Transmission

- **Transmission Infrastructure Performance - Excellent**
- **Continuing Forced Outages**
 - B and C lines from NJ to NYC, Hudson-Farragut 345 kV B3402 and Marion-Farragut 345 kV C3403
 - 68 from NY to Pennsylvania, S. Ripley - Dunkirk 230 kV 68 line
 - One Phase Angle Regulator (PAR) at the Ontario border, L33P St. Lawrence – Moses
- **As of 3/1/19, Long Mountain – Pleasant Valley 345 kV 398 line scheduled out-of-service until 5/19/19**

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Gas System

- **The interstate and gas LDC pipelines all remained in-service**
- **Gas Pipelines and Gas LDCs issued many of the following:**
 - Gas Alerts
 - Daily OFOs (Operational Flow Orders)
 - Hourly OFOs
 - Interruption of Transportation Services (Interruptible Gas Customers will not be able to get Gas)
- **Even with relatively few cold days NY experienced a high number of OFO conditions this season. OFO conditions may become more prevalent and constraining at higher temperatures as compared to the past.**

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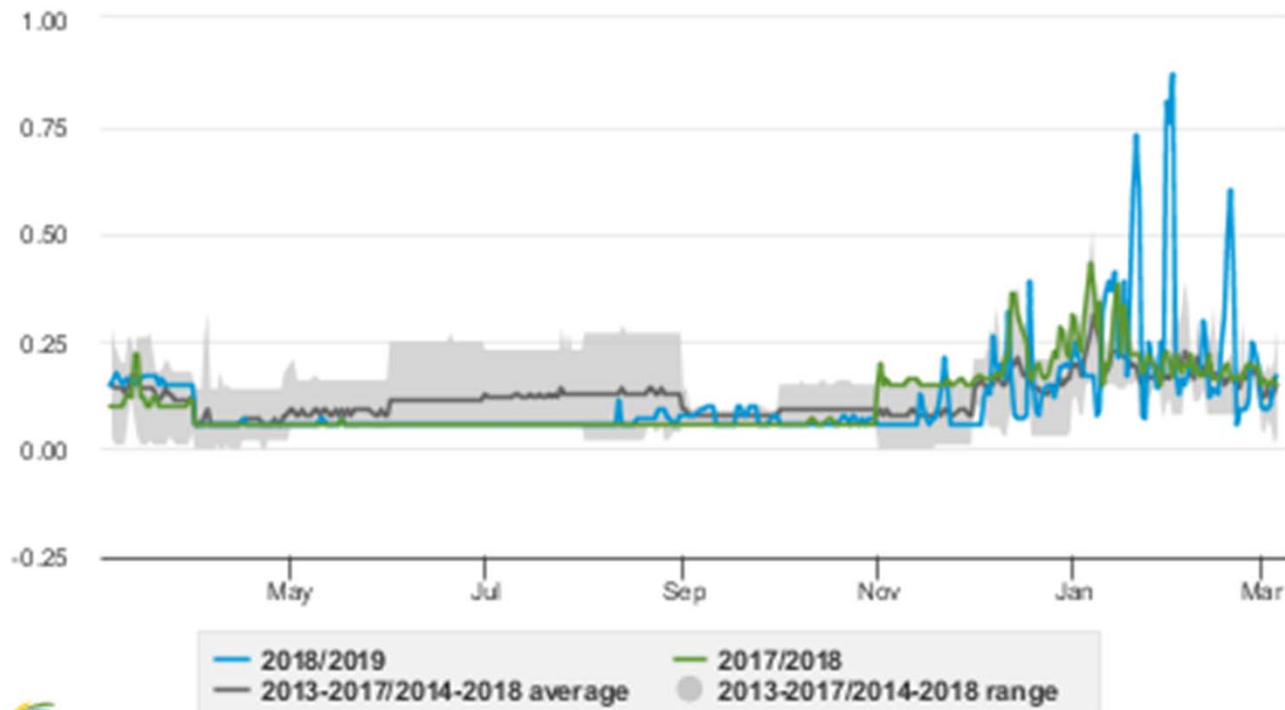
Record amounts of LNG

- Northeast Gateway Deepwater terminal hit a record peak send-out flow rate of over 800,000 MMBtu/day (.8 Bcf) on 2/1/2019
- Canaport and Everett LNG also saw high levels of LNG imports this season

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Daily deliveries of liquefied natural gas in New England

billion cubic feet per day (Bcf/d)



Source: OPIS PointLogic

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Fuel Monitoring

- Weekly Surveys
- Ad Hoc Surveys
- Reach-out to a few for more specific information
- Cooperation and Accuracy of the Web Based Fuel Survey Application was excellent

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Fuel and Energy Security

- NY did not experience any long duration, severely cold weather this season resulting in a minimal amount of winter operating challenges.
- Fuel assurance will continue to be important, hence the significance of the ongoing 2019 Fuel and Energy Security project.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system

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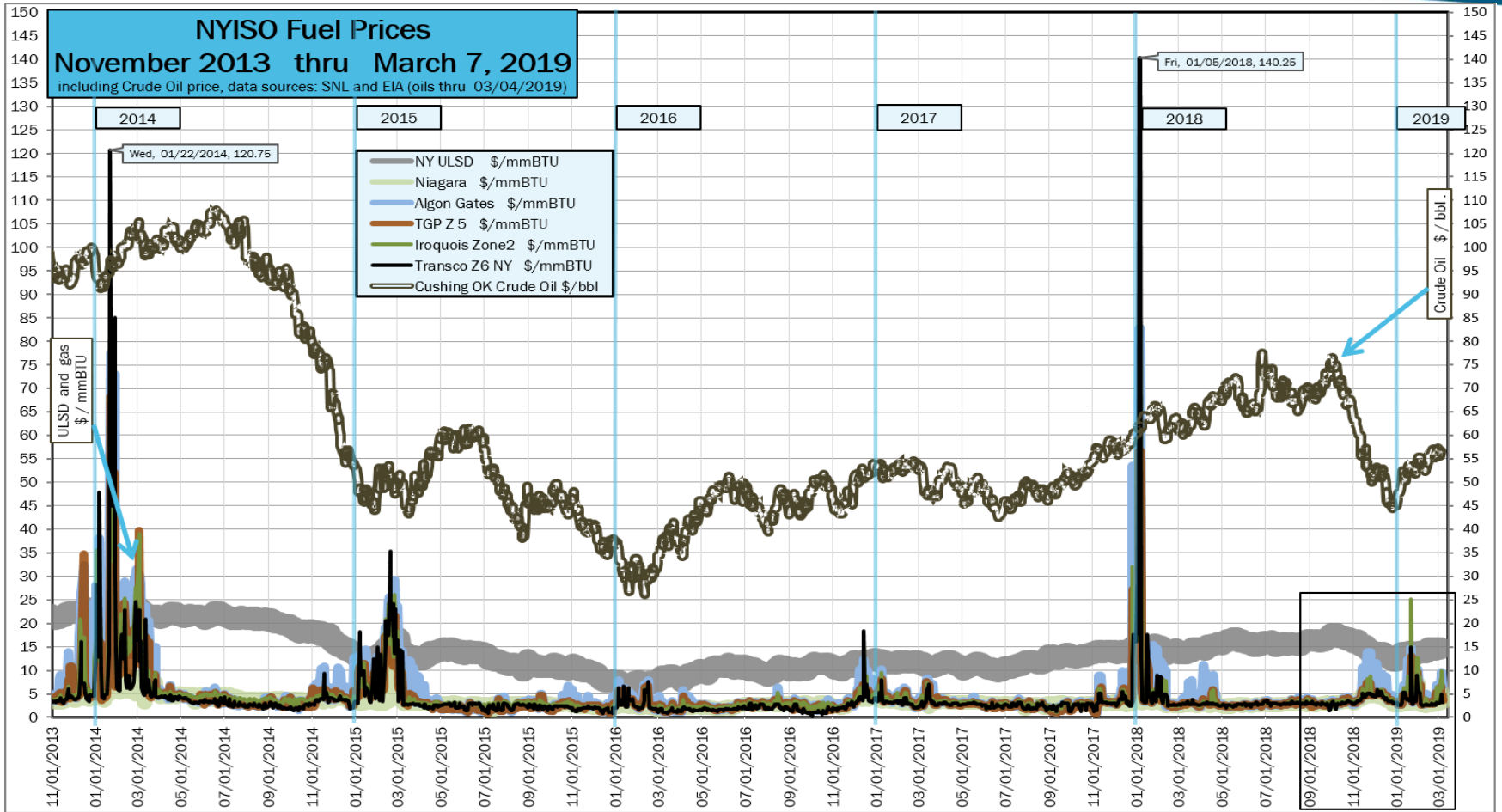


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Appendix

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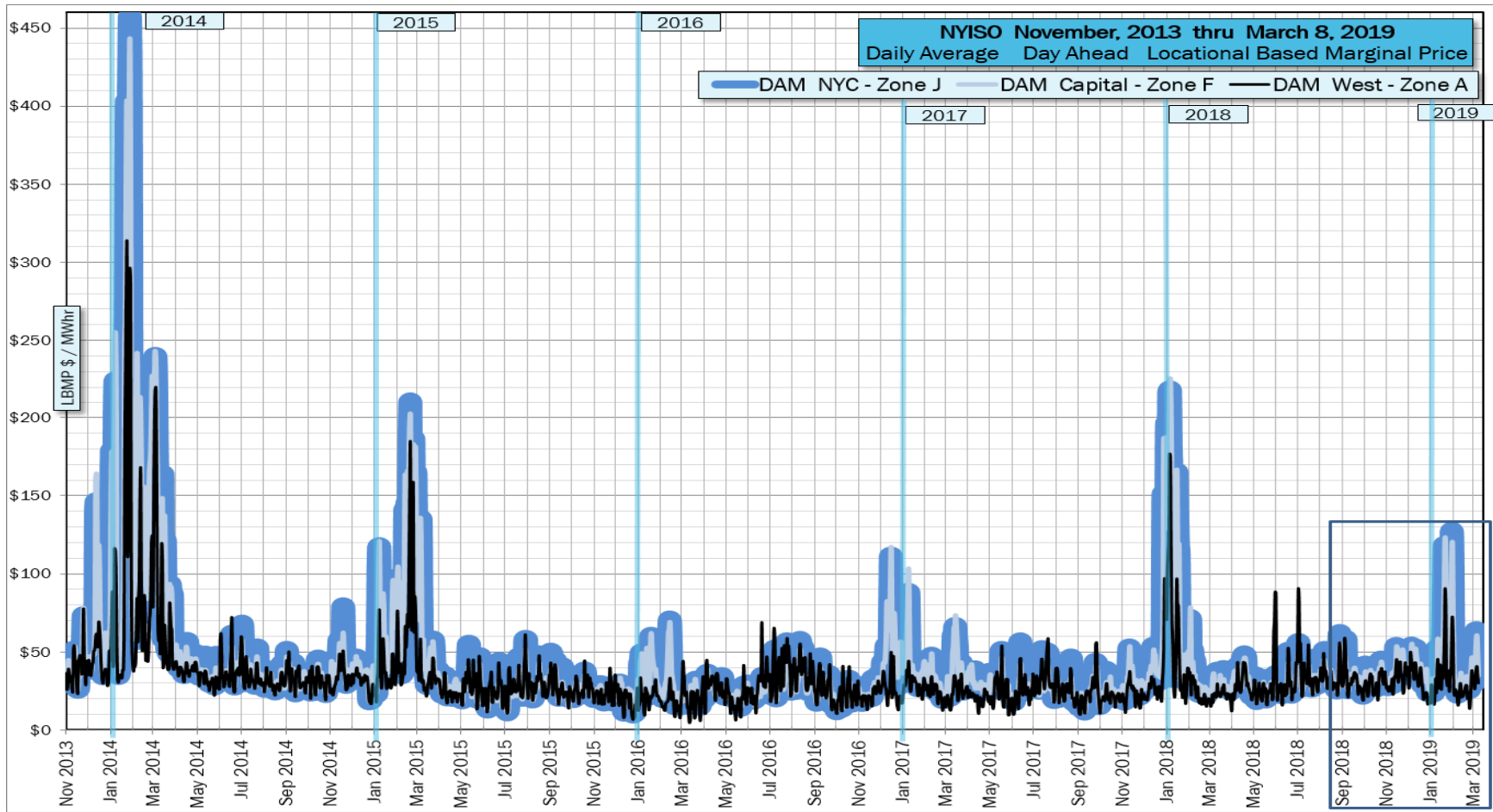




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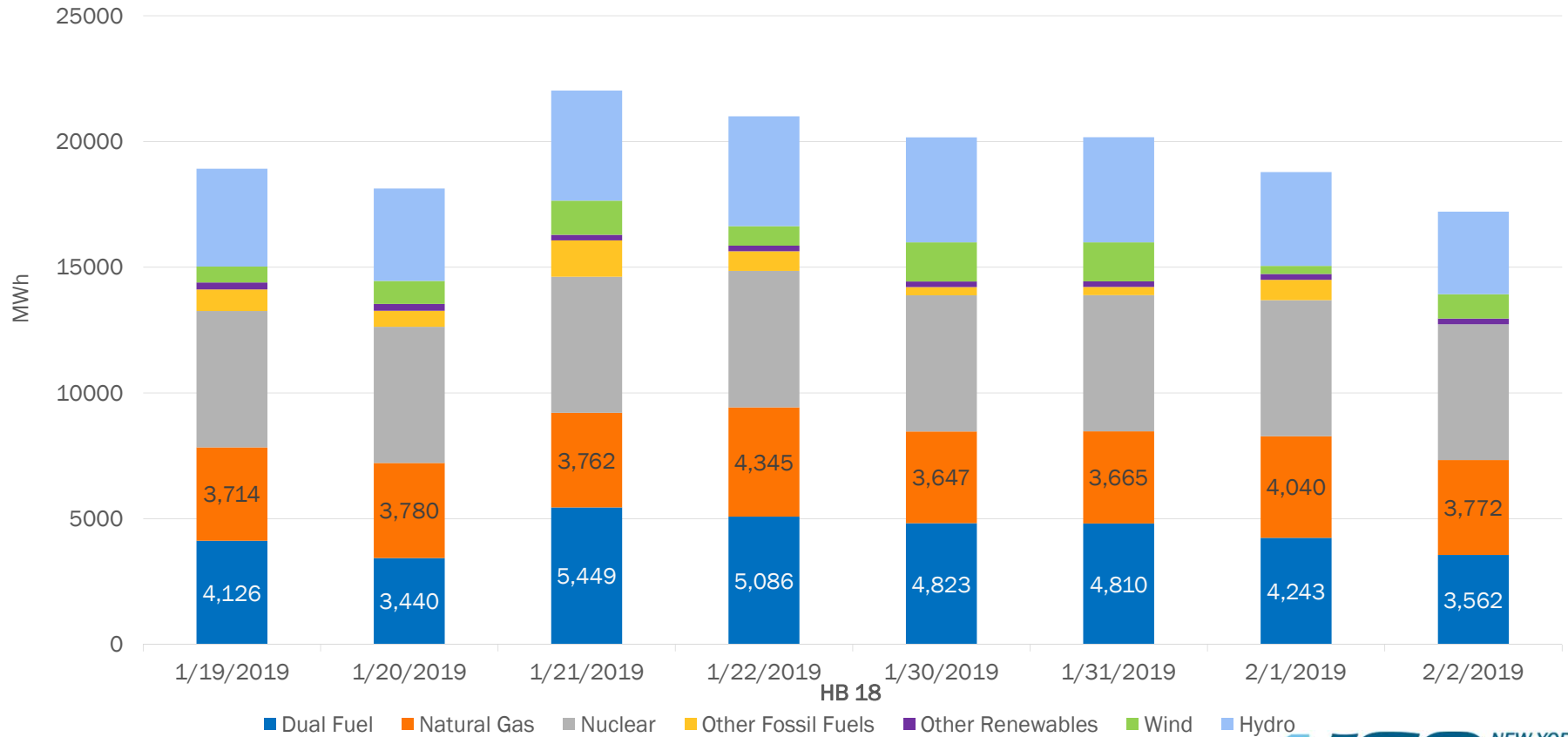
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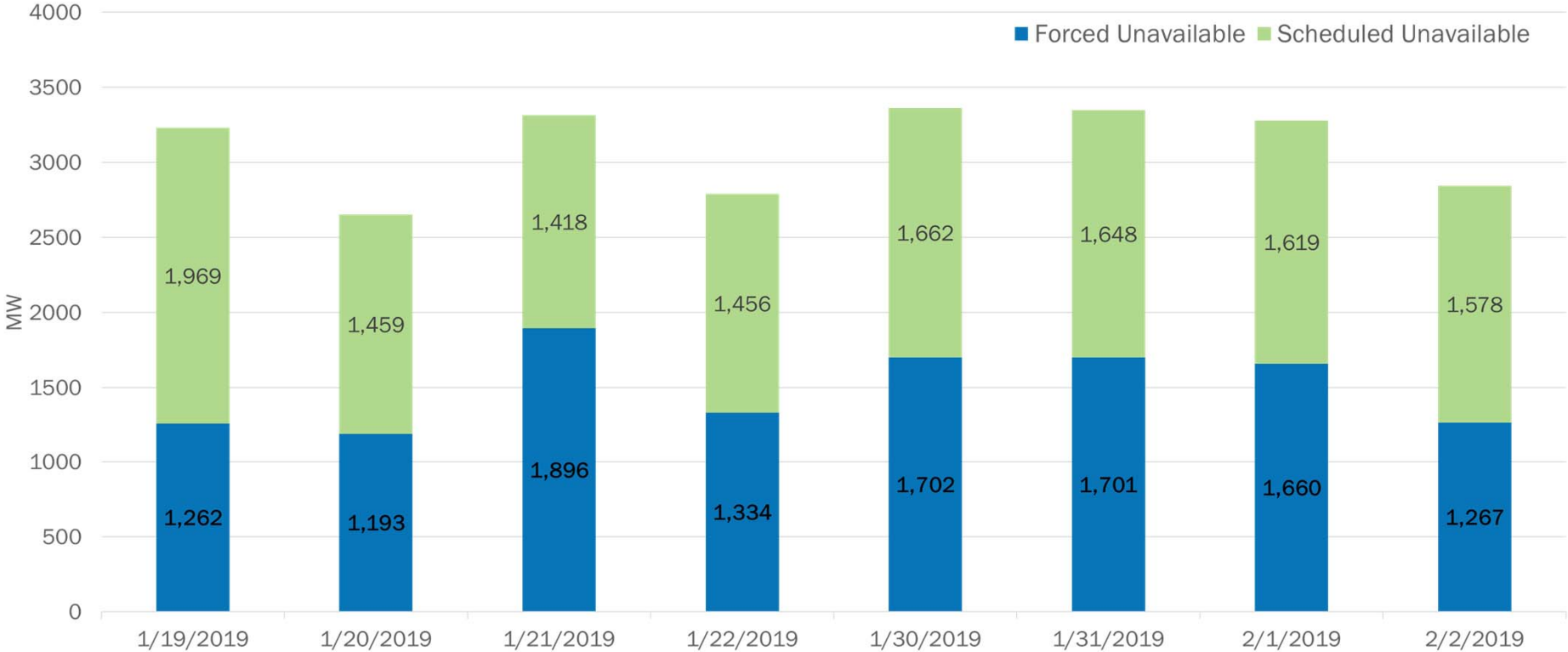


Total Actual Generation by Fuel Mix During Peak Hours



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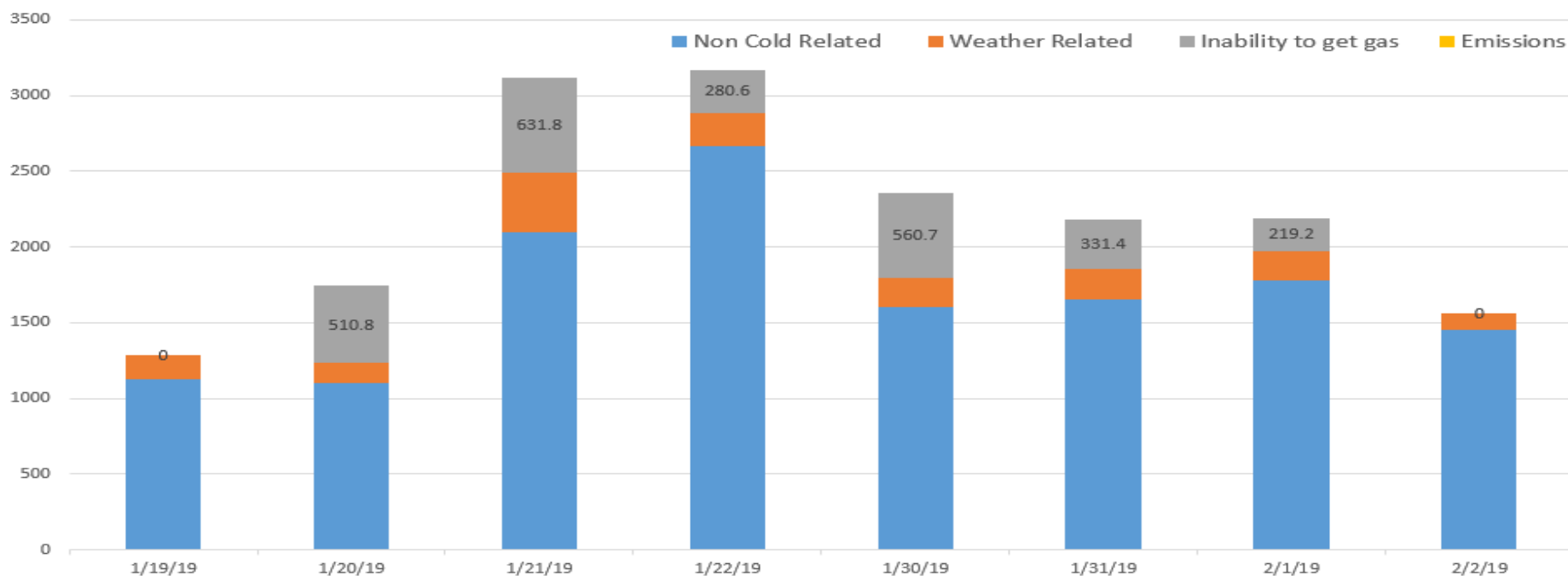
Outages by Type - Over Peak Hours



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Thermal and Hydro Forced Outages and Forced Derates by Category



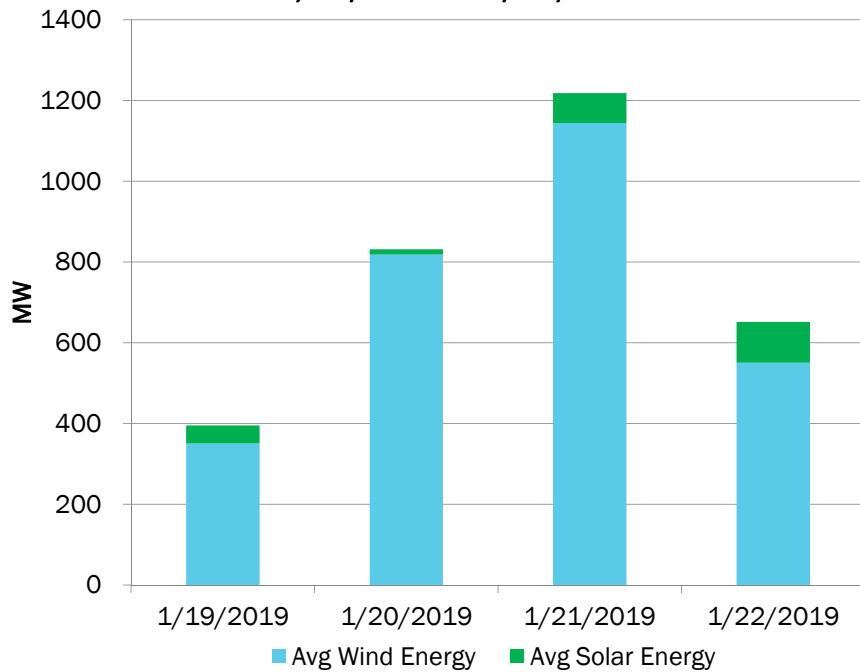
In the December 19, 2018 Management Committee presentation, "Winter 2018 Capacity Assessment Winter Preparedness" based on 60 months of history the projection was 3,287 MW of Hydro and Thermal Forced outages

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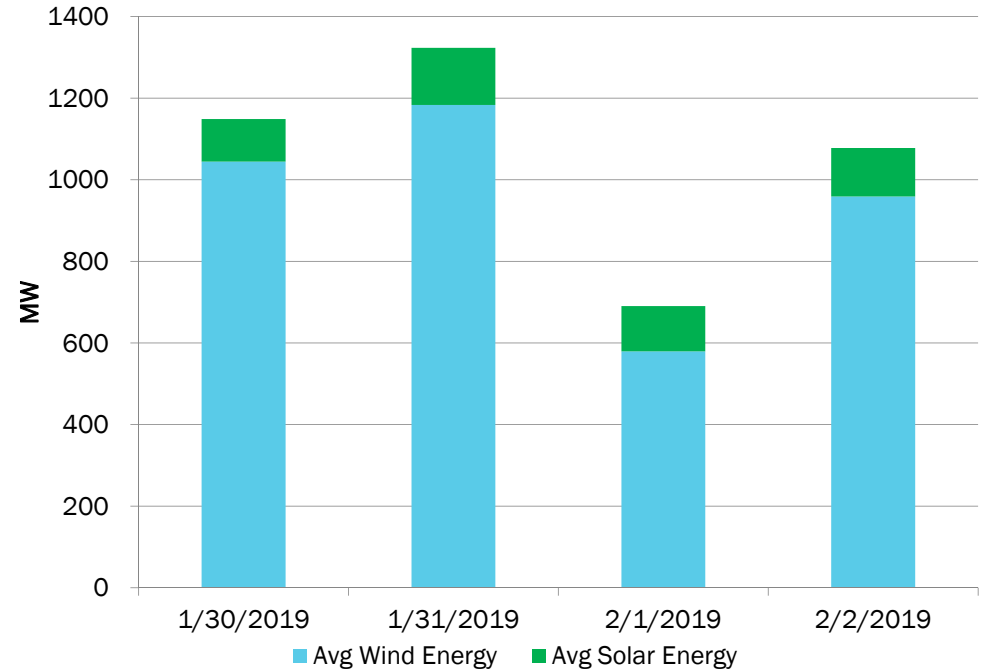


Renewable Generator Performance

Daily Wind & Solar Production
01/19/2019 - 01/22/2019



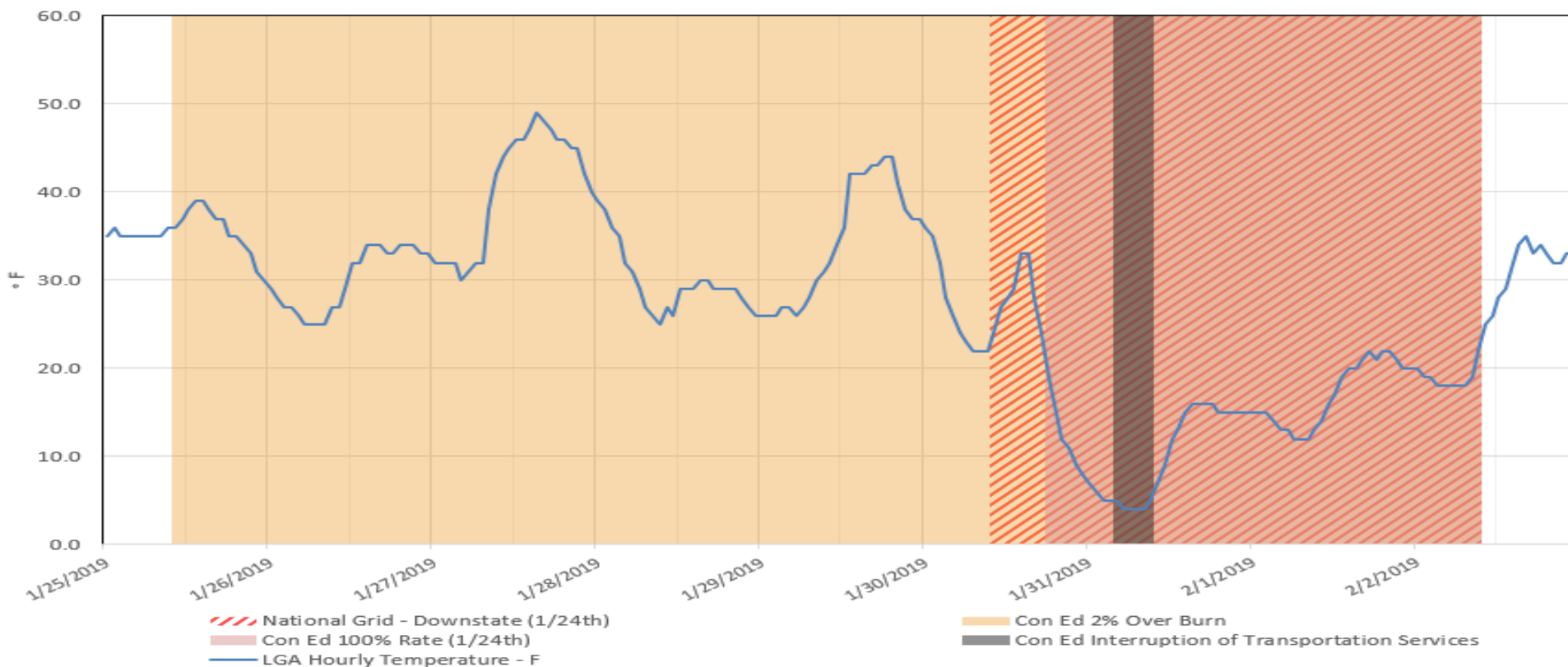
Daily Wind & Solar Production
01/30/2019 - 02/02/2019



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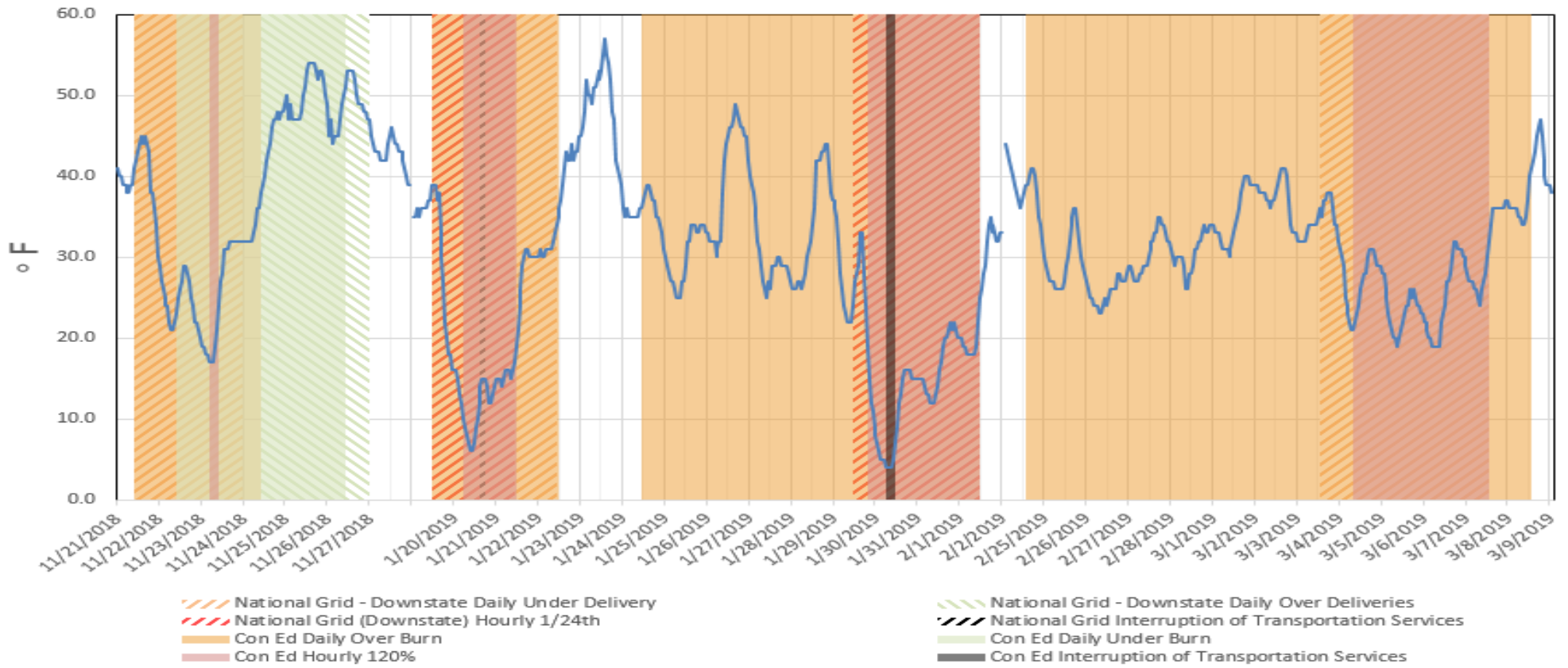
OFO conditions vs. NYC temperature



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OFO conditions vs. NYC temperature



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High Wind Event - 2/24/19 – 2/25/19

- New York experienced high winds and very high wind gusts across upstate for an extended period of time driving wind turbine cutouts.
- Wind turbine cut out band ~50-55mph (varies by manufacturer and design) and wind cut back-in speed of ~45mph.
- Not impactful on the high voltage transmission system or generation fleet (some 115kV trip and reclose & 2 trip and lockout both restored within a day)
- Per utility websites there were approximately 75,000 distribution outages

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National Weather Service Warnings

NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

WRN
WEATHER READY NATION

Significant Wind Event likely Sunday and Sunday night

Maximum Wind Gusts
Valid: 02/24/2019 10:00 AM - 02/25/2019 02:00 AM EST

National Weather Service
Buffalo New York
02/21/2019 11:26 AM EST

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Weather Forecast Office
Buffalo, NY

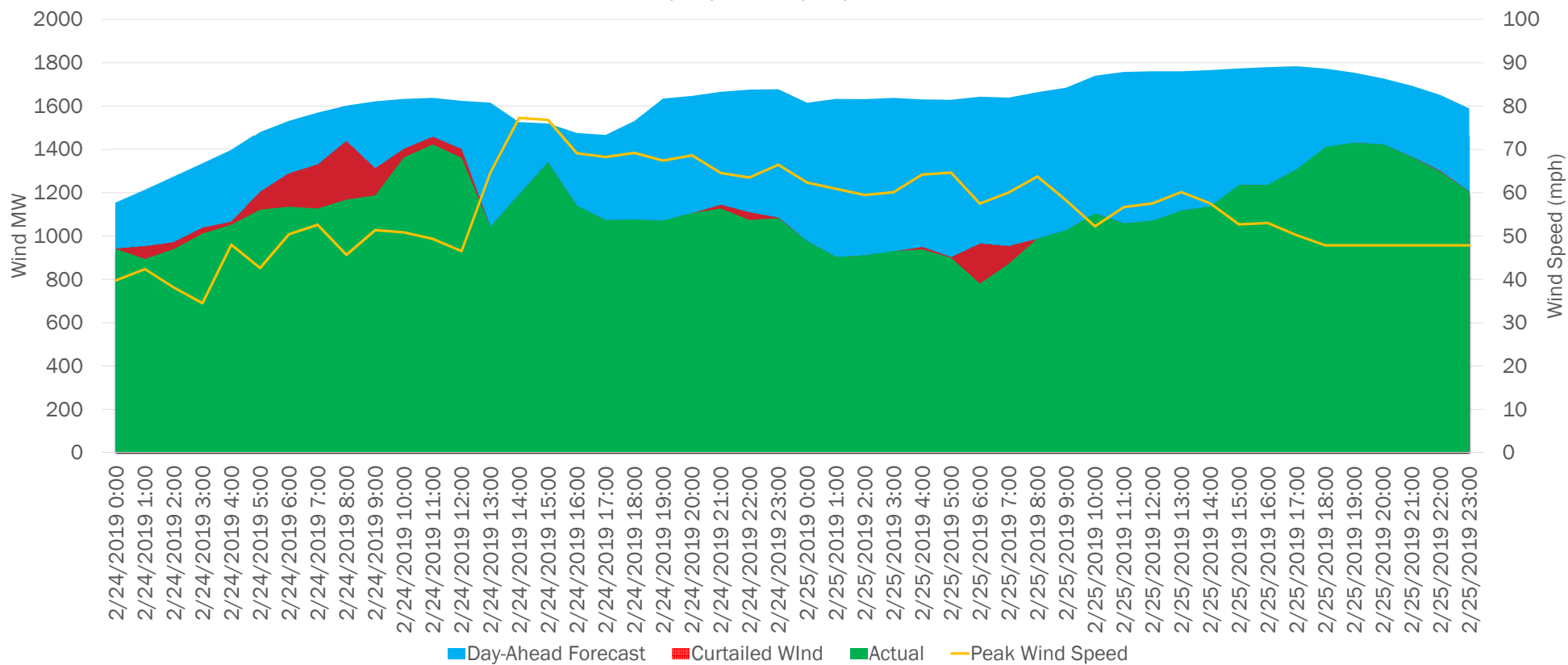
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Presentation Created
2/21/2019 2:20 PM 1

- ✓ Confidence in a significant wind event is high
- ✓ Damaging wind gusts likely throughout the region
- ✓ Strongest winds expected along the Lake Erie shoreline to Rochester and east of Lake Ontario
- ✓ Peak wind gusts to 75 mph possible from Buffalo to Rochester
- ✓ Strongest winds from late morning Sunday through Sunday night
- ✓ Widespread damage to trees and property likely
- ✓ Widespread power outages likely

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High Wind Event 2/24/2019-2/25/2019



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