New York ISO
Independent System Operator

Gas Constraints Whitepaper Update

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Agenda

- Past Discussion Recap
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Past Discussion Recap

- **During the 5/30 ICS meeting, the NYISO presented the progress of the Gas Constraint Whitepaper Research and determined several conclusions:**
  - After reviewing the GADS data and operational reports, the NYISO concluded that currently there is no issue of double counting the gas constraints in the GADS database. NYISO recommended continuing with the development of the gas constraint model and monitoring the GADS data for future changes.
  - The NYISO reviewed two modeling approaches to reflect gas constraints during winter and concluded that the availability approach is currently not feasible with the GE MARS program and could introduce significant changes to the underlying IRM database. The NYISO recommended proceeding with the modeling effort to reflect gas constraints via the form of generator unavailability.
  - The NYISO screened 4 different modeling concepts and recommended further developing the model to trigger gas constraints by load conditions through an hourly profile of a dummy generator.
  - NYISO aims to develop different hourly profiles for the triggering conditions for different LFU bins
- **While the NYISO is progressing with the gas constraint modeling development, a set of sensitivity cases were conducted with a simplified modeling approach to assess the potential impacts of implementing gas constraints**

Full background on the Gas Constraint Whitepaper is available in the Appendix

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Winter Modeling

- **In the current RA model, there is very little winter risk due to lack of accounting for winter conditions in the base case model. It is essential to improve winter modeling in the IRM study to ensure proper reflection and evaluation of winter risks**
  - NYCA is forecasted to become winter peaking by the mid-2030's and winter RA risk is expected to emerge long before that
  - The Winter Constraints sensitivities also highlighted how essential it is continue researching winter gas constraints, winter Emergency Assistance ("EA") and other winter considerations (See slide 5 for details)
- **Implementing reasonable levels of Gas Constraints in the IRM study is an important first step in enhancing the way winter conditions are reflected**
  - While the addition of gas constraints to the IRM Study is not anticipated to have imminent impacts on the LOLE or IRM, it is vital to research how to properly model them
- **Another winter modeling improvement identified that should be addressed is adjusting the load shapes to the winter peaks, as well as the summer peaks**
  - The current process aligns the load shapes to the summer peaks, but winter peaks are not aligned
  - It will be increasingly important as winter loads and risk increase and will be studied and implemented in the near term as identified in the RA Modeling Improvement Strategic Plan

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Winter Constraints Sensitivities

- At the 8/29/2023 ICS meeting, the NYISO presented the results of the Winter Constraints sensitivity cases on the 2024 – 2025 IRM Preliminary Base Case that were requested by the NYSRC

  https://www.nysrc.org/wp-content/uploads/2023/08/WinterConstraintsSensitivities_2023.08.2921424.pdf

- The results of these sensitivities showed that removing 7,000 MWs of capacity during the winter months, as in cases 7a-2 and 7b-2, will impact the IRM when combined with limiting EA
  - 7,000 MWs of capacity reduction for all hours during winter was an approximated worst-case scenario in zones F – K based on the gas availability study performed by NYISO's Market Monitoring Unit (MMU)
  - This assumption could be considered as a worst-case scenario for gas constraints to be applied to limited conditions in the model

- While the 7,000 MWs of capacity reduction may be seen as a worst-case scenario for gas constraints, the capacity reduction could capture potential risks in the winter from different perspectives, such as load variations and additional generation retirement. Therefore, the results of the sensitivity cases were valuable in assessing real reliability threats during winter seasons
  - Hence having the winter modeling developed is an important priority for improving the RA study model

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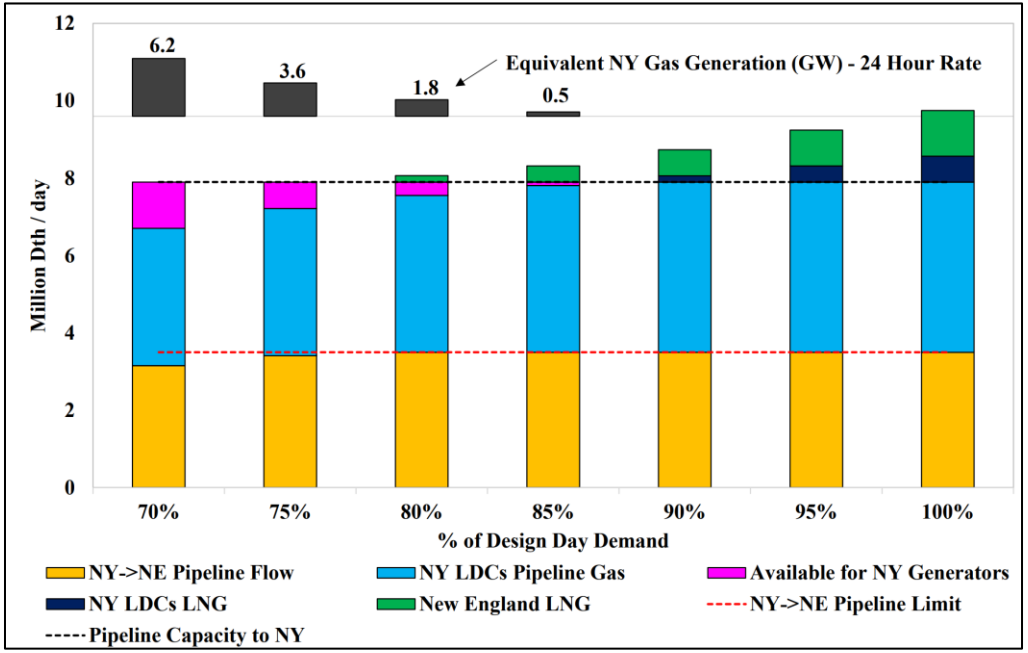
MMU Gas Availability Study

- MMU illustrated that as demand approaches 100% of design day demand, the amount of gas available for New York generators decreases, so as winter loads increase the production of gas reliant generators should decrease
- Chart Specifics:
  - Y-Axis: Millions Dth/Day of Gas sourced from pipeline/LNG
    - When there is more pipeline gas available than demand, the remainder is assumed available for NY Generators (Pink)
    - MMU translated that gas available for NY Generators into generation capability at the top of the chart (Dark Gray)
  - X-Axis: Daily Demand of Gas as a percentage of the design day demand
    - Design Day – Utilities procure firm gas to meet firm demand on a very cold day (ex. 1-in-33 years)
- Above 85% of design day demand, no pipeline gas would be available for NY Generators under this analysis



MMU Analysis of Gas Availability in Eastern New York (https://www.potomaceconomics.com/wp-content/uploads/2022/10/MMU-Gas-Availability-Presentation__20221020.pdf)

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Historical Gas Generator Production

- **The NYISO examined the historical production of the gas reliant units during high winter load hours to help determine a realistic impact of gas constraints during colder winter scenarios**
  - For this review, we started with gas-only units (as determined in the 2023 GB) to try to find a trend between load and gas production
  - Potential improvements would be to look at all gas reliant units and try to determine if similar characteristics are observed for all unit types
    - One possible category would be Dual Fuel that have not run on oil in recent years (This category can be determined using EPA data, as suggested by MMU)
- **No historical data exists for extreme winter peak load such as under 90/10 weather conditions. As winter peak loads continue to increase, the production data may demonstrate a clearer trend for gas availability during winter**

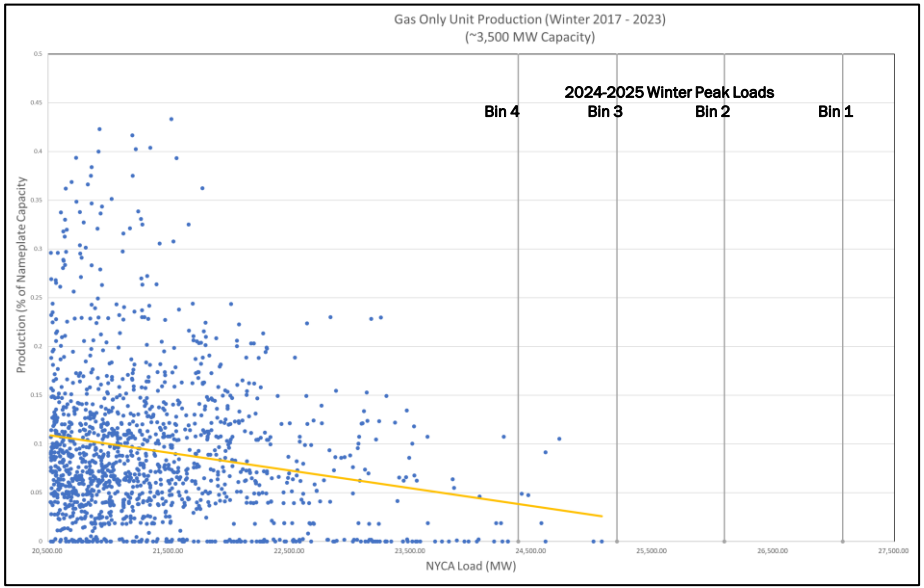

Chart depicts Historical Production of Gas-Only Units vs NYCA Load for the top 10% of load hours during the most recent 7 winters (2017 – 2023)
Linear Trendline: y = -1.82E-05 + 0.4812

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Takeaways Thus Far

- **The 7,000 MW capacity reduction modeled in the sensitivity cases represents a conservative scenario that could potentially align with Bin 1 or worse winter conditions**
  - During normal conditions, the unavailability of gas dependent units is likely lower
- **The magnitude of gas constraints is tied to winter load level, which would be a proxy for temperature. However, the exact relationship may not be directly observable through historical data, and likely is different under certain weather and gas system conditions**
  - The extrapolation approach, similar to the methodology used for the revised Emergency Assumption model, may be considered to develop assumptions for different LFU bins
    - An illustrative example using linear trendline from previous slide (assuming 23,000 MW as baseline where derate = 0%)

NYCA Load	23,000+	24,000+	25,000+	26,000+	27,000+
% Derate	0%	28%	57%	86%	100%

- **It is important to note that, the goal of the gas constraint modeling is to implement the framework. As the winter risk continues to grow and the market rules continue to evolve, the actual gas constraint assumptions will be updated to reflect the evolving system conditions.**

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Next Steps

- The NYISO will take the ICS feedback regarding Historical Production vs Load analysis and continue working to better develop gas constraint magnitude levels and load level triggers
- The NYISO will continue testing the Gas Constraint Triggered by Dummy Generator Condition modeling concept
- The NYISO will return at the November 1, 2023 ICS meeting with continued research and preliminary testing results of the preferred modeling concept for feedback
- The NYISO is on track to complete and present the whitepaper research with modeling recommendations at the November 28, 2023 ICS Meeting
    - These recommendations will be the first phase of gas constraints modeling and ongoing research and modeling improvements should continue during the upcoming IRM cycles

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Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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Questions?

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Appendix

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Background

- **As supported by the NYSRC and stakeholders, the NYISO is conducting research analyzing the impact of extreme winter conditions on gas availability to New York electric power generators**
- **The gas constraints whitepaper is part of the 5-year strategic plan for Resource Adequacy ("RA") modeling improvements**
  - The scope of this whitepaper was discussed and accepted at the 2/1/2023 ICS meeting and an update on the modeling and research was presented at the 5/30/2023 ICS meeting
    Gas Constraints Whitepaper: Scope (2/1/2023 ICS):
    https://www.nysrc.org/PDF/MeetingMaterial/ICSMeetingMaterial/ICS%20Agenda%20273/Gas%20Constraints%20Whitepaper_Scope_2023.02.01_revised[13443].pdf
    Gas Constraints Whitepaper Update (5/30/2023 ICS):
    https://www.nysrc.org/wp-content/uploads/2023/07/11_ICS_GasConstraintsWhitepaperUpdate_2023.05.30_v415826.pdf
  - A Winter Constraints sensitivity conducted relating to this modeling effort was presented at the 8/29/2023 ICS meeting
    Winter Constraints Sensitivities (8/29/2023 ICS):
    https://www.nysrc.org/wp-content/uploads/2023/08/WinterConstraintsSensitivities_2023.08.2921424.pdf
  - This effort is also being coordinated with the Capacity Market Design's Modeling Improvements for Capacity Accreditation Project (Previous discussions on next slide)
- **The objective of the whitepaper is to appropriately reflect the gas constraints during the winter period in the IRM study, via answering the following questions:**
  - What are the characteristics of winter gas constraints on the availability of electric power generators?
  - What are the reasonable levels of such gas constraints to be reflected in the IRM study while avoiding potential double counting with an electric power generator's forced outage rate?
  - What is the recommended modeling approach to represent these characteristics in the RA model?

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Previous Discussions on Capacity Market Design's Efforts

- Modeling Improvements for Capacity Accreditation: Natural Gas Constraints
- 2/28/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/36499713/Gas%20Constraints%2002_28_2023%20ICAPWG_Final.pdf/e258d867-12f9-8453-c93b-49bc94b8e803
- 4/27/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/37254128/Natural%20Gas%20Constraints%202023_04_27_Final.pdf/0821aba8-bdcd-b1ce-96f3-2d8a740e1356
- 6/1/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/37883690/Natural%20Gas%20Constraints%2006_01_2023_ICAPWG_Final.pdf/d479ea64-a0d0-86d1-388a-f93d01ff1e10
- 6/23/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/38423065/2%20Natural%20Gas%20Constraints_06_23_2023_ICAPWG_Final.pdf/177ad95e-1fa3-5c57-a626-d06182b55c9b
- 8/9/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/39257338/Natural%20Gas%20Constraints_08_09_2023%20ICAPWGv4%20(002).pdf/de6053e0-030d-5520-ed59-18f2225f0f92
- 9/20/2023 ICAPWG:
  https://www.nyiso.com/documents/20142/40085480/Natural%20Gas%20Constraints_9_20_2023_v4.pdf/8c76a250-d1e0-d30a-2c24-115f10268c65

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