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Independent System Operator

Attachment #4.1.2
Return to Agenda

Fuel Availability Constraints Modeling Phase 2

NYISO

NYSRC Executive Committee Meeting #311

March 14, 2025

Purpose of this presentation

- This presentation aims to provide the Executive Committee (EC) a high-level overview of the methodology used to develop and update initial fuel availability assumptions, as discussed at the 3/5/2025 Installed Capacity Subcommittee (ICS) meeting and solicit feedback and inputs from EC
  - Additional details provided in the Appendix

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Background: Phase 1 Whitepaper Initial Assumptions

- The Phase 1 Whitepaper outlines the following 6-tiered fuel availability assumptions triggered by daily peak load level

Tier	NYCA Load Conditions (MW)	Available Gas (MW)	Available Oil (MW)	Total Available Fuel (MW) (Gas + Oil)**	Illustrative Modeled Derate (Rounded MW)***
1	>26,000	375	11,000	11,375	8,600
2	25,000 - 26,000	750		11,750	8,225
3*	24,000 - 25,000	2,750		13,750	6,225
4*	23,000 - 24,000	4,500		15,500	4,475
5	22,000 - 23,000	5,500		16,500	3,475
6	<22,000	No Constraint			0

* Tier 3 and 4 load levels comprise the actual peak loads observed in recent winter operating conditions. The illustrative MW derates are generally consistent with the typical reduction in generator capability experienced during such operating conditions.
**Includes gas-only and dual fuel units located in Load Zones F-K.
*** "Illustrative Modeled Derate" values are calculated using the gas-only and dual fuel fleet modeled in Load Zones F-K in the 2024-2025 IRM Final Base Case (ICAP: ~21,770 MW; UCAP: ~19,975 MW)

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Methodology in Phase 1 Whitepaper

- "Available Gas" calculation
  - Use historical gas-fired production data in Load Zones F-K during the daily winter peak load hour (2017–2022)
  - Correlate the gas-fired production with the daily winter peak load to derive a regression trendline of historical gas production to develop the 6-tiered "Available Gas" assumptions
- "Available Oil" calculation
  - Use weekly winter generator fuel survey data (2018-2023)
  - Compare the reported available non-gas fuel storage (in MWh) against an energy production duration assumption of 96 hours to calculate the corresponding MW of oil capable production
  - Sum the average of the calculated MW of oil capable production for each generator across the fuel survey data points (range of 9,000 MW – 11,500 MW)

Additional details and examples were discussed with the ICS and are available in the Appendix

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Updating the Phase 1 Whitepaper Available Fuel Assumptions

- The NYISO has updated the initial available fuel assumptions recommendation for the 2026-2027 installed reserve margin (IRM) study to account for the following information:
  - Updating the energy production duration assumption, which is utilized to inform the initial "available oil" assumption, to 56 hours based on assessed reliability needs and potential winter reliability risks
    - The prior assumption was a 96-hour energy production duration assumption based on the previously proposed firm fuel duration requirement
  - Incorporating more recent winter data into the datasets used to inform the "available oil" and "available gas" assumptions
    - Historical gas-fired production data in Load Zones F-K during the daily winter peak load hour (2017 – 2025)
    - Weekly winter generator fuel survey data (2018-2025)

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Updated Fuel Availability Recommendations

- The NYISO recommends use of the following updated 6-tiered fuel availability assumptions for the 2026-2027 IRM study

Tier	NYCA Load Conditions (MW)	Available Gas (MW)	Available Oil (MW)	Total Available Fuel (MW) (Gas + Oil)**	Illustrative Modeled Derate (Rounded MW)***
1	>26,000	375	12,100	12,475	7,525
2	25,000 - 26,000	1,200		13,300	6,700
3*	24,000 - 25,000	3,100		15,200	4,800
4*	23,000 - 24,000	4,600		16,700	3,300
5	22,000 - 23,000	5,700		17,800	2,200
6	<22,000	No Constraint			0

* Tier 3 and 4 load levels comprise the actual peak loads observed in recent winter operating conditions. The illustrative MW derates are generally consistent with the typical reduction in generator capability experienced during such operating conditions.

**Includes gas-only and dual fuel units located in Load Zones F-K.

*** "Illustrative Modeled Derate" values are calculated using the gas-only and dual fuel fleet modeled in Load Zones F-K in the 2025-2026 IRM Final Base Case (ICAP: ~21,700 MW; UCAP: ~20,000 MW)

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Preliminary Impact Analysis

Case	IRM	J LCR	K LCR	G-J LCR	LOLE (Event-Days/Yr)	Summer LOLE (Event-Days/Yr)	Winter LOLE (Event-Days/Yr)	EOP Calls
IRM25-26 FBC + BTM Solar + ELM	25.20%	76.04%	108.77%	87.25%	0.100	0.100	0.000	5.79
IRM25-26 FBC + BTM Solar + ELM + Fuel Avail. Constraints	**25.50%**	**76.17%**	**108.65%**	**87.34%**	**0.100**	**0.099**	**0.001**	**6.12**
Delta	+0.30%	+0.13%	-0.12%	+0.09%	-	-0.001	+0.001	+0.33

- A Tan45 test case was performed adding the fuel availability constraints modeling construct (with the updated fuel availability assumptions) to a case consisting of the 2025-2026 IRM Final Base Case (FBC) plus the proposed behind-the-meter (BTM) solar and enhanced load modeling (ELM) improvements
- The impact analysis showed a net 0.3% increase to IRM and lesser impacts to the locational capacity requirements (LCRs) from the implementation of fuel availability constraints modeling
- With addition of the fuel availability constraints modeling, the NYISO observed the presence of winter loss of load expectation (LOLE) risk in the IRM model. But the overall LOLE is still largely driven by summer reliability risk for the 2025-2026 IRM FBC

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ICS Discussion

- At the 3/5/2024 ICS meeting, the following requests were made and the NYISO plans to follow up at the upcoming ICS and EC meetings in April 2025
  - With respect to the “available oil” assumption methodology, consider the potential impact of other production limitations (i.e., air permit limitations) on the calculated MW of oil production capability
  - Regarding the “available gas” assumption methodology
    - Consider revising the regression to reduce the impact/consideration of data points for winter peak load levels below 22,000 MW
    - Consider updating the Tier 1 assumption (i.e., 375 MW) to account for the updated Tier 2 assumption
  - NYISO operations personnel review of (and feedback on) the proposed fuel availability assumptions
  - With respect to the preliminary impact assessment
    - Investigate to better understand the IRM impact resulting from a relatively small observed increase in winter LOLE risk
    - Assess whether the Tan45 test case meets the standard error criteria
- The ICS also discussed the need to continue working on the process/methodology for future updates to the fuel availability assumptions for future IRM studies

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Questions?

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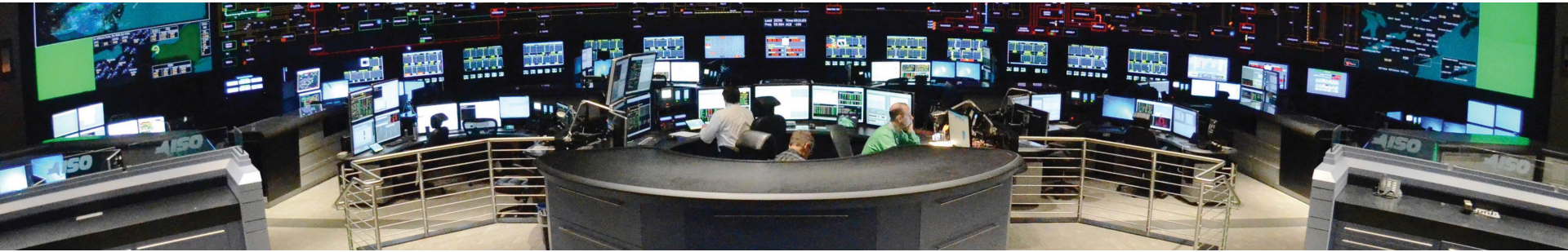
Our Mission and Vision

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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Appendix

(Slides Presented at the 3/5/2025 ICS Meeting)

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Timeline

Milestone	Date
Update Fuel Availability Assumption Recommendations	Q1 2025
Conduct Test Cases and Present Findings to ICS	Q1 2025/Early Q2 2025
Finalize Assumptions and Modeling Recommendation for 2026-2027 IRM study	Q2 2025
Implement NYSRC Approved Recommendations as part of the Preliminary Base Case for the 2026-2027 IRM study	Following NYSRC Executive Committee Review (Target End of Q2 2025)

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Updating the Available Oil Assumption

- **The 2024 Gas Constraint Whitepaper ("Phase 1 Whitepaper") established the initial assumptions for available oil level informed by generator fuel surveys against a 96-hour energy production duration assumption based on previously proposed firm fuel duration requirement**
  - Additional details on methodology for establishing the initial “available oil” and “available gas” assumptions are provided in the “Fuel Availability Assumptions” section of this presentation
- **Since the Phase 1 Whitepaper, NYISO has updated the proposed duration requirement for firm fuel to 56 hours based on the assessed reliability needs and potential winter reliability risks using the model developed as part of the 2023 Fuel and Energy Security (FES) study**
  - The 2023 FES study and associated model assessed comprehensive system risks of wintertime operations under various adverse conditions
    - The 2023 FES study is available at: https://www.nyiso.com/documents/20142/41258685/Analysis-Group-2023-Fuel-Security-Study-Final.pdf.
  - The methodology used to derive the updated duration requirement was reviewed at the November 21, 2024 ICAPWG meeting: https://www.nyiso.com/documents/20142/48151567/MICA%2011_21%20ICAPWG_v6.pdf
- **Therefore, NYISO proposes using a 56-hour energy production duration assumption to update the initial assumed level of “available oil” for purposes of the fuel availability constraints modeling developed for the IRM study.**

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“Available Oil” Calculation

- At the 2/5/2025 ICS meeting, there were requests for more information regarding how the initial value for “available oil” was determined
- The dataset used to calculate the “available oil” value proposed herein consists of weekly generator fuel surveys from recent winters (2018 – 2025, 84 surveys in total)
  - The same process described herein was used to determine the initial assumed value of “available oil” for the Phase 1 Whitepaper. However, the updated value presented herein accounts for additional recent fuel survey data and a 56-hour energy production duration assumption
- The data in the fuel surveys is submitted by generator owners and reviewed by NYISO operations personnel with generator owners as necessary for confirmation/correction
- The fuel survey responses include reporting of the amount of non-gas fuel (in MWh) that each generator has in storage
- The NYISO used the reported non-gas fuel storage quantities to calculate the quantity of capacity covered by reported oil storage (non-gas fuel) for each generator based on a 56-hour energy production duration assumption (see example calculations on the following slide)

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“Available Oil” Calculation Examples

Unit Name	Capacity (MW)	Non-Gas Fuel in MWh	# of Hours at Capacity Level	% Capacity Covered by Oil Storage	Capacity Covered by Oil Storage (MW)
Calculation	Given	Generator Submitted Data	Non-Gas Fuel in MWh / Capacity	Min (# of Hours at Capacity Level / 56, 100%)	Capacity x % Capacity Covered by Oil Storage
Unit A	100	2,800	28	50%	50
Unit B	100	10,000	100	100%	100

- The examples above outline the calculation for capacity covered by oil storage for each generator for all weekly fuel surveys which informs the initial assumed level of “available oil”
- The non-gas fuel in MWh, which is submitted by generators in each survey, is converted into the number of hours each generator could potentially perform at their capacity level based on that submitted value
- The number of hours calculated above is converted into capacity covered by oil storage using a 56-hour energy production duration assumption
  - Number of hours covered by oil storage divided by 56 is multiplied by each generator’s capacity to calculate the capacity covered by oil storage
    - The capacity covered by oil storage is capped at the generator’s capacity if the number of hours is > 56, like Unit B in the example above

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Updated Recommendation for the Initial Assumed Level of "Available Oil"

- Based on the results of the calculations described on the preceding slide, the NYISO calculated the total amount of capacity covered by reported oil storage from each weekly fuel survey
- Across all 84 surveys, the average amount of capacity covered by stored oil was approximately 12,100 MW with a range from 11,600 MW – 12,530 MW
- Based on this average, the NYISO recommends updating the assumed level of "available oil" to **12,100 MW** for the initial implementation of the fuel availability constraints modeling in the IRM study
  - The recommended increase from the 11,000 MW initial "available oil" assumption in the Phase 1 Whitepaper is primarily due to the use of a 56-hour energy production duration assumption that was derived based on the reliability risk assessment discussed on Slide 5

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“Available Gas” Calculation

- The initial 6-tiered “available gas” assumptions set forth in the Phase 1 Whitepaper were developed based on production data from dual fuel and gas-only resources in Load Zones F-K during recent winters
- Data from more recent winter months was added to the dataset and the regression analysis previously used to estimate the amount of natural gas generation capacity at various load levels was updated (see next slide)

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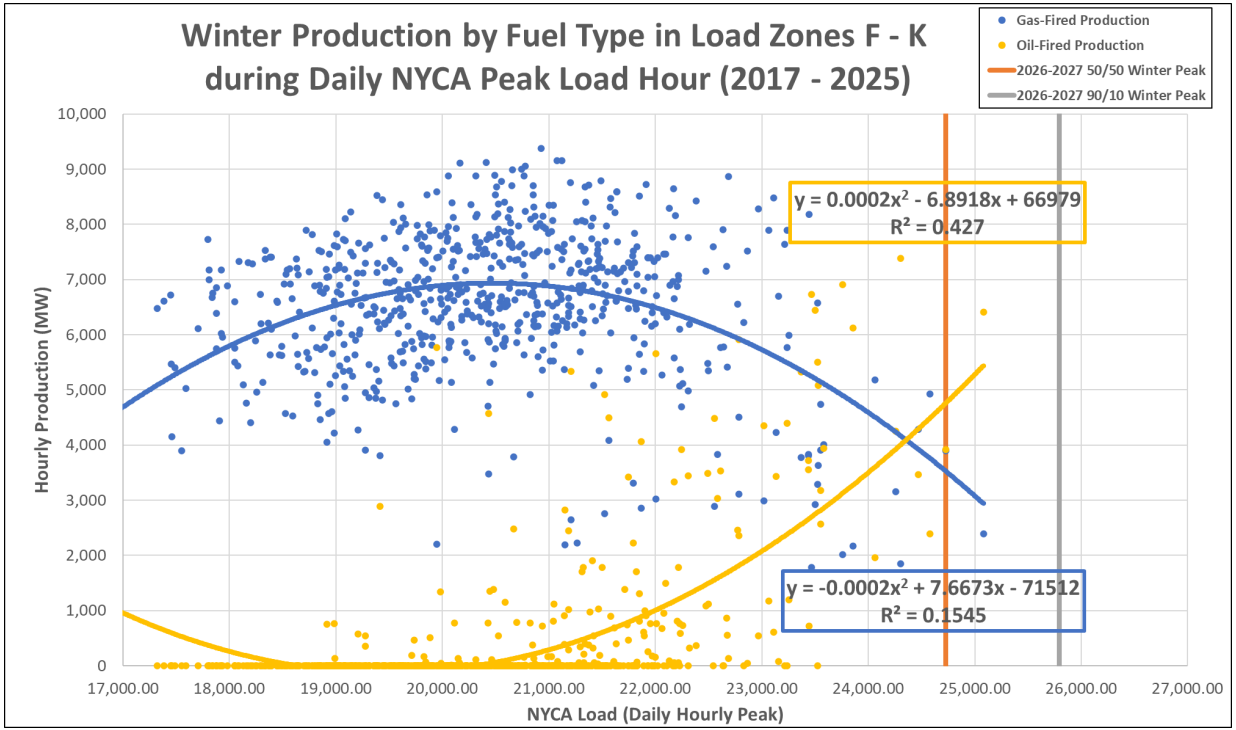
“Available Gas” Production Analysis

- The chart shows the compiled datapoints and trendlines between NYCA load and production by fuel type for gas-only and dual fuel units in Load Zones F-K during the daily peak load hour for the past several winters (2017–2025)
- This dataset and trendline were used to inform the updated recommendations for the assumed level of “available gas” recommendations set forth on the following slide



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Updated Recommendation for the Initial Assumed Levels of "Available Gas"

- Based on the updated data shown on the prior slide, the table below depicts the NYISO's recommended updates for the initial assumed levels of "available gas" to be used for the fuel availability constraints modeling:

Tier	NYCA Load Conditions (MW)	Available Gas (MW) – Updated Recommendation	Available Gas (MW) – Phase 1 Whitepaper Recommendation	Available Gas (MW) - Delta
1	>26,000	375	375	0
2	25,000 - 26,000	1,200	750	+450
3	24,000 - 25,000	3,100	2,750	+350
4	23,000 - 24,000	4,600	4,500	+100
5	22,000 - 23,000	5,700	5,500	+200
6	<22,000	No Constraint	No Constraint	0

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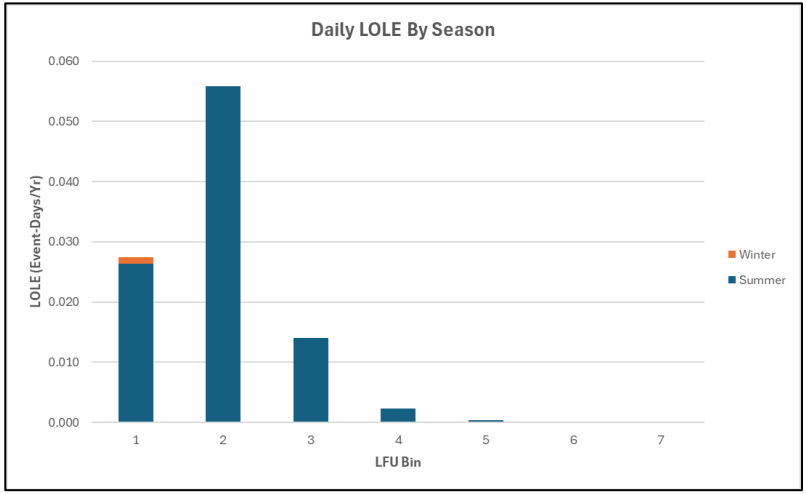
Winter LOLE Analysis

- Winter LOLE is largely driven by load forecast uncertainty (LFU) Bin 1 when load levels consistent with “Tier 1” of the fuel availability constraints modeling are most likely to occur
- The chart to the right shows the amount of LOLE by season in each LFU Bin
  - Winter LOLE only occurs in LFU Bin 1
- The chart below highlights that the driver of LOLE is the “Tier 1” load conditions of the fuel availability constraints modeling



Tier	NYCA Load Conditions (MW)	Available Gas (MW)	Available Oil (MW)	Total Available Fuel (MW) (Gas + Oil)**	Illustrative Modeled Derate (Rounded MW)***	LOLE (Event-Days/Yr)
1	>26,000	375	12,100	12,475	7,525	0.001
2	25,000 - 26,000	1,200		13,300	6,700	0.000
3	24,000 - 25,000	3,100		15,200	4,800	-
4	23,000 - 24,000	4,600		16,700	3,300	-
5	22,000 - 23,000	5,700		17,800	2,200	-
6	<22,000	No Constraint		No Constraint	0	-