2027-2028 Installed Reserve Margin (IRM) Sensitivities

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Resource Adequacy

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2027-2028 IRM Sensitivity Cases

Case	Description	IRM	IRM Change from Base
2027-2028 IRM Preliminary Base Case (PBC)	PBC Tan45 Final Results	30.8%	--
Sensitivity Case 1 (S01)	New York Control Area (NYCA) Isolated	35.3%	+4.5%
Sensitivity Case 2 (S02)	No Internal NYCA Transmission Constraints	27.7%	-3.1%
Sensitivity Case 3 (S03)	No Load Forecast Uncertainty (LFU)	24.7%	-6.1%
Sensitivity Case 4 (S04)	No Wind Capacity – All Wind Units Removed	23.1%	-7.7%
Sensitivity Case 5 (S05)	Firm Fuel Availability with Firm Fuel Characteristic Elections (Tan45)	29.5%	-1.3%
Sensitivity Case 6 (S06)	Empire and Sunrise Wind Included (Tan45)	34.0%	+3.2%
Sensitivity Case 7 (S07)	No New Generator Inclusion (Tan45)	27.6%	-3.2%
Sensitivity Case 8 (S08)	2020-2024 Thermal EFORd Data (Tan45)	29.7%	-1.1%

[1] S07 and S08 were presented with the 2027-2028 IRM PBC Tan45 Analysis at the 8/5/2026 ICS meeting: 2027-2028 IRM PBC Tan45 + LCR Results (correction) – ICS 08052026

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S01: NYCA Isolated

- **In the S01 case, the NYCA is assumed to not receive any emergency assistance (EA) from neighboring control areas.**
  - Due to modeling limitations, this sensitivity is conducted by setting the net emergency energy imports to 0 MW. As a result, EA flow may still exist over the interties with equal inbound and outbound amounts.
- **The removal of emergency assistance has an IRM impact of +4.5%.**
  - The IRM impact is slightly lower than the impact observed in the 2026-2027 IRM S01 case (+4.8%). This reduction is driven by the increase in LOLE in external control areas.
    - The 2027-2028 IRM PBC shows decreases in the maximum EA flow from IESO, HQ, and ISO-NE, and increases to summer EA from NYCA to IESO and ISO-NE.
    - Additional updates to the EA modeling assumptions in 2027-2028 IRM PBC reduced the EA import limits from PJM to NYCA downstate load zones

Results (%)	IRM (%)	J LCR (%)	K LCR (%)
S01	35.3	89.3	113.9
Delta from PBC	*+4.5*	*+3.4*	*+4.0*

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S02: No Internal Transmission Constraints

- **In the S02 case, all internal interface limits between NYCA load zones are increased to 99,999 MW.**
  - No changes are made to Unforced Deliverability Right (UDR) cable transition rates and capacity states.
- **Forward direction (from upstate to downstate, west to east) interface limits are typically not binding for upstate load zones and binding for downstate load zones.**
  - Exceptions to this trend are the forward interface limits for Marcy-South (Load Zone E to Load Zone G), which is binding, and Millwood-South (Load Zone H to Load Zone I), which is not binding.
- **Reverse direction (from downstate to upstate, east to west) interface limits are now binding between Load Zone C and Load Zone A.**
  - While the West-Central Reverse (Load Zone C to Load Zone B) interface limit has been binding in prior IRM studies, the Dysinger East Reverse (Load Zone B to Load Zone A) interface limit is now also binding due to new generation inclusions in upstate load zones.
- **Elimination of transmission constraints reduces the IRM by 3.1%.**
  - Reduced transmission constraints on the West-Central Reverse interface in the winter months from the seasonal topology update reduces risk in Load Zones A and B in the IRM PBC.

Results	IRM (%)	J LCR (%)	K LCR (%)
S02	27.7	83.5	107.1
Delta from PBC	*-3.1*	*-2.4*	*-2.8*

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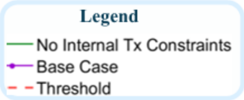
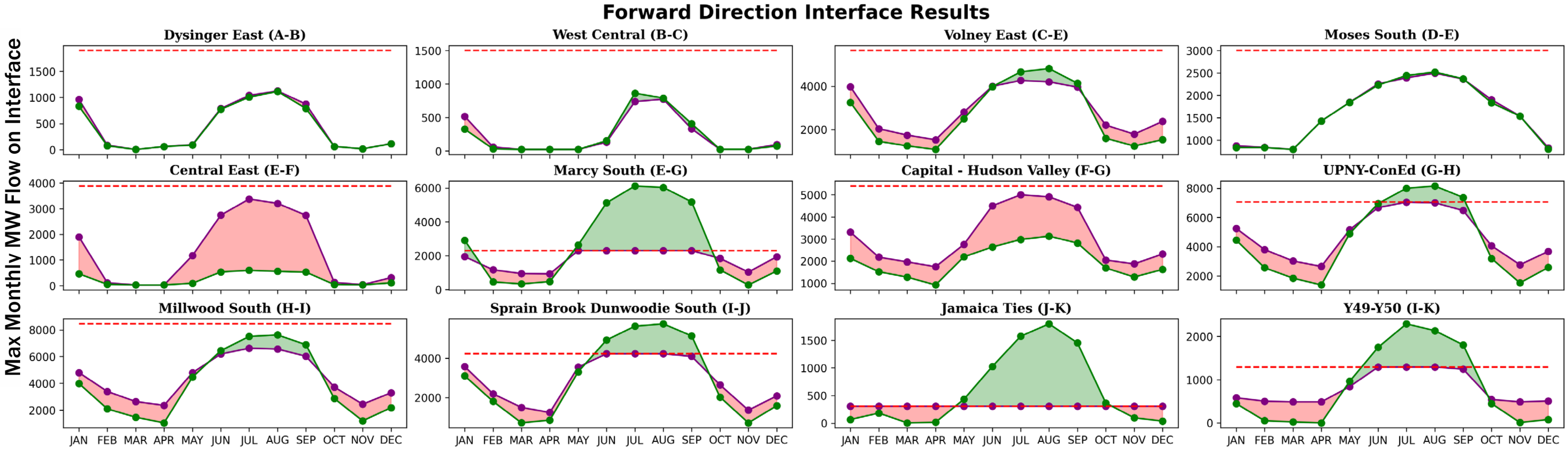
S02: Forward Interfaces

- **The Marcy South interface is the only interface identified where the maximum flow exceeds the original forward direction interface limit during the winter months. The NYISO will continue to evaluate potentially impactful interfaces for seasonal topology updates.**
  - The Marcy South, Central East, and Capital Hudson Valley interfaces show major changes in maximum reported monthly interface flows. This is attributed to path prioritization in GE MARS simulations.

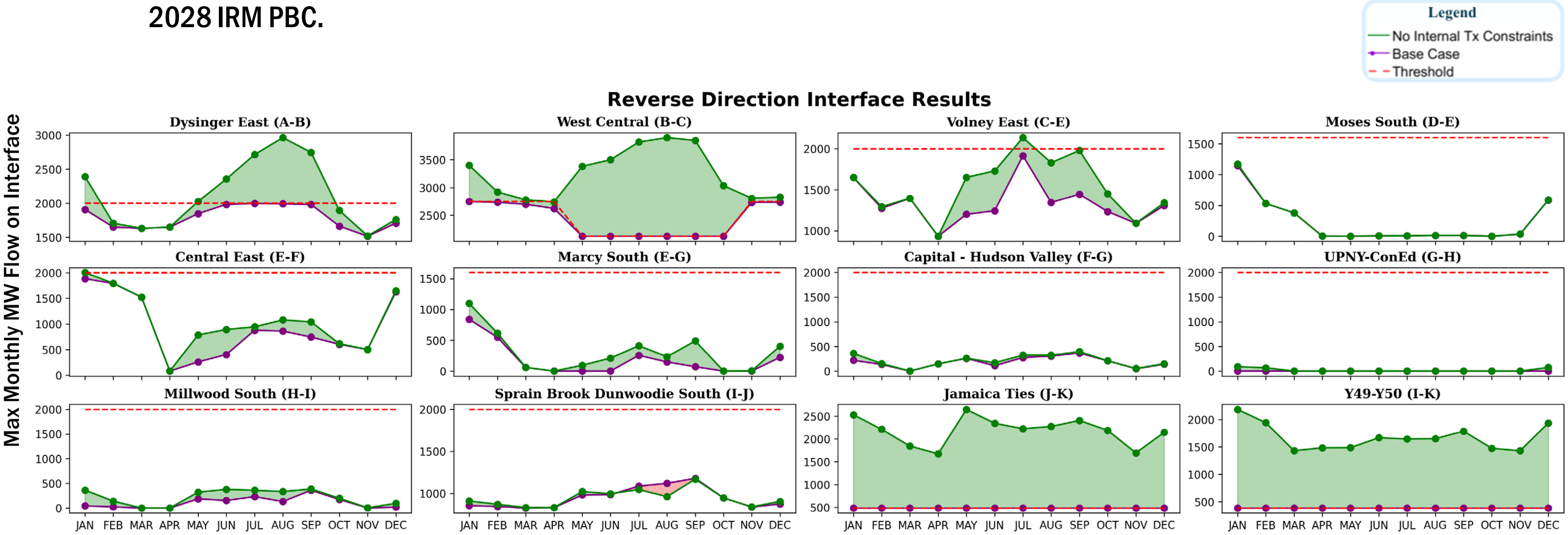




* The figures above illustrate the system conditions prior to applying capacity adjustments needed to restore the case to LOLE criteria

S02: Reverse Interfaces

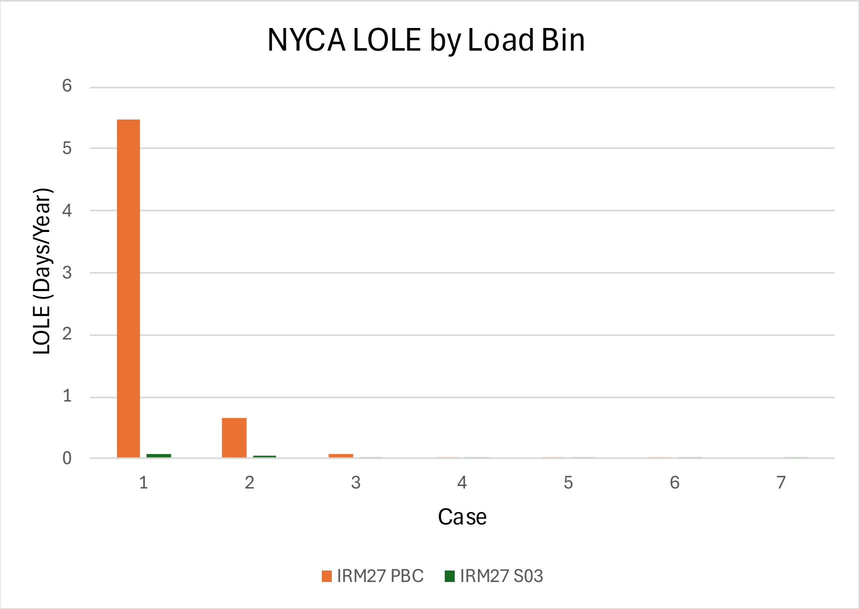
- The Dysinger East, West Central, Central East, Jamaica Ties, and Y49-Y50 Reverse interface monthly maximum flow exceeds the original interface limit during the winter months when transmission constraints are removed.
- Increases in reverse interface flow between Load Zones A, B, and C were observed relative to the prior study year. These increases are associated with the increase in generation capacity with new generation inclusions in the 2027-2028 IRM PBC.



* The figures above illustrate the system conditions prior to applying capacity adjustments needed to restore the case to LOLE criteria

S03: No LFU

- **In the IRM study, LFUs function as a multiplier on the forecasted peak load. The seven LFU bins create seven different load scenarios for each replication, from Bin 1 (high load scenarios) to Bin 7 (low load scenarios).**
- **In the S03 case, removing LFUs sets all NYCA LFU multipliers to 1.0 for the entire study period.**
  - The load multipliers in Bins 1-3 are greater than 1.0, and therefore LOLE in these LFU bins is reduced in the S03 case compared to the PBC.
  - The load multipliers in Bins 4-7 are 1.0 or less, and therefore LOLE in these LFU bins is increased in the S03 case compared to the PBC.
- **The decrease in risk for Bin 1-3 scenarios greatly outweighs the increase in risk for Bin 4-7 scenarios. The result is a 6.1% decrease in the IRM from the PBC.**
  - A reduction in winter risk is also observed.



Results	IRM (%)	J LCR (%)	K LCR (%)
S03	24.7	81.2	104.4
Delta from PBC	*-6.1*	*-4.6*	*-5.5*

* The results for S03 above illustrate the system conditions prior to applying capacity adjustments needed to restore the case to LOLE criteria

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S04: No Wind Capacity

- The S04 case models the removal of all wind generation capacity in the NYCA, comprising 132 MW off-shore wind (OSW) and 2,904 MW land-based wind (LBW).
- Due to the higher derating factors of intermittent resources, this removal decreases the zonal derating factor for NYCA and the load zones where wind capacity was removed.
  - Consistent with the 2026-2027 IRM S04 case results, removing all wind capacity in the NYCA and returning the system to criteria with perfect capacity reduces the IRM and increases winter risk.
- Removal of all wind capacity reduces the IRM by 7.7% compared to the PBC.
  - A larger impact on the IRM was observed relative to the prior study year, consistent with the increased wind capacity represented in the current PBC.

Results	IRM (%)	J LCR (%)	K LCR (%)
S04	23.1	87.1	108.8
Delta from PBC	*-7.7*	*+1.3*	*-1.1*

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S05: Firm Fuel Characteristic Elections

- **In the S05 case, the winter fuel availability is modeled for each Load Zone based on the firm fuel characteristic elections for the 2027-2028 Capability Year.**
  - Compared to the Fuel Constraint Availability Model in the PBC, S05 case models more available fuel in Tier 1 through 4 and less available fuel in Tier 5 and 6

Tier	Percentage of NYCA Baseline Winter Peak Load	27-28 IRM PBC NYCA Available ICAP (MW)*	S05 Available ICAP (MW)	Delta
1	>106.25%	13,656	17,494	3,838
2	105% +/- 1.25%	14,350		3,144
3	102.5% +/- 1.25%	15,843		1,651
4	100% +/- 1.25%	17,214		280
5	97.5% +/- 1.25%	18,389		(895)
6	<96.25%	20,726		(3,232)

* Available ICAP (MW) for each fuel constrained event tier is calculated by subtracting the unavailable MW in each Load Zone at each tier from the assumed total ICAP of thermal resources subject to fuel constraints modeling

- **Fuel availability modeled at the elected characteristic values reduces the IRM to by 1.3% and winter LOLE risk to 0.01%.**

Results	IRM (%)	J LCR (%)	K LCR (%)	Winter Risk (%)
S05	29.5	85.9	110.1	0.01
Delta from PBC	*-1.3*	*0*	*+0.3*	*-9.1*

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S06: Empire & Sunrise Wind Included

- **Empire and Sunrise OSW units are modeled using five years of simulated production profiles, consistent with the NYISO's approach for modeling intermittent resources.**
  - Production profile shapes for each unit were created using the DNV simulated data[1]. The shapes for each year are based on simulations of turbine production, including loses, and hourly wind speeds and directions.
    - Empire Wind production shapes are based on simulation data specific to New York Harbor site in the DNV dataset. Shapes used for Sunrise Wind are based on simulation data specific to the Long Island Shore site in the DNV dataset.
    - At present, the most up-to-date shapes available represent years 2020-2024.
- **Inclusion of these units in the sensitivity adds 1,740 MW of ICAP, while removing only 741 MW of ICAP to return the system to criteria. This results in a 3.2% increase in the IRM.**
  - As previously discussed for the S04 (No Wind Capacity) and S07 (No New Generator Inclusion) sensitivities, ICAP additions from intermittent resources, including OSW units, have a lower contribution to reliability than thermal units.
- **Load Zone J and Load Zone K locational requirements (LCRs) increase in the S06 case.**
  - A larger increase in the Load Zone K LCR is observed relative to the Load Zone J LCR.
    - Similar quantities of ICAP are added in each Load Zone; however, the lower peak load in Load Zone K results in a proportionally larger LCR impact.

Results	IRM (%)	J LCR (%)	K LCR (%)
S06	34.0	88.5	122.8
Delta from PBC	*+3.2*	*+2.6*	*+12.9*

[1] Offshore Wind Profile Development

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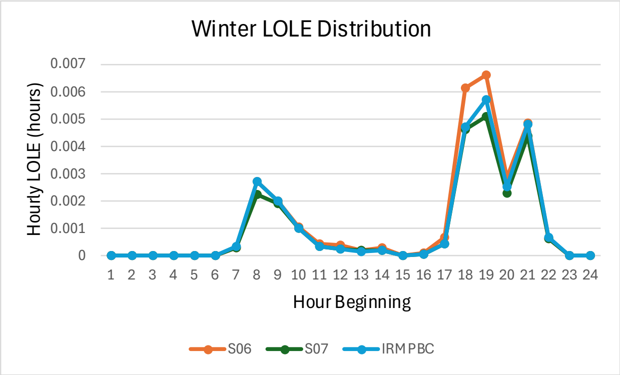
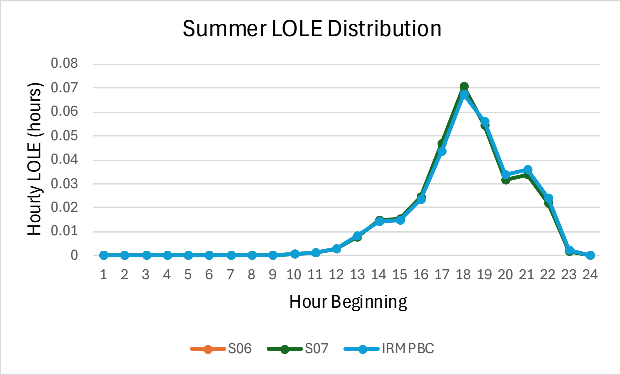
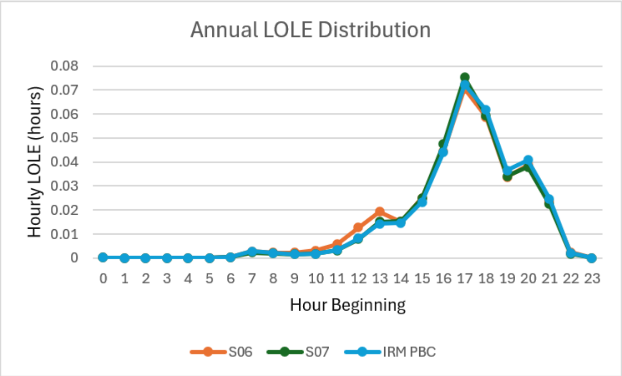
Impact of New Renewable Resources on The Hourly LOLE Distribution (S06 & S07)







- The S06 (Empire & Sunrise Wind Included) and S07 (No New Generator Inclusion) cases exhibit changes in the winter hourly LOLE distribution; however, winter LOLE remains a small component of annual LOLE, resulting in a limited impact on the annual LOLE distribution.

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Three-Year Historical Comparison (PBC, S01-S04)

Results	2025-2026		2026-2027		2027-2028	
	IRM (%)	IRM Change From Base (%)	IRM (%)	IRM Change From Base (%)	IRM (%)	IRM Change From Base (%)
IRM PBC	23.6	--	27.3	--	30.8	--
S01: NYCA Isolated	29.1	+5.5	32.1	+4.8	35.3	+4.5
S02: No Internal NYCA Tx Constraints	21.7	-1.9	25.1	-2.2	27.7	-3.1
S03: No LFU	18.5	-5.1	21.7	-5.6	24.7	-6.1
S04: No Wind Capacity	17.0	-6.6	20.5	-6.8	23.1	-7.7

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Questions?

Appendix

(Slides presented at the 8/5/2026 ICS meeting)

S07: Impact of New Generator Inclusion

Results	2027-2028 IRM PBC S07 *	2027-2028 IRM PBC Tan45	Delta
IRM	27.6%	30.8%	3.2%
Load Zone J	85.5%	85.9%	0.4%
Load Zone K	110.0%	109.9%	-0.1%
G-J Locality	89.1%	89.3%	0.3%
URM	9.4%	10.3%	0.9%

- **The 2027-2028 IRM PBC includes 1,229 MW of new generation additions, of which 1,119 MW are renewable resources located in Load Zones A and B.[A]**
  - The additions consist of 339 MW of wind in Load Zone A, 780 MW of solar in Load Zone B, 10 MW of energy storage in Load Zone C, and 100 MW of energy storage in Load Zone J.
- **Although 1,229 MW of new generation ICAP was added, only 216 MW of ICAP is removed to restore LOLE, resulting in a net increase of approximately 1,013 MW in the ICAP requirement.**
  - The new resources contribute 428 MW of UCAP. **
  - Restoring the system to 0.1 LOLE requires the removal of 177MW of perfect capacity, which translates to ~216MW of ICAP using zonal UCAP-to-ICAP translation factors.
- **The large IRM impact is consistent with observations from prior NYSRC high-renewable studies.[B]**
  - Additionally, these Tan45 sensitivity results closely resemble the new generation screening parametric results.

[A] New Generation Inclusion Screening 2027-2028 IRM PBC
*A sensitivity analysis that excludes all new generation additions assumed in the 2027–2028 IRM PBC (Sensitivity Case S07).
** This UCAP reflects applicable derating and availability assumptions and does not represent perfect capacity.
[B] High Renewables Phase 2 Results (fig. 1)

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S08: Impact of Updated Thermal EFORd Data

Results	2027-2028 IRM PBC S08	2027-2028 IRM PBC (Base Case)	Delta
IRM	29.7%	30.8%	1.1%
Load Zone J	83.6%	85.9%	2.3%
Load Zone K	108.4%	109.9%	1.5%
G-J Locality	87.7%	89.3%	1.6%
URM	9.5%	10.3%	0.8%

- **The 2027–2028 IRM PBC incorporates thermal outage rates based on thermal generator EFORd data for the years 2021–2025, replacing the 2020–2024 dataset.**
  - The 2025 data reflects a higher frequency and duration of outage events recorded that year relative to the 2020 data that was rolled off from the five-year dataset.[C]
  - The increase in forced outage hours was concentrated in Load Zones G-K.
- **To isolate the impact of the thermal outage rate update, the NYISO conducted a sensitivity analysis that excludes this year's thermal outage rate update assumptions (Sensitivity Case S08).**
  - Consistent with the 2027–2028 IRM PBC assumptions, this sensitivity uses PowerGADS as the source of thermal generator outage data.
- **The Tan45 results for Sensitivity Case S08 indicates that the thermal outage rate update results in a 1.1% increase in the IRM.**

[C] Generator Transition Rate Matrices: Impact Analysis

New York ISO

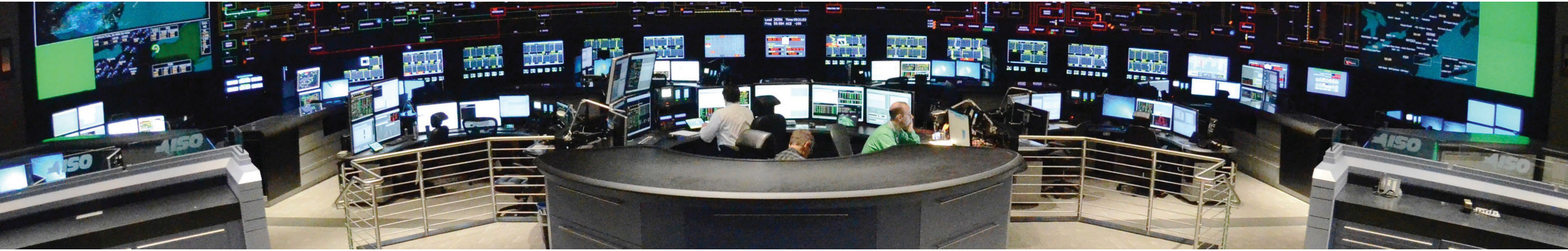
Our Mission and Vision

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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