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Independent System Operator

2027-2031 Resource Adequacy Modeling Improvements Strategic Plan

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Background

- NYISO presented the proposed 2027–2031 Resource Adequacy Modeling Improvements Strategic Plan (Strategic Plan) at the 9/29/2026 ICS meeting.[1]
- Based on feedback from ICS, the plan presented at the 10/8/2026 EC meeting was updated to include an accelerated review of seasonal resource inclusion considerations for 2027.[2]
  - The EC discussion identified an additional opportunity to coordinate the Load Shape and LFU Review with Large Load Modeling.
- This presentation provides updates addressing:
  - Seasonal Resource Inclusion: Updated 2027 scope and timeline
  - Load Shape and Large Load Modeling: Increased coordination between the two initiatives
  - Planned Transmission-Related 9300 Code Events: Consideration of whether additional evaluation should be included in the 2027 whitepaper scopes
- The broader Strategic Plan scope and timing remain unchanged except for the targeted updates described herein.

[1] 09/29/2026 ICS Presentation
[2] 10/08/2026 EC Presentation

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Updates to Seasonal Reliability Enhancements

- **Based on feedback from ICS, the Strategic Plan has been updated to include an interim step regarding consideration of seasonal resource inclusion and seasonal EFORd assumptions by year-end 2027.**
  - This interim step is dependent on prior research, and any potential enhancements would need to be assessed for alignment with subsequent seasonal capacity adjustments, reliability criteria, and the Tan45 methodology review.
- **Updated scope and timeline***
  - Q1/Q2 2027: Review seasonal LOLE, EUE, and locational risk distributions. Assess seasonal EFORd statistics and evaluate potential applications within the IRM study.
  - Q3/Q4 2027: Develop interim recommendations, if any, for seasonal resource performance and resource inclusion. Explore potential seasonal consideration in the reliability criteria or metrics and alternative IRM study treatment of resources entering service during the Capability Year. Evaluate potential implications in conjunction with seasonal resource performance assumptions.
  - Q1/Q2 2028: Based on conclusions/recommendations of the seasonal reliability and resource performance considerations, assess potential changes to capacity adjustment methodologies.
  - Q4 2028: Develop recommendations and coordinate with the Tan45 Methodology Review Whitepaper. Assess potential need for revisions to NYSRC Reliability Rules, Policy No. 5, the Tan45 methodology, or related procedures.
  - Q1/Q2 2029: Coordinate with the Tan45 Methodology Review Whitepaper and develop implementation plan for any approved enhancements.

*Updates since the 9/29/2026 ICS presentation are shown in blue

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Load Shape and LFU Review / Large Load Modeling

- **Based on feedback from EC, the NYISO proposes expanding the Load Shape and LFU Review to coordinate with the Large Load Modeling initiative. This expanded scope will include:**
  - Evaluating how forecasted large loads should be reflected in load shapes, seeking to align treatment between the load forecast and IRM model.
  - Considering appropriate LFU treatment for large loads, recognizing that LFU represents weather-driven load uncertainty.
- **Updated scope and timeline for Load Shape and LFU Review***
  - Q1/Q2 2027: Evaluate recent load duration curves and identify representative load shapes. Q3 2027: Finalize recommendation on updated load shape selection for potential base case adoption, coordinating with Large Load Modeling on load-shape and LFU treatment for large loads. Evaluate alignment of BTM solar modeling with Reliability Planning studies.
  - Q4 2027: Assess more granular locational winter LFU assumptions.
  - Q1/Q2 2028: Quantify the reliability impacts of potential BTM solar modeling and winter LFU enhancements and develop recommendations.
  - Q3/Q4 2028: Implement approved enhancements to BTM solar modeling and winter LFU assumptions, coordinating with Large Load Modeling, as applicable.

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Background on 9300 Code Events

- 9300 code events represent generator outages or derates caused by upstream transmission system issues, which are considered outside of the control of the generator. The NYISO requires that 9300 code events be submitted as forced generator outages.
- For the 2027-2028 transmission security limit (TSL) floor value determinations, the NYISO has proposed to implement a methodology to identify and remove the impact of 9300 code events deemed to be related to planned transmission outages from the five-year derating factor by cross-referencing GADS and NYISO outage record data. [3]
- Using 2023-2025 data, the proposed methodology had a small impact (in a range <0.5%) on the derating factors to be used in the 2027-2028 TSL floor value calculations.
- While the recommended methodology is consistent with the credible combination of tight system conditions within the deterministic transmission security framework, the NYISO did not recommend a similar treatment for the probabilistic Resource Adequacy model.
  - The 9300 code events deemed to be related to planned transmission outages are still considered forced outages for the impacted generators
  - Removing these events from transition-rate matrices within the Resource Adequacy model would require event-level identification and modification across the historical outage data. Incomplete or unmatched transmission-outage records could also result in inconsistent treatment across generators.
- At the 9/29/2026 ICS meeting, certain stakeholders requested consideration of whether 9300 code events related to planned transmission outages should also be excluded from the IRM study resource performance calculations.

[3] 9/8/2026 ICAPWG Presentation: TSL Considerations

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Considerations for 9300 Code Events in the IRM Study

- **The NYISO in collaboration with the ICS Chair and the NYSRC Technical Consultants, considered the following on the 9300 code events**
  - The IRM study is intended to capture uncertainty in generator availability, including the possibility that a generator may become unavailable due to an upstream transmission outage. Including the 9300 code events in generator unavailability assumptions allows for accounting of such a possibility in the probabilistic simulation.
  - Removing such outage events, in part or fully, would eliminate that risk from the generator outage history unless it is represented elsewhere in the model.
    - For example, generator planned maintenance outages are not included in the generator unavailability assumptions in the IRM model. However, the potential risk due to maintenance outages is reflected separately in the IRM as a specified assumption of MW not available during the peak load months in summer and winter.
  - The TSL floor values used in the NYISO's determination of Locational Minimum Installed Capacity Requirements represent a deterministic assessment of tight system conditions, where certain planned outages may be recallable, avoidable, or deferred based on expected system conditions.
- **Strategic Plan**
  - Based on these considerations, other 2027 modeling priorities, and available resources, and in coordination with the ICS Chair and NYSRC Technical Consultant, additional evaluation of planned transmission-related 9300 events is not proposed for inclusion in the 2027 whitepaper scopes.
  - The 2027 whitepaper efforts will remain focused on the previously identified strategic priorities.

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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 9/29/2026 ICS Meeting)

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Background

- **Since 2022, the NYISO has worked with the NYSRC to develop a 5-year Resource Adequacy (RA) Modeling Improvement Strategic Plan with the following objectives:**
  - Prioritize modeling improvement initiatives, as reflected in a 5-year plan (Strategic Plan)
  - Align the strategic priorities with other NYSRC or NYISO initiatives affecting the RA model (e.g., Extreme Weather Working Group, market design improvements, capacity accreditation, etc.)
  - Guide the whitepaper development and resource allocation for the Installed Capacity Subcommittee (ICS)
- **The Strategic Plan is revisited regularly to consider updates to priorities and timelines**
- **The NYISO aims to align the updated Strategic Plan with the latest goals of the NYSRC Executive Committee (EC)**
  - The previous 2026-2030 Strategic Plan was presented to ICS in January 2026[1]

[1] RA Modeling Improvements 2026 Strategic Plan

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Strategic Priorities for 2027-2031

- **The NYISO recommends continued assessment of winter modeling improvements to appropriately account for winter reliability risks in resource adequacy studies.**
  - Periodically review assumptions related to load modeling, generation performance, fuel availability, and system topology as electrification, the resource mix, and the transmission system evolve.
  - Consider the changing seasonal risk profile as well as relevant NYISO initiatives addressing winter reliability risks in the capacity market.
- **The NYISO recommends advancing load and resource modeling to reflect the evolving power system.**
  - Conduct a Load Shape and Load Forecast Uncertainty (LFU) Review assessing the potential for updated load shapes, behind-the-meter (BTM) solar modeling improvements, and Load Zone-specific winter LFU considerations.
  - Establish a separate Large Load Modeling initiative to assess implications for the potential development of various withdrawal service options for large loads in response to FERC's Show Cause Order related to large load matters.
  - Continue refining energy limited resource (ELR) functionality to address limitations in GE MARS and assess updates to modeling assumptions based on operational experience with emerging resource technologies.
- **The NYISO recommends continued evaluation of the Tan45 methodology and the addition of evaluating standard error enhancements to the modeling improvement plan.**
  - Evaluate whether refinements are warranted as modeling assumptions, system conditions, and reliability-risk profiles evolve.
- **The NYISO recommends continued collaboration with the Extreme Weather Working Group to improve accounting of regional weather impacts and correlated outages, as well as potential refinements to intermittent resource modeling.**
  - This initiative is expected to be led by the NYSRC and supported by the ICS and NYISO.

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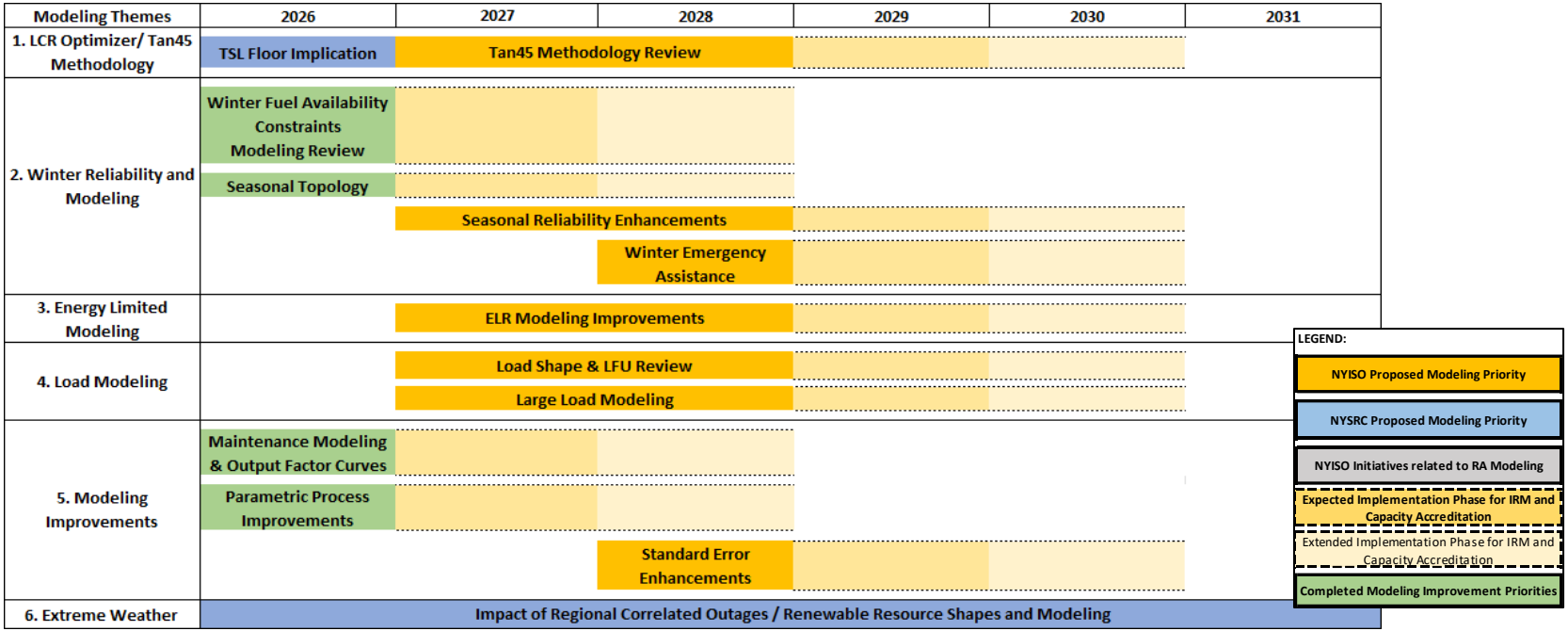
Proposed RA Model Improvements Strategic Priorities (2027-2031)



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Recommended Strategic Plan Updates

- **Expand the Load Modeling priority into two coordinated initiatives:**
  - "Load Shape and LFU Review" including the assessment of updated load shapes, updates to BTM solar modeling, and Load Zone-specific winter LFU considerations
  - "Large Load Modeling" including assessment of implications for the potential to implement various withdrawal service options for large loads in response to FERC's Show Cause Order related to large load matters
- **Advance the "Winter Fuel Availability Constraints" initiative to the implementation phase for 2027**
  - Continue updating model assumption with relevant data and evaluating the potential need for expansion of fuel availability constraints beyond Load Zones F through K
- **Defer the "Winter Emergency Assistance" initiative to 2028 pending available historical data**
- **Add the "Standard Error Enhancements" initiative beginning in 2028**

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2027 Proposed Whitepaper Backgrounds, Scopes and Timelines

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Seasonal Reliability Enhancements

- **Background**
  - Summer and winter reliability risk profiles are changing as electrification, resource performance, resource portfolio, fuel availability, and system topology evolve.
  - Seasonal derating factors have been implemented for intermittent resources, and a tool to calculate seasonal EFORd statistics is under development. These efforts support further evaluation of how seasonal resource performance affects summer and winter reliability risk.
  - The IRM study applies an annual 0.1 days/year LOLE criterion and annual capacity adjustments, warranting evaluation of whether seasonal risks are appropriately represented.
- **Objective**
  - Assess whether enhancements to seasonal resource performance modeling, capacity adjustments, and/or reliability criteria/metrics are needed to appropriately reflect changing summer and winter risk profiles and maintain effective operability/functionality of the Tan45 methodology and evolving system conditions.
- **Recommended scope and timeline**
  - Q1/Q2 2027: Review seasonal LOLE, EUE, and locational risk distributions. Assess seasonal EFORd statistics and evaluate potential applications within the IRM study.
  - Q3/Q4 2027: Explore potential seasonal consideration in the reliability criteria or metrics and alternative IRM study treatment of resources entering service during the Capability Year. Evaluate potential implications in conjunction with seasonal resource performance assumptions.
  - Q1/Q2 2028: Based on conclusions/recommendations of the seasonal reliability and resource performance considerations, assess potential changes to capacity adjustment methodologies.
  - Q4 2028: Develop recommendations and coordinate with the Tan45 Methodology Review Whitepaper. Assess potential need for revisions to NYSRC Reliability Rules, Policy No. 5, the Tan45 methodology, or related procedures.
  - Q1/Q2 2029: Coordinate with the Tan45 Methodology Review Whitepaper and develop implementation plan for any approved enhancements.

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Tan45 Methodology Review

- **Background**
  - The Tan45 Methodology Review (2024 Phase) Whitepaper demonstrated concerns with the ability of the current Tan45 process to determine an installed reserve margin (IRM) under certain future scenarios, along with challenges to the fundamentals behind the process. As a result, the whitepaper identified the need to further assess the results and evaluate potential methodology improvements
  - The IRM/Load Zone K LCR curve of the 2026-2027 IRM Preliminary Base Case exhibited a steep curve and warrants further investigation
- **Objective**
  - Collaborate closely with NYSRC technical consultant and working groups to define the study scope and identify potential enhancements to the current Tan45 methodology for determination of the IRM along with any potential revisions necessary for NYSRC Policy 5
- **Recommended scope and timeline**
  - Q1/Q2 2027: Work with the NYSRC to define the scope of work, review prior Tan45 assessments, and identify key areas for further evaluation.
  - Q3/Q4 2027: Work with the NYSRC to identify and explore potential enhancements to the Tan45 methodology and IRM determination process.
  - Q1/Q2 2028: Coordinate with the Seasonal Reliability Enhancements Whitepaper to assess implications of seasonal capacity adjustments, reliability criteria, and related modeling enhancements.
  - Q3/Q4 2028: Develop recommendations and assess whether revisions to the Tan45 methodology or NYSRC Policy No. 5 are warranted.
  - Q1/Q2 2029: Coordinate with the Seasonal Reliability Enhancement Whitepaper and develop implementation plan for any approved enhancements

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Load Shape and LFU Review (LFU Phase 4)

- **Background**
  - Current IRM and Reliability Planning studies use historical load shapes from 2013, 2017, and 2018, based on the LFU Phase 2 review.
  - In the IRM study, BTM solar is modeled through random selection from the five most recent annual BTM solar shapes. This selection is not correlated with the historical load shapes and may overstate BTM solar variability on peak load days.
  - Winter LFU is currently specified at the NYCA level and does not differentiate assumptions by Load Zone. This warrants review as winter reliability risk and regional differences in winter load behavior continue to evolve.
- **Objective**
  - In collaboration with NYISO Planning and Demand Forecasting and Analysis teams, evaluate potential enhancements to load shape selection, BTM solar modeling, and winter LFU assumptions to better represent load and BTM solar behavior.
- **Recommended scope and timeline**
  - Q1/Q2 2027: Evaluate recent load duration curves and identify representative load shapes.
  - Q3 2027: Finalize recommendation on updated load shape selection for potential base case adoption. Evaluate alignment of BTM solar modeling with Reliability Planning studies.
  - Q4 2027: Assess more granular locational winter LFU assumptions.
  - Q1/Q2 2028: Quantify the reliability impacts of potential BTM solar modeling and winter LFU enhancements and develop recommendations.
  - Q3/Q4 2028: Implement approved enhancements to BTM solar modeling and winter LFU assumptions.

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Large Load Modeling

- **Background**
  - In response to the FERC Show Cause Order related to large load matters, the NYISO is developing planning and market rules for integrating Large Loads which include the potential for implementing various types of withdrawal service for large loads.[2]
    - For example, as of the date of this presentation, the NYISO is currently contemplating the following potential withdrawal service options for large loads:
      - Large loads taking firm withdrawal service do not cause/have chosen to resolve any and all Transmission Security or Resource Adequacy issues identified by the proposed Large Load Integration Procedures and are assigned a capacity purchase requirement
      - Large loads taking non-firm withdrawal service are not assigned a capacity purchase requirement and would be subject to mandatory curtailment before deployment of emergency operating procedures.
      - Zero withdrawal service applies to a load that is served entirely by co-located, behind-the-meter generation either because it physically cannot or does not desire to take grid-tied withdrawals for service
      - A large load may qualify to simultaneously take multiple types of withdrawal service
- **Objective**
  - In collaboration with NYISO Planning, Market Design, and Demand Forecasting and Analysis, assess whether the treatment of large loads requires additional consideration in the IRM study.
- **Recommended scope and timeline**
  - Q1 2027: Review the most recent large load framework and identify implications for resource adequacy modeling.
  - Q2 2027: Evaluate the treatment of large loads and co-located suppliers in the load forecast and study models.
  - Q3 2027: Assess modeling alternatives, including explicit flexible-load modeling, emergency operating procedure treatment, fixed derates, updated load shapes, and/or sensitivity cases.
  - Q4 2027: Quantify reliability impacts and develop recommendations, subject to ongoing regulatory and market rule development.
  - Q2/Q3 2028: Implement approved modeling enhancements, subject to regulatory approval and market rule implementation.

[2] 9/22/2026 ICAPWG Presentation: Large Load

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ELR Modeling Improvements

- **Background**
  - Currently, ELRs are utilized by GE MARS “as-needed” when loss of load events occur without consideration of future shortage hours or the potential to hold energy for more critical intervals. Therefore, the current utilization of ELRs could lead to sub-optimal outcomes with the potential to distort the resulting system LOLE.
- **Objective**
  - In collaboration with the NYISO Planning department and GE, seek to refine modeling of Energy Limited Resources and Energy Storage Resources in the IRM study model to better capture parameters such as round-trip efficiency, monthly/annual energy limits, and seasonal limitations on energy, as well as assessing potential refinements to start time and optimal utilization using current GE MARS logic.
- **Potential scope and timeline:**
  - Q1 2027: Provide overview of current GE MARS ELR/ES modeling and potential parameters to evaluate for updates/improvements. Develop exploratory high ELR future system conditions to use in conducting analysis
  - Q2 2027: Identify potential improvements to IRM study modeling within the current GE MARS framework and assess impacts
  - Q3/Q4 2027: Evaluate and implement interim modeling enhancements
  - Q1/Q2 2028: Continue collaboration with GE to assess GE MARS framework enhancements
  - Q4 2028: Develop recommendations and finalize the whitepaper

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2028 Proposed Project Backgrounds

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Standard Error Enhancements

- **Recent IRM studies have exhibited elevated standard error levels.**
  - In 2026, NYSRC Policy No. 5 was revised to increase the acceptable standard error threshold from 0.025 to 0.05.[3] This revision is designed to mitigate near-term concerns regarding study convergence as the resource mix and load characteristics evolve.
  - The NYISO recommends allowing additional experience to be gained under the revised threshold before evaluating whether further enhancements are warranted.
- **The purpose of this effort is to assess whether additional reporting metrics, convergence criteria, and/or methodological enhancements should be considered to support confidence in future IRM study results.**
  - Evaluate current standard error reporting and convergence practices.
  - Explore alternative metrics that may provide additional insight into study convergence and result quality.

[3] Policy 5 Revision 20 as approved by the NYSRC Executive Committee on 07/17/2026.
https://www.nysrc.org/wp-content/uploads/2026/07/4.1.10-NYSRC-Draft-Policy-5-20-Draft-2026-07012026-Clean-and-Redline-Attachment-4.1.10.pdf

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Additional Topics to Monitor

- **Reliability Attribute-Based Capacity Pricing for Transmission Security**
  - The NYISO is pursuing a 2027 market design project to evaluate mechanisms for explicitly valuing transmission security within the capacity market framework. Potential outcomes may affect the relationship between resource adequacy and transmission security assessments and should be monitored as the work develops.
- **Daylight Saving Time**
  - Ongoing consideration of potential changes to Daylight Saving Time requirements could affect the development and application of load shapes, intermittent resource production profiles, behind-the-meter solar modeling, and other time-series inputs used in resource adequacy studies.
  - Monitor legislative/regulatory developments and assess whether any modeling or procedural updates would be warranted if changes are adopted.

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