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Independent System Operator

NYISO Resource Adequacy Modeling Improvements *Strategic Plan (2025-2029)*

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NYISO

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Background

- **In 2022, the NYISO worked with the NYSRC to develop a 5-year Resource Adequacy (RA) Modeling Improvement Strategic Plan with the following objectives:**
  1. Prioritize modeling improvement initiatives(Strategic Plan)
  2. Align the strategic priorities with other NYSRC or NYISO initiatives affecting the RA model (e.g., Extreme Weather Working Group, capacity accreditation, etc.)
  3. Guide the whitepaper development and resource allocation for the Installed Capacity Subcommittee (ICS)
- **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**

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2024 Whitepaper and Study Efforts

SCR Modeling

- Modeling improvements to reflect Special Case Resources (SCRs) as energy limited resources (ELRs) with hourly response rates
- Adopted in 2025-2026 IRM Preliminary Base Case

DER Modeling

- Distributed Energy Resource (DER) participation model implemented in NYISO markets on April 16, 2024
- Modeling recommendations accepted by the ICS in Q2 2024

Gas Constraints Whitepaper

- Fuel availability constraints modeling triggered by load level in peak winter months
- Whitepaper completed Q2 2024
- Expected implementation of fuel constraints modeling in the 2026-2027 IRM model

BTM Solar and Load Modeling

- Behind-the-Meter (BTM) solar modeled as a supply resource
- Researched alternative load shape adjustment methodology to match energy forecast and winter peak scaling as a complementary component of modeling BTM solar as a supply resource
- Sensitivity conducted on 2025-2026 IRM Preliminary Base Case

Tan45 Methodology

- Developed high renewables and future transmission expansion sensitivities to assess Tan45 outcomes under a variety of potential future system conditions
- Initial research determined that the existing shifting methodology may fail under certain assumed future scenarios
- Continue research into potential methodology improvements in 2025

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Strategic Priorities

- **The NYISO recommends continued review of the IRM establishment methodology together with the locational capacity requirement (LCR)/transmission security limit (TSL) enhancements to facilitate consistent and clear signals of resource needs and reliability**
  - The assessment of future system scenarios has identified potential challenges for the operation of the current Tan45 methodology for the evolving grid with major changes in topology, penetration of offshore wind, and the location of new entries
  - Comprehensive methodology review to ensure the IRM and LCRs consistently satisfy reliability criteria for both resource adequacy and transmission security
    - Requires continued coordination and collaboration between the NYISO and NYSRC
- **The NYISO considers improved winter modeling will continue to be a major priority for RA modeling improvements to facilitate proper accounting of winter risks in meeting the reliability criteria**
  - Continues review of assumptions as electrification unfolds, to reflect changes in load modeling, generation performance, fuel availability, and system topology
  - Consider changing system risk profiles as winter loss of load expectation (LOLE) increases relative to summer, as well implications of the NYISO's ongoing initiative to enhance consideration of winter reliability risks in its capacity market
- **The NYISO recommends continued evaluation of load and ELR modeling improvements to properly reflect the changing characteristics of the power system and resource fleet**
  - Continue development of load modeling improvements to support winter modeling, and to capture future load characteristics
  - Continue refining the ELR functionality to mitigate adverse impacts of the limitations in the GE Multi-Area Reliability Simulation (MARS) model, and continual refinement of assumptions based on operational experience with respect to energy storage resources (ESRs), hybrid storage resources, DER, and other new flexible resource technologies
- **The NYISO recommends continued collaboration with the Extreme Weather Working Group to improve accounting of regional weather impacts and correlated outages**
  - This initiative is expected to be led by the NYSRC and supported by the ICS and NYISO

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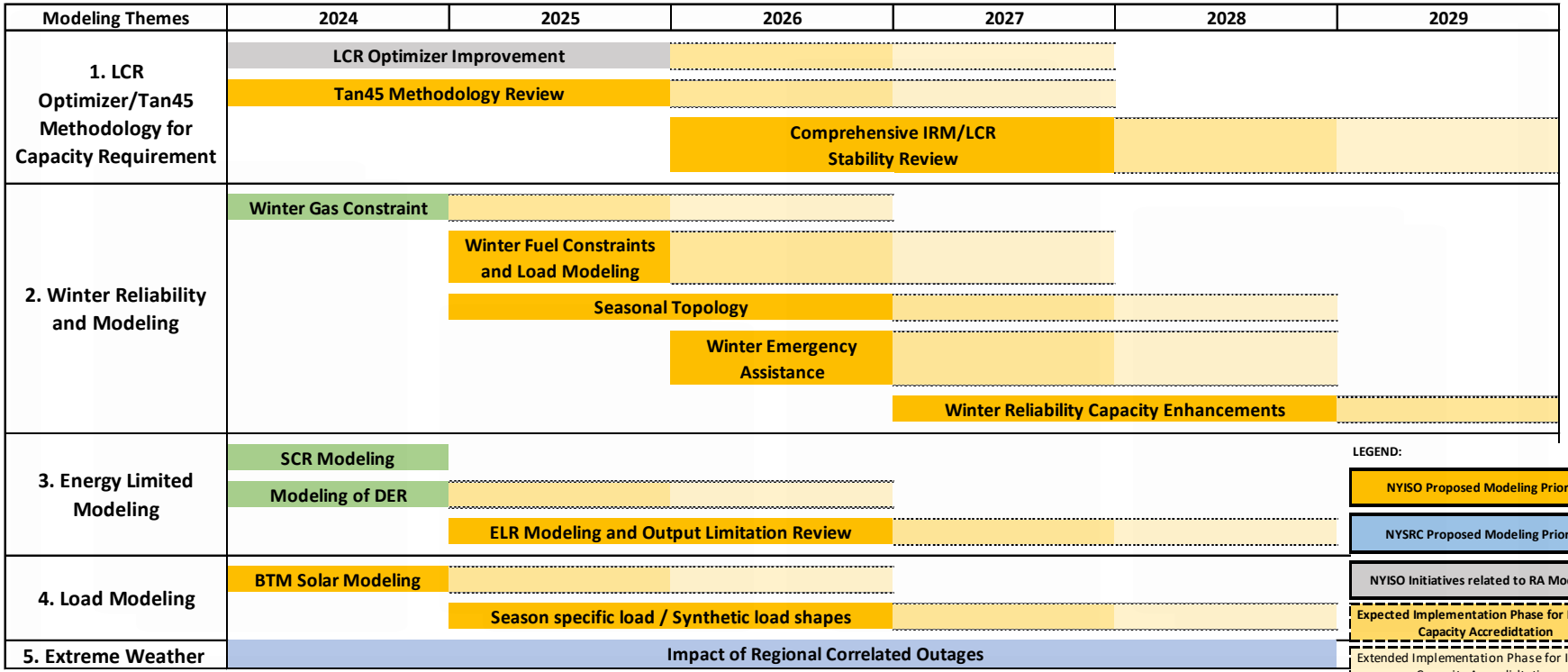
The RA Model Improvements Strategic Priorities (2024-2029)



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Recommended Near-Term Project Plan (2025-2026)

- **Tan45 Methodology Review**
  - Identify potential enhancements for the anchor method for annual IRM study to address potential challenges presented by the evolving grid, including identification of any Policy-5 implications
  - Account for transmission security needs in addition to resource adequacy criteria in establishing Installed Capacity requirements
- **Winter Modeling Improvements (fuel constraints, load, and topology)**
  - Implement the fuel availability constraints model and improved winter load modeling (recommended 2025 priority)
  - Research seasonal topology modeling, additional generation, and EA assumptions improvement in future years
  - Consider potential reliability criteria evolution with increased winter LOLE risk
- **ELR Modeling and Output Limitation Review**
  - Evaluate the current battery charging logic in MARS to identify concerns and potential improvements/alternatives
  - Identify alternative options for output window limitations for ELRs, relating to assumed start times and duration considerations
  - Reflect that risk distribution will change as the system evolves, and account for the increasing reliance on energy limited resources
- **Potential 2026 projects and initial whitepaper scopes to be confirmed with ICS at the end of 2025**
  - Coordinate with ongoing NYISO initiatives to assess winter reliability risk in its capacity market (e.g., seasonal considerations for LOLE/risk distribution as winter risk increases relative to summer, capacity requirements in different seasons, winter-specific Equivalent Forced Outage Rate on Demand [EFORd] values)
  - Assess use of synthetic load shapes and winter topology modeling
  - Review resource adequacy metrics as risk duration/profile changes
  - Refine fuel availability refinements constraint modeling, and seasonal renewable output profiles

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Potential Focus for 2026-2028

- **Theme 1: Continue the comprehensive review of Tan45 and LCR processes**
  - Implement improvements to the Tan45 and LCR methodologies, including processes for better capturing the uncertainties of large entry and exit
  - Comprehensively review any enhancements implemented to Tan45 and LCR methodologies to assess ongoing stability/predictability of IRM and LCRs
- **Theme 2: Continue to assess winter reliability and refine assumptions during winter season**
  - Assess winter reliability risks and winter topology/modeling limits
- **Theme 3: Continue the modeling improvement for ELRs, particularly the modeling for ESRs, hybrid storage resources, DERs, and SCRs**
  - Explore alternative software solutions to address implications of significant ELRs, including storage and hybrid storage resources
- **Theme 4: Continue assessment and potential adoption of synthetic load shapes**
- **Additional items for consideration:**
  - Modeling of extreme weather event modeling and development of additional reliability standards to address risks presented by the evolving system and resource mix

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Next Steps

- **Subject to ICS feedback/acceptance, present the updated Strategic Plan and the near-term project plan to NYSRC Executive Committee**
- **Work with ICS to prioritize 2025 whitepapers and finalize the detailed scopes and timelines for the whitepapers**
  - The prioritization would consider the updated Strategic Plan and near-term projects
  - Additional whitepapers on topics other than RA modeling improvements (e.g., comprehensive review of Policy 5) would be considered and prioritized by the NYSRC and its consultants
- **Continual review and refinement of the Strategic Plan**
  - Allow for modifications to the staging of the modeling improvements and new strategic priorities to be added based on system changes and updated policy directions (e.g., extreme weather modeling)

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Appendix

- Detailed Description of RA Modeling Priorities

Model Progress - 2024

- **Theme 1: Comprehensive review of the IRM setting process as relate to market requirements**
  - Assessed robustness of Tan45 methodology and alternative methodologies for grid evolution and reliability needs
- **Theme 2: Winter Reliability Modeling**
  - Completed fuel availability constraints whitepaper in Q2 2024; consider modeling for the 2026-2027 IRM Preliminary Base Case
- **Theme 3: Modeling for emerging resources/participation modes (e.g., DER, co-located storage resources, and hybrid storage resources)**
  - Implemented DER participation model in NYISO markets on April 16, 2024
  - Developed DER modeling principles to aggregate individual resources by their modeling type/duration on a zonal basis
  - Implemented SCR modeling improvements in the 2025-2026 IRM Preliminary Base Case
- **Theme 4: Load modeling improvement**
  - Developed potential methodology to model BTM solar as a supply resource in 2024, and conducted sensitivity on the 2025-2026 IRM Preliminary Base Case
  - Explored alternative load shape adjustment methodology to match energy forecast and winter peak scaling; recommend continuing research in 2025
- **Additional items for consideration (i.e., Extreme Weather and Correlated Outages):**
  - Commence research on the impact of regional correlated outages among renewable fuel types

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Modeling Priorities - 2025

- **Theme 1**: Comprehensive review of the IRM setting process, particularly the Tan45 methodology
  - Continue 2024 priorities and prepare for comprehensive Tan45/LCR review
- **Theme 2&4:** Winter reliability modeling and load modeling improvement
  - Implement winter fuel availability constraints in the IRM model
  - Improve the load modeling to capture and reflect the winter load forecast; consider improvements to load shapes such as energy scaling
- **Theme 3**: Modeling for emerging resources/participation modes, i.e. DER, CSR and hybrid storage resources
  - Improve the GE ELR functionality to establish alternative approach to the current output window limitation
  - Exploration of methodologies to dispatch ELRs, hybrid storage resources
- Additional items for consideration (i.e., Extreme Weather and Correlated Outages):
  - Continue research on the impact of regional correlated outages among renewable fuel types

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Potential Modeling Improvements of Interest

- Winter Reliability Enhancements - process changes necessary to accommodate a winter peaking system
- Modeling separate summer and winter EFORd values
- Dynamic modeling of winter fuel availability for thermal units
- Review of capacity zone determination and deliverability processes
- Review of intermittent resource modeling techniques, potentially supplementing the 5 years of historical data currently used in RA models
- Use of forecasting tools for intermittent resource output
- Review of the reliability implications of maintenance scheduling given that other control areas have begun to experience tight operating conditions during maintenance seasons due to rapidly fluctuating intermittent resource output
- Review of high renewable impact in conjunction with high renewable penetration in external areas
- Potential replacement of the current RA software platform with a different software platform
- Review of the LCR optimization method including identification/development of enhancements
- Expand software to consider additional localities or changes to the current zonal modeling
- Modeling of internal controllable lines
- Review of modeling of calendar year vs. Capability Year
- Review of NYSRC “parametric study” process and identify potential enhancements

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Questions?

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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