New York ISO
Independent System Operator

Maintenance Modeling & Output Factor Curves: IRM/MARS fundamentals

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Background

- The objective of this whitepaper is to assess potential enhancements to the planned maintenance derates and outages modeled for the 2027-2028 installed reserve margin (IRM) study.
- Currently only forced outages and 50 MW of planned summer maintenance (allocated equally between Load Zones J and K) are assumed to occur in the IRM study.
- The previous presentation[1] at the March 4th ICS meeting provided an overview of NYISO's maintenance outage management practices and timelines.
- This presentation assesses the GE Multi-Area Reliability Simulation software program (MARS) functionality for modeling planned and forced outages/derates, to inform the assessment of potential alternative modeling approaches/enhancements.

1. https://www.nysrc.org/wp-content/uploads/2026/02/Maintenance-Modeling-Output-Factor-03042026-ICS.pdf

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NYISO's Maintenance Scheduling

- **Maintenance outages are approved by the NYISO and Local Transmission owners on a year-round basis as capacity margins allow.**
  - A majority of the planned maintenance outages are taken in the shoulder months of March/April and October/November.
  - Planned maintenance outages are still taken in the Summer and Winter peak months but at reduced quantities compared to shoulder months.
- **If at the time of a previously approved maintenance outage, capacity margins are determined to be at risk of being violated, the NYISO may cancel the outage for rescheduling at a later date.**
  - Scheduled outages may be canceled at any time up until when the asset owner requests authorization to officially remove the resource from service.
  - Typically, maintenance outages scheduled out in the Day-Ahead Market (DAM) are rarely recalled.
- **After a resource goes out of service on an approved scheduled maintenance outage there is no enforceable recall time to be back in service if capacity margins become deficient.**
  - The NYISO may request generators on an approved outage to voluntarily return service.

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MARS Model

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MARS Model: Unit-Specific State Modeling Overview

- **Unit-specific forced unavailability modeling is done using the Generator Transition Rate Matrices (GTRM) to simulate a probabilistic four-state representation of generators using the most recent 5-years of Generator Availability Data System (GADS) data.**
  - A unit may move between the four distinct states (fully available, upper derating, lower derating, and outage) depending on the calculated transition rates.
- **Events with a 9300 cause code are included in the GTRM unit-specific unavailability modeling.**
  - The NYISO requires that events with a 9300 cause code be submitted as forced outage event types (U1, U2, U3, D1, D2 or D3).
  - Generators do not distinguish in their GADS data whether the upstream transmission limitations are due to planned or forced reasons.
- **Planned and maintenance derating event types (D4, DM, and PD) are currently factored into the MARS GTRM as the unit being within either the upper or lower derating states depending on their available capacity.**
- **Planned and maintenance outage event types (PO, MO, Etc.) are currently not factored into the MARS GTRM.**

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MARS Model: Summer Maintenance Assessment

- **Currently in the IRM study, a fixed 50 MW of planned summer maintenance is assumed (split equally among Load Zones J and K), to represent the assumed aggregated maintenance impacts during summer peak conditions.**
  - In Load Zones J and K, 25 MW of additional load is assumed to occur in each zone continually from June 1st through August 31st to represent the aggregated maintenance impacts.
- **The currently assumed 50 MW of planned summer maintenance is reviewed annually by an assessment of the prior year's reported planned and maintenance GADS events during the period June 1st to September 15th.**
  - The 2024 assessment identified 376 planned and maintenance events submitted by generators across the NYCA during the summer peak period.[1]
  - Approximately 7% out of the 376 events reviewed occurring on days when gross loads exceeded 28,000 MW.

1. https://www.nysrc.org/wp-content/uploads/2025/08/2024-Summer-Maintenance-Analysis-Presentation.pdf

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Next Steps

- Return to a future ICS meeting to review the annual assessment used to inform the current summer maintenance assumptions modeled in the IRM study.
- Evaluate potential considerations for winter maintenance modeling.

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Questions?

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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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