New York ISO
Independent System Operator

Maintenance Modeling

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Agenda

- Background
- Maintenance Modeling Overview
- Impact Assessment
- Next Steps

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Background

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Background

- **The Installed Reserve Margin (IRM) study model currently includes an assumption of a nominal 50 MW of planned maintenance during the summer period, which is divided equally between Load Zones J and K (25 MW in each zone)**
  - This summer maintenance assumption is based on the most recent available data regarding summer planned maintenance events[1]
  - As part of the 2022-2023 IRM study, the unit-specific maintenance modeling was removed due to other modeling changes in GE Multi-Area Reliability Simulation (MARS), which caused high levels of Emergency Operating Procedure (EOP) calls/year in the previous IRM cycles[2,3]
- **During the ICS meeting on 9/4/2024, stakeholders expressed interest in potential reimplementation of a more robust maintenance modeling in the IRM model**

[1] https://www.nysrc.org/wp-content/uploads/2024/07/2023-Summer-Maintenance-Analysis-Presentation33998.pdf
[2] https://www.nysrc.org/wp-content/uploads/2023/05/EOP-Discussion-Posting-for-20211117-ICS19234.pdf
[3] https://www.nysrc.org/wp-content/uploads/2023/05/AI-11-ICS-Briefing-on-increased-EOP-use.pdf

Modeling Overview

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Maintenance Modeling Overview

- **The following MARS input data from the NYISO Operations scheduling group and Generating Availability Data System (GADS) is used to develop unit specific maintenance assumptions for modeling**
  - The NYISO Operations planned maintenance schedule (the impact assessment herein uses 2025 data)
  - GADS historical data (most recent 5-year average)
  - If no NYISO Operations or GADS data is available, the unit is assigned a default value of 1 week of scheduled maintenance
  - New units and units with less than 5 years of historical data are assigned a default value of 4 weeks of scheduled maintenance
- **In the MARS modeling, there are two types of maintenance modeling:**
  - Fixed daily maintenance
    - Modeled with specific start/stop dates the generator would be on maintenance outage
    - More than one maintenance periods can be specified for each unit
  - Scheduled maintenance
    - Modeled with a specified number of weeks the generator must be on maintenance outage during the simulation year
    - MARS schedules the generators on maintenance outage based on the pre-load forecast uncertainty (LFU) load level
      - The scheduling of maintenance occurs prior to any MARS replication; thus, it is independent of the other assumptions or variables during the simulation
      - In the current MARS modeling, 18 weeks of summer period are manually modified; therefore, MARS is less likely to schedule maintenance during high demand summer periods
    - If a fixed daily maintenance is specified for the unit, scheduled maintenance is overridden

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Impact Assessment

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Impact Assessment (2025-2026 IRM PBC)

- Using the parametric methodology, the NYISO conducted an impact assessment of implementing 2025 unit-specific maintenance assumptions in the 2025-2026 IRM Preliminary Base Case (PBC)
- The implementation of 2025 unit-specific maintenance assumptions in the 2025-2026 IRM PBC would increase the IRM by 0.19% and locational capacity requirements (LCRs) would increase by a similar margin
- The expected annual Emergency Operating Procedure (EOP) calls would also increase by 1.6 days if the 2025 unit-specific maintenance assumptions were implemented for the 2025-2026 IRM PBC
- With the implementation of the maintenance assumptions, winter loss of load events would occur for the 2025-2026 IRM PBC and would account for 2.6% of the total events
  - Summer Loss of Load Expectation (LOLE) = 0.09746
  - Winter LOLE = 0.00257

	PBC25	+Maintenance	*Delta*
IRM	23.60%	23.79%	*0.19%*
J LCR	75.98%	76.12%	*0.13%*
K LCR	102.52%	102.69%	*0.17%*
G-J Locality	87.54%	87.69%	*0.15%*
EOP calls	7.4	9	*1.6*
Monthly LOLE			
JAN	0.00000	0.00002	*0.00002*
FEB	0.00000	0.00255	*0.00255*
MAR	0.00000	0.00000	*0.00000*
APR	0.00000	0.00000	*0.00000*
MAY	0.00000	0.00259	*0.00259*
JUN	0.00022	0.00008	*-0.00014*
JUL	0.07987	0.07743	*-0.00244*
AUG	0.01184	0.01015	*-0.00169*
SEP	0.00806	0.00721	*-0.00085*
OCT	0.00000	0.00000	*0.00000*
NOV	0.00000	0.00000	*0.00000*
DEC	0.00000	0.00000	*0.00000*

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Impact Assessment (Fuel Availability Constraints Sensitivity Cases)

- Using the parametric methodology, the NYISO conducted an impact assessment of implementing 2025 unit-specific maintenance assumptions in the 2025-2026 IRM PBC fuel availability constraints modeling sensitivity cases with 11,000 MW (Case 6a) and 8,000 MW (Case 6b) of oil assumed as available
- The maintenance modeling combined with the fuel availability constraints modeling **double counts the derate** of the thermal capacities resulting in greater levels of unavailable capacity than intended by the fuel availability constraints modeling
- The implementation of 2025 unit-specific maintenance assumptions would increase the IRM of the sensitivity cases by 2.4% (Case 6a) and 4.38% (Case 6b). LCRs in each sensitivity case would increase by a smaller margin
- With the implementation of the maintenance assumptions, a significant shift in seasonal risk is observed as shown below

	S6a (11000)	+Maintenance	S6b (8000)	+Maintenance
Summer	0.09095	0.05388	0.04864	0.01611
Winter	0.00795	0.04617	0.05115	0.08390

	S6a (11000)	+Maintenance	*Delta*	S6b (8000)	+Maintenance	*Delta*
IRM	24.50%	26.90%	*2.40%*	30.80%	35.18%	*4.38%*
J LCR	76.60%	78.28%	*1.68%*	78.50%	81.58%	*3.08%*
K LCR	102.75%	104.99%	*2.24%*	103.49%	107.59%	*4.10%*
G-J Locality	87.99%	89.84%	*1.85%*	89.39%	92.76%	*3.37%*
EOP calls	8.6	8.2	*-0.4*	7.6	6.0	*-1.6*
			Monthly LOLE			
JAN	0.00516	0.01501	*0.00985*	0.03096	0.02723	*-0.00373*
FEB	0.00004	0.00709	*0.00705*	0.00102	0.00980	*0.00878*
MAR	0.00000	0.00000	*0.00000*	0.00000	0.00000	*0.00000*
APR	0.00000	0.00000	*0.00000*	0.00000	0.00000	*0.00000*
MAY	0.00000	0.00113	*0.00113*	0.00000	0.00030	*0.00030*
JUN	0.00024	0.00006	*-0.00018*	0.00045	0.00001	*-0.00044*
JUL	0.07223	0.04389	*-0.02834*	0.03378	0.01185	*-0.02193*
AUG	0.01121	0.00498	*-0.00623*	0.00942	0.00230	*-0.00712*
SEP	0.00727	0.00382	*-0.00345*	0.00499	0.00165	*-0.00334*
OCT	0.00000	0.00000	*0.00000*	0.00000	0.00000	*0.00000*
NOV	0.00000	0.00000	*0.00000*	0.00000	0.00000	*0.00000*
DEC	0.00275	0.02407	*0.02132*	0.01917	0.04687	*0.02770*

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Considerations

- **The current maintenance modeling in MARS is not designed for a system with differences in seasonal risks**
  - MARS modeling currently includes 18 weeks of *summer* period that are manually modified; thus, MARS is less likely to schedule maintenance during high demand summer periods
- **The NYISO Operations historical practice would seek to avoid excessive scheduling of maintenance during periods of increased reliability risks**
  - As winter risks are identified, NYISO Operations would be expected to limit the scheduling of maintenance during peak winter months
- **Further analysis and potential modifications/refinements to the modeling of maintenance is warranted before considering the implementation in the IRM study model**
  - With the future implementation of the fuel availability constraints modeling, the maintenance modeling double counts the derate of the thermal capacities, resulting in greater levels of unavailable capacity than intended by the fuel availability constraints modeling
  - Consideration of further modifications/refinements is warranted to avoid the modeling of an unnecessary level of assumed maintenance during winter months that have increased reliability risk

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Next Steps

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Next Steps

- Based on the impact assessments and analysis conducted, it is not recommended to adopt the current MARS unit-specific maintenance modeling in the IRM study model at this time
- The NYISO will collaborate with ICS to explore and conduct analyses on potential changes to the maintenance modeling in conjunction with the fuel availability constraints modeling during the 2026-2027 IRM study cycle to assist in identifying an appropriate modeling approach for maintenance
- The NYISO will provide ongoing updates to the ICS to share progress and solicit feedback

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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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