



Investigation into Observed Increase in EOP Activation in 2021 IRM Final Base Case

NYSRC Installed Capacity Subcommittee Meeting

February 03, 2021

Background

- This presentation discusses the 2021 Final Base Case (FBC) IRM Study results, and in particular the increased activation of Emergency Operating Procedures (EOP) resulting from the modeling of Energy Limited Resource(s) (ELR).
- The NYISO presented on this issue to the Executive Committee (EC) at its January 2021 meeting.
- The NYISO appreciates the concerns raised by the members of the EC and the ICS, and the opportunity to review additional analysis that has been conducted. The additional analysis has confirmed our expectation that the increased activations were the result of the lack of flexibility in adjusting ELR output schedule dynamically to system conditions.
- The analysis demonstrates that alternative modeling strategies substantively reduce the EOP activations without appreciable impacts to the LOLE or IRM results.

ELR Modeling Technique

- **As part of the 2021 IRM Study development, the ICS considered whether, and how, to reflect energy duration limitations for the existing ELR resources.**
- **After considerable discussion, the ICS recommended using a simplified approach for the 2021 IRM study.**
 - ELR limitations have not been previously represented in the IRM studies.
 - GE is developing a model intended to efficiently schedule ELRs. However, investigations have demonstrated that the model is not currently working as expected.

ELR Modeling Technique (Cont.)

- **The ICS recommended approach for modeling the ELRs treats the resources as a fixed injection model based upon the summer operational capabilities of the units.**
 - The NYISO Resource Adequacy and Operations teams coordinated to construct a representative summer peak load output model for each ELR and replicated that shape throughout the year.
 - The representative models were reviewed and validated with the NYSRC ICS consultants.
 - Summer output shapes were selected as the IRM determination process has historically been driven by LOLE events observed in July and August, and continue to do so in this year's process.
 - It is expected that ELRs could have different operating capabilities during other parts of the year. More importantly, ELRs have the flexibility and obligation to adjust their output schedules daily to meet operational needs at the direction of the NYISO.
- **The impact of modeling ELRs caused an approximately 0.6% increase in IRM.**

Preliminary Base Case

- The Preliminary Base Case, which did not incorporate ELRs, demonstrated EOP activations consistent with prior years.

2021 IRM Preliminary Base Case: Expected Number of Days at Each Margin State

	Require SCRs (Load and Generator)	5% manual voltage reduction	30-minute reserve to zero	5% remote controlled voltage reduction	Voluntary load curtailment	Public appeals	Emergency purchases	10-minute reserve to zero	Customer disconnections
	1	2	3	4	5	6	7	8	9
JAN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
FEB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
MAR	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.00
APR	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.00
MAY	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.00
JUN	1.4	0.8	0.8	0.6	0.4	0.4	0.4	0.0	0.00
JUL	3.2	2.2	2.1	1.8	1.5	1.4	1.4	0.2	0.04
AUG	3.5	2.6	2.5	2.1	1.8	1.7	1.7	0.2	0.06
SEP	0.9	0.5	0.5	0.3	0.2	0.2	0.2	0.0	0.00
OCT	1.4	1.1	1.0	0.7	0.5	0.4	0.4	0.0	0.00
NOV	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.00
DEC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
ANNUAL	11.7	7.9	7.6	5.9	4.8	4.3	4.3	0.4	0.1

Scenario Results - Reserve Modeling

- In our continued review of the results we identified that the EOP activations were being triggered to address zonal deficiencies while reserve capacity was still available.
- MARS withholds resource capacity based upon zonal reserve allocation input data, and releases it back to the model in EOP steps 3 and 8. In actual operation, reserve would be re-distributed dynamically based upon system needs and resource capabilities.
- The ELR fixed injection model does not reflect the flexibility to increase output in response to reserve activations.
- NYISO performed a simulation, maintaining total reserve requirements but using an alternative zonal allocation which shifted reserve away from ELR zones and to generator surplus zones.

Scenario Results - Reserve Modeling (Cont.)

- The following table highlights the significant reduction in EOP activations while maintaining LOLE at 0.1

Name	Require SCRs (Load and Generator)	5% manual voltage reduction	30-minute reserve to zero	5% remote controlled voltage reduction	Voluntary load curtailment	Public appeals	Emergency purchases	10-minute reserve to zero	Customer disconnectio ns	
EOP	1	2	3	4	5	6	7	8	9	
JAN	1.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	-	-
FEB	4.9	2.2	2.0	2.0	1.6	1.6	1.6	1.6	0.0	0.00
MAR	1.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-
APR	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-
MAY	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
JUN	4.6	2.2	2.1	2.1	1.7	1.6	1.6	1.6	0.0	0.00
JUL	6.2	4.1	4.1	4.0	3.5	3.5	3.5	3.5	0.2	0.05
AUG	8.9	6.7	6.6	6.2	5.9	5.8	5.8	5.8	0.1	0.05
SEP	3.2	1.3	1.3	1.2	1.1	1.1	1.1	1.1	0.0	0.00
OCT	17.7	14.8	14.5	14.5	13.2	13.2	13.2	13.2	0.0	-
NOV	6.2	3.9	3.7	3.7	3.2	3.2	3.2	3.2	-	-
DEC	0.9	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.0	0.00
ANNUAL	55.3	36.1	35.0	34.4	30.6	30.5	30.5	30.5	0.3	0.1

Scenario Results – Increased Flexibility

- **The static summer ELR output models do not reflect the flexibility that exists in other time periods or the capability, and the obligation of these resources to adjust their schedules based upon real time operational needs.**
- **NYISO performed a second scenario in which we increased the operating capacity of one of the ELRs by ~10% in off-peak periods, while continuing to respect the upper operating limit of the resource.**
 - This scenario reflects the NYISO's ability to adjust an ELR's operating schedule based upon dynamic real-time conditions.

Scenario Results – Increased Flexibility (Cont.)

- The following table highlights the significant reduction in EOP activations while maintaining LOLE at 0.1

MONTH	Require SCRs	5% Manual Voltage Reduction	30 Minute Reserve to Zero	5% Remote Controlled Voltage Reduction	Voluntary Load Curtailment	Public Appeals	Emergency Assistance	10 Minute Reserves to Zero	Customer Disconnections
	1	2	3	4	5	6	7	8	9
JAN	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
FEB	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.00
MAR	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
APR	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.00
MAY	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
JUN	2.4	0.9	0.9	0.8	0.6	0.6	0.6	0.0	0.00
JUL	4.2	2.4	2.4	2.0	1.7	1.6	1.6	0.1	0.05
AUG	5.0	3.6	3.5	2.9	2.5	2.4	2.4	0.1	0.05
SEP	1.8	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.00
OCT	7.8	5.0	4.8	4.6	4.1	4.1	4.1	0.0	0.00
NOV	3.1	0.9	0.8	0.8	0.6	0.6	0.6	0.0	0.00
DEC	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
ANNUAL	25.2	13.3	12.8	11.4	9.7	9.6	9.5	0.3	0.10

Observation – Maintenance Schedules

- **The NYISO continued to observe a higher level of EOP activations in October. Our analysis identified this phenomenon was due to modeled resource maintenance schedules in that time period.**
- **The NYISO expects that additional flexibility of the ELR resource schedules for these unique situations would result in further reductions in the observed EOP activations.**
 - The NYISO did not attempt to simulate alternative ELR schedules for each of these situations.

Conclusions

- **In the IRM Final Base Case, as well as in this supplemental analysis, LOLE events continue to be observed only during summer peak load periods. The additional simulations confirm that additional flexibility to adjust ELR schedules avoids the need for EOP activations without appreciable impacts to LOLE events.**
- **The NYISO, ICS, GE and NYSRC consultants have prioritized the fully automated duration limited resource model as a high priority for next year.**
 - The NYISO, ICS and NYSRC consultants should consider if alternative ELR modeling strategies are desired in the event that a fully automated solution cannot be timely developed.

Next Steps

- **The NYSRC EC has directed the ICS to review the EOP steps and consider if potential modifications are warranted.**
 - Enhancing the ELR modeling process has already been prioritized by the NYSRC ICS and EC. The NYISO has engaged GE to provide the NYSRC enhanced ELR modeling proposals during the 2022 IRM process (i.e., this year).
 - The NYISO will work with the NYSRC to update how the MARS model represents operating reserves.
 - The NYISO will provide additional information regarding maintenance scheduling during the 2022 IRM Study and will ensure the combination of ELR modeling and maintenance scheduling produce reasonable study outcomes.