New York ISO
Independent System Operator

Modeling Improvements for Capacity Accreditation: SCR Modeling

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Agenda

- Purpose
- Current IRM Modeling vs Historical SCR Performance
- Enhanced SCR Modeling Review
- Preliminary Impact Assessment
- Next Steps

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Purpose

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Purpose

- Starting May 2024, each ICAP Supplier will be valued in the NYISO's ICAP Market based on Capacity Accreditation Factors (CAFs)
- These CAFs reflect the marginal reliability contribution of the ICAP Suppliers within each Capacity Accreditation Resource Class (CARC) toward meeting NYSRC resource adequacy requirements
  - The NYISO uses the IRM/LCR model to calculate CAFs ahead of each Capability Year
- For CAFs to accurately reflect the marginal reliability contributions of the ICAP Suppliers within each CARC, the modeling of those ICAP Suppliers in the IRM/LCR model should align with the expected performance and obligations that those ICAP Suppliers have in the NYISO's market

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Purpose

- **Because of how Special Case Resources (SCRs) are currently modeled in the IRM/LCR study, performing the CAF calculation using the same model may not properly reflect their marginal reliability contribution**
  - The current modeling does not fully align with the expected performance and obligations of SCRs
  - SCRs are currently modeled as available for an entire day if called but can only be activated up to 5 times per month. However, in the NYISO's market, SCRs have a minimum 4-hour performance obligation and are not expected to reduce load for an entire day. Additionally, there is no maximum number of SCR activations per month in the NYISO's market
- **Due to these modeling differences, the NYISO does not treat SCRs as a separate CARC for which to separately calculate CAFs**
- **Until changes are made to the SCR modeling in the IRM/LCR modeling, SCRs will be valued in the ICAP Market using the CAF of the 4-hour Energy Duration Limitation CARC**

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Purpose

- **As part of the NYISO's 2023 Modeling Improvements for Capacity Accreditation project, the NYISO analyzed historical SCR performance and developed enhancements to the current SCR modeling approach for potential use in the IRM, LCR, and capacity accreditation studies**
  - The modeling enhancements are intended to better reflects the expected performance and obligations of SCRs and, if adopted in the IRM model, would allow the NYISO to value SCRs in the ICAP Market based on their specific marginal reliability contribution

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Current IRM Modeling vs Historical SCR Performance

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Current IRM Modeling vs Historical SCR Performance

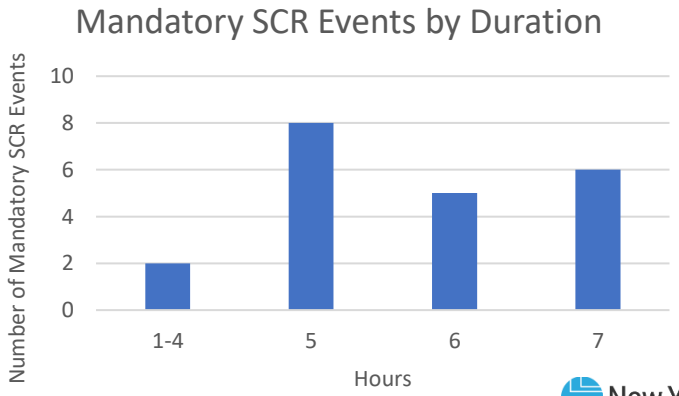
- **In the current IRM modeling, SCRs are modeled as an emergency operating procedure (EOP) step with the following characteristics:**
  - Subject to a maximum of 5 activations per month
  - Available for the whole day when called
  - Modeled by zone at a derated capacity based on zonal performance factors and zonal Average Coincident Load (ACL) to Customer Base Load (CBL) factors[1]
    - Zonal performance factors and ACL to CBL factors are based on historical SCR performance during all event hours, by zone, for each mandatory event from the most recent five years in which a mandatory event was initiated by the NYISO (but not older than summer 2012) and all performance test hours accumulated during the same timeframe even when there were no mandatory events
      - The look back window does not go back prior to 2012 because an alternative capacity baseline methodology was in place to measure SCR performance prior to 2012

[1]For more details on the zonal performance factor and ACL to CBL factor calculations, please see the "Demand Response: Final Model Values for 2024 IRM Studies" presentation to the August 2nd, 2023, meeting of the NYSRC Installed Capacity Subcommittee

Current IRM Modeling vs Historical SCR Performance

- **In the NYISO's market, curtailment duration requests have ranged from 1 to 7 hours in mandatory SCR events since 2012**
  - There are no restrictions on the length of a curtailment request, the time periods in which a curtailment request may be initiated, or the number of times during a month or Capability Period that a curtailment request may be executed by the NYISO

	Number of Mandatory SCR Events	Average Length of Mandatory SCR Events
Since 2012	21	5.6 hours



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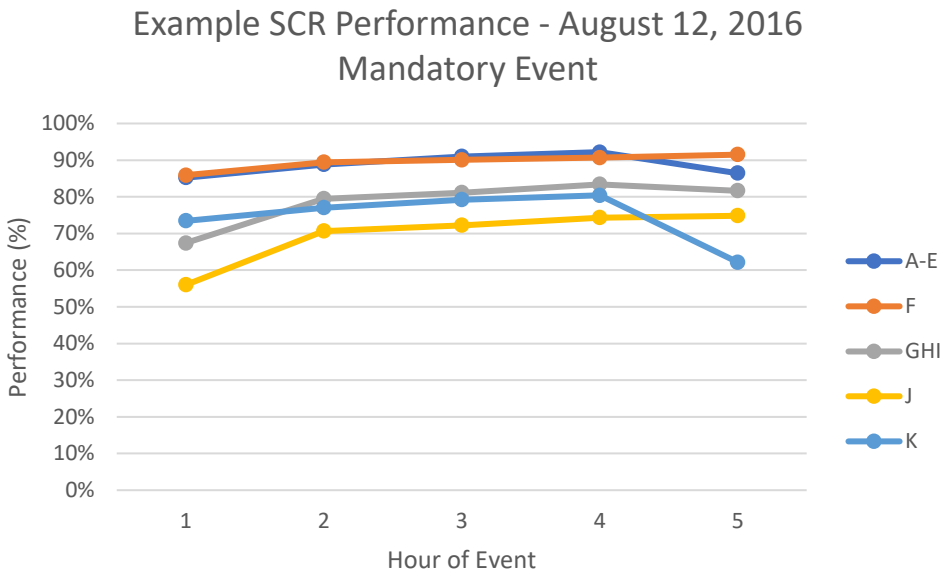
Current IRM Modeling vs Historical SCR Performance

- **Individual SCR performance is required for a minimum of 4 consecutive hours during mandatory events (or the duration of the event if shorter than 4 hours)**
  - SCRs can choose which 4 hours to perform within a call and performance beyond 4 consecutive hours is voluntary
- **Because 1) curtailment duration requests have historically been longer than the 4-hour minimum performance obligation and 2) SCRs can choose which 4 hours to perform within a call, the NYISO generally sees some level of SCR response across all hours of mandatory calls**
  - The SCR modeling enhancements are intended to reflect this aggregated performance of the SCR fleet by modeling SCRs as duration limited resources with hourly response rates



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Enhanced SCR Modeling Review

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Enhanced SCR Modeling Review

- **The enhancements to the current SCR modeling approach utilize a new energy limited resource (ELR) functionality to model SCRs as duration limited resources with hourly response rates**
  - The duration limits have been used to reflect the expected maximum SCR call length based on historically observed calls in the NYISO market
  - The hourly response rates have been used to simulate the aggregated performance and staggered responses of individual SCRs within a call

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Enhanced SCR Modeling Review (cont.)

- The following duration limits were used in the testing of the enhanced SCR modeling:

	SCR Activation Duration Limit by Zone (hours)			
	A-E	F	G-J	K
Duration Limit	5	7	6	7

- These duration limits reflect the maximum mandatory SCR event length that occurred in the applicable zone(s) over the most recent five years in which a mandatory event was initiated in the zone (but not older than summer 2012)[1]

[1]This lookback period aligns with the current lookback period utilized in the calculation of the performance factors and ACL to CBL factors used to derate SCR capacity in the current modeling of SCRs in the IRM model

Enhanced SCR Modeling Review (cont.)

- The following hourly response rates were used in the testing of the enhanced SCR modeling:

Response Rate by Hour of SCR Activation							
Zones	**1**	**2**	**3**	**4**	**5**	**6**	**7**
A-E[1]	79%	85%	83%	71%	70%		
F	75%	81%	84%	85%	84%	67%	64%
G-I[1]	59%	68%	70%	72%	74%	72%	
J	55%	61%	66%	68%	69%	66%	
K	50%	57%	62%	65%	65%	64%	53%

- The hourly response rates reflect the aggregated performance and staggered responses of individual SCRs during mandatory events over the most recent five years in which a mandatory event was initiated in the applicable zone(s) (but not older than summer 2012)
  - The response rate for each hour reflects the percentage of obligated SCR MW that responded during that hour across all mandatory events in the relevant zone(s) over the lookback period

[1] Reflects capacity-weighted averages of zonal response rates to protect potentially confidential market data

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Enhanced SCR Modeling Review (cont.)

- **Because SCR performance is captured in the hourly response rates in the enhanced SCR modeling approach, the maximum modeled SCR capacities are calculated based solely on the zonal SCR enrollment from the prior year and the zonal ACL to CBL factors**
  - This approach is consistent with the current IRM methodology for calculating the SCR final model values, except without factoring in the SCR performance factors
  - Maximum modeled capacities utilized in the testing of the enhanced SCR modeling on the 2023-2024 IRM models:

Capacity Region	SCR ICAP MW based on July 2022[1]	ACL to CBL Factor[1]	July Max Modeled Capacity (MWs)
ROS	694.5	93.6%	650.3
GHI	79.1	84.2%	66.6
J	417.5	74.4%	310.7
K	33.7	76.3%	25.7

[1] Same values utilized in the calculation of the final SCR values for the 2023 IRM Study

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Enhanced SCR Modeling Review (cont.)

- **Example – Zone J:**
  - If an SCR activation is triggered in GE MARS, the available SCR MW in Zone J will vary across the hours of the activation based on the maximum modeled capacity for the modeled month and the hourly response rates for Zone J

		Hour of SCR Activation					
Zone J		1	2	3	4	5	6
July Maximum Modeled Capacity (MWs)[1]	α	310.7					
Hourly Response Rates	β	55%	61%	66%	68%	69%	66%
MWs Available	$\gamma = \alpha * \beta$	171	190	205	211	214	205

[1] The maximum modeled capacities are calculated for each month using the total ICAP of SCRs enrolled in the relevant zone(s) in the same month of the prior year and the zonal ACL to CBL factor, as described on slide 15.

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Enhanced SCR Modeling Review (cont.)

- **Similar to the current ELR functionality, the enhanced SCR modeling utilizes an output restriction to prevent the SCRs from being used too early in the day before the majority of loss of load events occur**
  - The output limitation was lifted HB14 consistent with the modeling of energy storage and small ELRs in the 2024-2025 IRM[1]
- **Additionally, the SCRs are modeled with a 1 call per day limit under the enhanced modeling approach, consistent with how SCRs have historically been called in the NYISO's market**

[1]More information on the current ELR output restriction can be found in the "Recommended Approach to Update ELR Output Restriction Starting 2024-2025 IRM" presentation to the August 2, 2023, meeting of the NYSRC Installed Capacity Subcommittee

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Enhanced SCR Modeling Review (cont.)

- **The current SCR modeling limit of 5 calls per month was removed in the enhanced SCR modeling approach**
  - The 5 calls per month limit was removed because 1) there is no maximum monthly call limit for SCRs in the NYISO's market and 2) the limit has a significant impact on any SCR-specific CAFs
    - For more information on the impact of the 5 calls per month limit on SCR-specific CAFs, please see the 2022 SCR CAF testing results presented at the 02/28/2023 ICAPWG

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Preliminary Impact Assessment

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Test Cases

- **To test the preliminary impacts of the enhanced SCR modeling, the NYISO applied the enhanced SCR modeling to the 2023-2024 IRM final base case (FBC)**
  - Testing was conducted with and without the new Emergency Assistance (EA) modeling utilized in the 2024-2025 IRM
- **The Tan45 process was utilized to bring the cases back to at-criteria conditions after the addition of the enhanced SCR modeling**

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IRM and LCR Impacts

- **The enhanced SCR modeling lowered the IRM from 1% to 2.1% across the two sets of test cases**
  - The IRM impact of the enhanced SCR modeling approach decreased with the addition of the new EA modeling

	2023-2024 FBC		Delta	2023-2024 FBC + New EA		Delta
Enhanced SCR Modeling		X			X	
IRM	19.9%	17.8%	*-2.1%*	21.9%	20.9%	*-1.0%*
J LCR	78.2%	77.9%	*-0.3%*	77.9%	77.9%	*0.0%*
K LCR	107.4%	107.4%	*0.0%*	107.1%	107.2%	*0.1%*
G-J LCR	88.6%	88.3%	*-0.3%*	88.3%	88.3%	*0.0%*

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Expected EOP Implementation Days per Year[1]

- With decreased IRMs, the EOP implementation days increased in the enhanced SCR modeling cases

	2023-2024 FBC		Delta	2023-2024 FBC + New EA		Delta
Enhanced SCR Modeling		X			X	
EOP Step 1	6.9	8.9	+ 2.0	5.4	6.1	+ 0.7
EOP Step 2	4.6	6.6	+ 2.0	3.6	4.3	+ 0.8
EOP Step 3	4.4	6.3	+ 1.9	3.4	4.1	+ 0.7
EOP Step 4	2.8	4.6	+ 1.8	2.0	2.6	+ 0.6
EOP Step 5	2.1	3.6	+ 1.5	1.4	2.0	+ 0.5
EOP Step 6	1.7	3.1	+ 1.4	1.2	1.6	+ 0.5
EOP Step 7	1.6	3.0	+ 1.4	1.1	1.6	+ 0.5
EOP Step 8	0.2	0.2	0.0	0.2	0.2	0.0
EOP Step 9	0.1	0.1	0.0	0.1	0.1	0.0
EOP Step 10	0.1	0.1	0.0	0.1	0.1	0.0

[1] The expected implementation days per year reported in each EOP step are the expected number of days that MARS calls for that EOP step. If a EOP step has a limitation on the number of days that it can provide load relief, such as the 5 days per month limit for SCRs in the 2023-2024 LCR case, it will provide no load relief after the 5th day.

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SCR Calls

- Expected SCR calls increased from 0.7 to 2.0 days per year with the addition of the enhanced SCR modeling
- However, the LOLE reduction provided from SCRs showed little change
  - LOLE reduction was calculated by subtracting the LOLE at EOP step 1 (prior to SCR activation) from the LOLE at EOP step 2 (after SCR activation)

	2023-2024 FBC		Delta	2023-2024 FBC + New EA		Delta
Enhanced SCR Modeling		X			X	
Expected SCR Calls (EOP 1)	6.9	8.9	**+ 2.0**	5.4	6.1	**+ 0.7**
LOLE Reduction from SCRs	-2.3	-2.3	**0.0**	-1.8	-1.7	**+ 0.1**

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SCRs and EA

- LOLE reduction from EA increased with the addition of the enhanced SCR modeling
  - LOLE reduction was calculated by subtracting the LOLE at EOP step 7 (prior to EA) from the LOLE at EOP step 8 (after EA)
- By modeling SCRs as ELRs (with the ELR output restriction and removal of the 5 calls per month limit), SCRs are available during the peak risk hours. Therefore, the loss of load events that remain after SCR activation are more easily solved by EA, which increases the LOLE reduction provided by EA

	2023-2024 FBC		Delta	2023-2024 FBC + New EA		Delta
Enhanced SCR Modeling		X			X	
LOLE Reduction from EA (EOP 7)	-1.4	-2.8	**+ 1.4**	-0.9	-1.3	**+ 0.5**

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SCRs and EA: Illustration

- **By deploying SCRs like ELRs, SCRs are more likely to be available to meet the loss of load events that remain after EA**
  - Illustrated by the blue shaded area above the example load curve

ELR Modeling Illustration

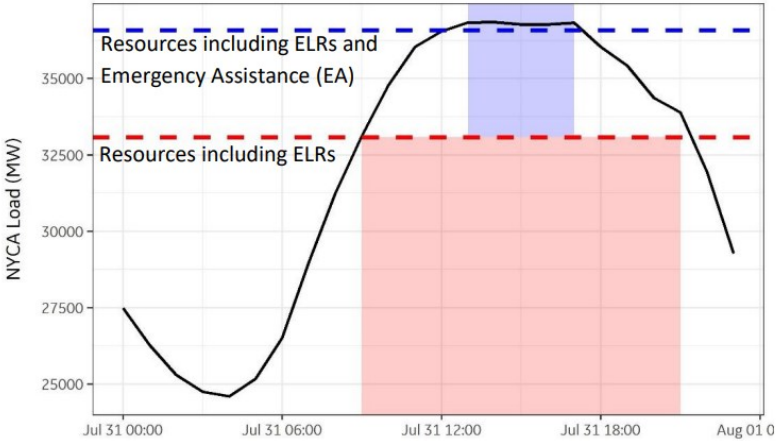

Figure 3 from the 2021 NYSRC White Paper on Energy Limited Resources Modeling

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Next Steps

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Next Steps

- The NYISO currently plans to return to the February 2024 ICS meeting with results of the enhanced SCR modeling approach tested on the 2024-2025 IRM preliminary base case (PBC) and FBC

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Questions?

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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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