Modeling Improvements for Capacity Accreditation: SCR Modeling

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  - Enhanced SCR Modeling Overview

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Project Review

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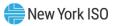
Project Review

- As part of the Modeling Improvements for Capacity Accreditation project, the NYISO developed an enhanced methodology for modeling Special Case Resources (SCRs) in the IRM, LCR, and capacity accreditation studies
  - The purpose of the enhanced SCR modeling is to better reflect the expected performance and obligations that SCRs have in the NYISO's market by modeling SCRs as duration limited resources with hourly response rates based on historical performance
  - A more detailed overview of the enhanced SCR modeling is included in the Appendix
- The NYISO plans to continue discussions on the enhanced SCR modeling with the New York State Reliability Council (NYSRC) in 2024
  - If the NYSRC incorporates the enhanced SCR modeling into the 2025 IRM final base case, SCRs would receive SCR-specific Capacity Accreditation Factors (CAFs) for the 2025-2026 Capability Year
    - Until such time, SCRs will be valued in the ICAP Market using the CAFs of the 4-hour Energy Duration Limited Capacity Accreditation Resource Class

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Project Review

- At the 10/26/2023 ICAPWG, the NYISO presented CAF results for the enhanced SCR modeling approach
  - These CAFs were calculated on at-criteria base cases that utilized the LCR Optimizer to set both the IRM and LCRs

- In response to stakeholders' requests, the NYISO has calculated updated CAFs for the enhanced SCR modeling on an at-criteria base case that utilized the Tan45 process to set the IRM
  - The LCR Optimizer was subsequently utilized to set the LCRs while retaining the Tan45-established IRM

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Enhanced SCR Modeling Results

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Enhanced SCR Modeling Results

- **Consistent with prior testing, the NYISO used the 2023 LCR case as the starting database and then incorporated both the enhanced SCR modeling and new Emergency Assistance (EA) modeling**
  - This new EA modeling was adopted in the 2024 IRM Final Base Case, as summarized in the FBC assumptions approved by the NYSRC Executive Committee

- **When re-establishing the at-criteria base case after incorporating the enhanced SCR modeling and new EA modeling, the NYISO utilized the Tan45 process to set the IRM[1] and subsequently used the LCR Optimizer from the 2023 LCR study to set the LCRs while retaining the Tan45-established IRM**
  - The IRM and LCRs for this case are:
    - NYCA IRM: 120.9%
    - G-J LCR: 85.4%[2]
    - J LCR: 81.7%[2]
    - K LCR: 104.3%

[1] The IRM impact of the enhanced SCR modeling will be further studied with the NYSRC ICS in 2024
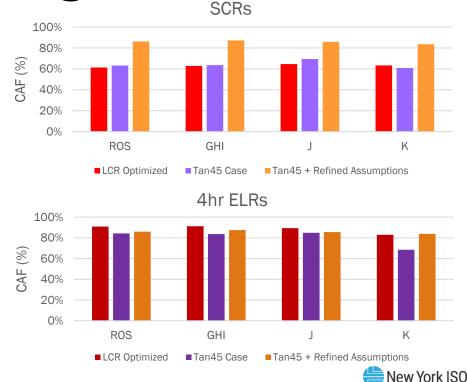[2] 2023 TSL floor remained binding

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Enhanced SCR Modeling Results

- **Additionally, the NYISO refined the modeling assumptions utilized for the incremental SCR and 4hr Energy Limited Resource (ELR) units to align with the refined ELR modeling assumptions utilized in the production of the 2024 Preliminary Base Case (PBC) Informational CAFs[1]**
  - These refined assumptions include the daily energy limit for the 4hr ELRs and "delayed" removal of the injection restriction to represent ELRs more consistently with expected market performance
    - The incremental SCR units, modeled in the calculation of the SCR CAFs, utilize the same starting hours as the first injection eligible hours utilized for the 4-hr ELRs
      - These starting hours vary by capacity zone

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Enhanced SCR Modeling Results

- In most capacity zones, the CAFs from the Tan45 case show small changes from the CAFs of the LCR Optimized case[1]

- With the incorporation of the refined modeling assumptions, the SCR CAFs increased while the 4hr ELR CAFs showed minimal changes in most capacity zones

  – The SCR CAFs increased due to the delayed starting hour for the incremental SCR unit
    - The starting hour was previously 2pm for both the incremental SCR and 4hr ELR units

  – Outside of Zone K, the 4hr ELR CAFs showed minimal changes due to the offsetting impacts of the daily energy limit and delayed removal of the injection restriction
    - The delayed removal of the injection restriction had a greater impact in Zone K

SCRs — CAF (%): ROS, GHI, J, K — LCR Optimized, Tan45 Case, Tan45 + Refined Assumptions

4hr ELRs — CAF (%): ROS, GHI, J, K — LCR Optimized, Tan45 Case, Tan45 + Refined Assumptions

[1] See the "Enhanced SCR + EA modeling" CAF results from the 10/26/2023 ICAPWG presentation

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Next Steps

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Next Steps

- The NYISO plans to work with the NYSRC in 2024 to continue discussion and analysis of the enhanced SCR modeling

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Questions?

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Appendix

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Previous Discussions

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Previous Discussions – SCR Modeling

Date	Working Group	Discussion Points and Links to Materials
January 26, 2023	ICAPWG	Modeling Improvements for Capacity Accreditation: Project Kick Off - https://www.nyiso.com/documents/20142/35880057/2023-01-26%20ICAPWG%20Modeling%20Improvements%20-%20Kick%20Off.pdf/c7ac6b6e-c90b-54b4-832d-ec6ecfc8f7ff
February 28, 2023	ICAPWG	SCR Modeling Kick Off - https://www.nyiso.com/documents/20142/36499713/2023-02-28%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/c1a52495-bc30-3e7c-f5c1-61c38f30fbe4
April 27, 2023	ICAPWG	Exploratory Testing Methodology for Existing SCRs - https://www.nyiso.com/documents/20142/37254128/2023-04%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/30382824-7468-24d2-e567-56c770d6a185
June 7, 2023	ICAPWG	Exploratory Testing Methodology for the Representative SCR unit - https://www.nyiso.com/documents/20142/38023757/2023-06-07%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/250f8f1d-9dfe-5756-640b-c1e31f3a6328
July 11, 2023	ICAPWG	Exploratory Testing Methodology Initial Results - https://www.nyiso.com/documents/20142/38699263/2023-07-11 ICAPWG Modeling Improvements - SCR Modeling v2 - clean.pdf/2f27473b-2292-31d4-ecb7-5d30d6b860f0
October 3, 2023	ICAPWG	Project Update - https://www.nyiso.com/documents/20142/40342797/2023-10-03%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/e5b6faa3-7865-c92a-dbf2-39e1ea6c65e8
October 26, 2023	ICAPWG	SCR Modeling– Enhanced SCR Modeling Results: https://www.nyiso.com/documents/20142/40834869/2023-10-26%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/7d81b04c-e08a-0298-eaa6-cf99d92aa88c

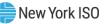# Background

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Background: Modeling Improvements for Capacity Accreditation

- As part of the 2022 Improving Capacity Accreditation project, the NYISO identified that the functionality utilized in the current resource adequacy analysis -- used to establish New York State installed reserve margins and used as the basis of determining Capacity Accreditation Factors -- related to the modeling of and accounting for attributes, such as correlated fuel unavailability for non-renewable resources, long start up notification requirements, non-fuel-related correlated outages, etc., may limit the basis for identifying certain Capacity Accreditation Resource Classes (CARCs) and calculating Capacity Accreditation Factors(CAFs) for some resource types
  - Enhancing the model's functionality will enable more accurate calculations of the Resource Adequacy requirements needed to maintain reliability and the Capacity Accreditation Factors, which will reflect the marginal reliability contributions of each Capacity Accreditation Resource Class
- The Modeling Improvements for Capacity Accreditation project deliverable is the development of Functional Requirements due in Q4 2023

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Background: SCR Modeling

- Special Case Resources (SCRs) are modeled in the IRM/LCR model. However, the current modeling of SCRs in the IRM/LCR model is not sufficiently aligned with the expected performance and obligations of SCRs in the NYISO's market. Therefore, SCRs cannot currently be treated as a separate CARC, for which to separately calculate CAFs, using the current modeling of SCRs
  - The following slide highlights differences in the modeling of SCRs in the IRM/LCR model compared to the expected performance and obligations of SCRs in the NYISO's market
  - Until the IRM/LCR model reflects the expected performance and obligations of SCRs in the NYISO's market, SCRs will be assigned to the 4-hour Energy Duration Limitation Capacity Accreditation Resource Class

- As part of this project, the NYISO will examine and recommend how to better reflect the expected performance and obligations of SCRs in the IRM/LCR study
  - Changes to the design of the SCR program are not within the scope of this project. Discussions on the needs of demand side resources and DERs, and gaps of the current NYISO DR/DER programs will take place as part of the Engaging the Demand Side initiative.

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Background: SCR Modeling

- **IRM/LCR modeling**

  - SCRs are modeled as a step in the Emergency Operating Procedure (EOP)

    - GE MARS activates EOP steps if there is not enough capacity to supply load in the simulation

  - GE MARS does not consider certain market requirements such as advanced notice for SCRs

  - The SCR EOP is limited to a maximum of 5 activations per month

  - SCRs are modeled without output hour limitations and therefore can be available for the whole day

  - All SCRs in the NYISO are activated as part of the EOP

  - SCRs are modeled at a derated capacity based on zonal performance factors and zonal Average Coincident Load (ACL) to Customer Base Load (CBL) derates

- **Expected performance and obligations in the NYISO market**

  - Similar to an EOP, the NYISO activates SCRs only when the Day-Ahead Market indicates potential serious shortages of supply for the next day. (ICAP Manual Section 4.12.5)

  - The NYISO is required to provide SCRs with advanced notice at least 21-hours prior to activation

  - There is no maximum number of SCR activations per month in the NYISO market

  - When activated, SCRs have a minimum 4-hour performance obligation. SCRs are not expected to reduce load for the entire day

  - SCRs can be activated separately by LBMP zone

  - SCRs receive capacity payments based on the Aggregation's seasonal performance factor, which "recognizes over-performance by one SCR to compensate for underperformance by another SCR in the same SCR Aggregation in the same hour" (ICAP Manual Section 4.12.2)

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Enhanced SCR Modeling Overview

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Enhanced SCR Modeling Overview

- At the <u>04/27/2023 ICAPWG</u>, the NYISO presented an exploratory testing methodology for modeling existing SCRs as duration limited resources with hourly response rates in the IRM model

  - This modeling is intended to reflect the aggregate performance and staggered responses of individual SCRs during activations

  - The hourly response rates reflect the historical hourly performance of SCRs within each zone during mandatory events from Summer 2012–Summer 2022

    - Hourly response rates are presented on the following slide

- The duration limit of the zonal SCR resources will vary by load zone based on the maximum historical call length that has occurred in the zone since 2012

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

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Enhanced SCR Modeling Overview

Zones	Response Rate by Hour of SCR Activation						
	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%

[1] Reflects capacity-weighted averages of zonal response rates. Zonal response rates are used in the enhanced SCR modeling

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Enhanced SCR Modeling Overview

- ## Zone J Modeling Example

  - If an SCR activation is triggered in GE MARS, the MWs available from the existing SCRs in Zone J will vary across the hours of the activation based on the maximum modeled capacity for the month and the hourly response rates for Zone J

Zone J		Hour of SCR Activation					
		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 zone in the same month of the prior year and the zonal ACL to CBL factor, as described on slide 12 of the 04/27/23 ICAPWG presentation. For example, the maximum modeled capacity for Zone J for July (310.7 MWs) was calculated by multiplying the Zone J SCR enrollments from July 2022 [417.5 MWs] by the Zone J ACL to CBL factor, as calculated for the 2023 IRM study [74.4%]

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Enhanced SCR Modeling Overview

- The representative SCR unit – which will be utilized for the CAF calculations– will be modeled as a 4-hour duration limited resource with 100% availability (*i.e.,* 100% hourly response rates across 4 consecutive hours)

  - Under marginal capacity accreditation, Capacity Accreditation Factors should reflect the marginal reliability contribution expected from adding one additional unit of a Capacity Accreditation Resource Class to the system in order to send economically efficient signals for market entry and exit
  - Individual SCR units have a 4-hour performance obligation
  - The activation of the representative SCR unit will be tied to the activation of the existing SCRs in the same zone
  - The representative SCR unit will not be subject to an ACL to CBL derate

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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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