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Independent System Operator

Modeling Improvements for Capacity Accreditation: Consumer Impact Analysis

Nicole Bouchez, Ph.D.
Sr. Principal Economist and Consumer Interest Liaison

ICAPWG/MIWG
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Reposted: The Startup Track CIA slides (Slides 36-40) have been struck because the NYISO is no longer proposing a change in rules in this track.

Agenda

- Overview of Modeling Improvements Tracks
- Methodology
- Consumer Impact Analysis
  - Correlated Derates
  - Gas Constraints
  - SCR Modeling
  - Startup Time

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Overview of the four Modeling Improvement Tracks

Modeling Improvements for Capacity Accreditation Tracks

- Correlated Derates
- Gas Constraints
- SCR Modeling
- Startup Time

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Overview of Modeling Improvement Tracks

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Correlated Derates	The number of units allowed to participate as Capacity Limited Resources (CLRs) has been reduced over time. The proposal is to sunset the CLR classification. Expanding DMNC ambient adjustment requirements to include all thermal units and adjust for humidity where appropriate. Proposal will also require water-cooled units to test during July/August period when ambient water temperatures are typically near peak	Capacity Limited Resource can currently sell capability into the ICAP market that is only available during emergencies. Sunsetting the CLR classification will require the ICAP equivalent of UCAP sold to be available to the energy market. While improving ambient derates for thermal units will better capture resource capability expected during system peak conditions		X	X

Overview of Modeling Improvement Tracks

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Gas Constraints	Examine and recommend how to account for natural gas constraints in the availability of non-firm fuel resources in the IRM/LCR model by developing a methodology to identify and quantify natural gas constraints, identify resources impacted by those constraints, and develop a methodology to account for the impact of natural gas constraints in GE MARS	The primary purpose of this market design effort is to put in an administrative process for units to make a CARC election based on their anticipated fuel supplies and to develop eligibility requirements for firm units	X	X	

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Overview of Modeling Improvement Tracks

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
SCR Modeling	Examine and recommend how to align the modeling of SCRs in the IRM/LCR study with the expected performance and obligations of SCRs in the NYISO's market	Proposes to model SCRs in the IRM/LCR study as duration limited resources with hourly response rates to better align with expected performance and obligations of SCRs in the NYISO's market	X	X	

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Overview of Modeling Improvement Tracks

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Startup Time	Examine if/how startup notification requirements of non-baseload units should be accounted for in the IRM/LCR model by identifying whether startup notification requirements of non-baseload units impact the ability of those units to be called upon to serve load under conditions of high loss of load risk. If found to have an impact, the NYISO will evaluate and recommend how to incorporate that impact into the IRM/LCR model	Verify start-up times do not inhibit a capacity supplier's ability to meet NY capacity needs under peak conditions without being scheduled through out of market actions		X	

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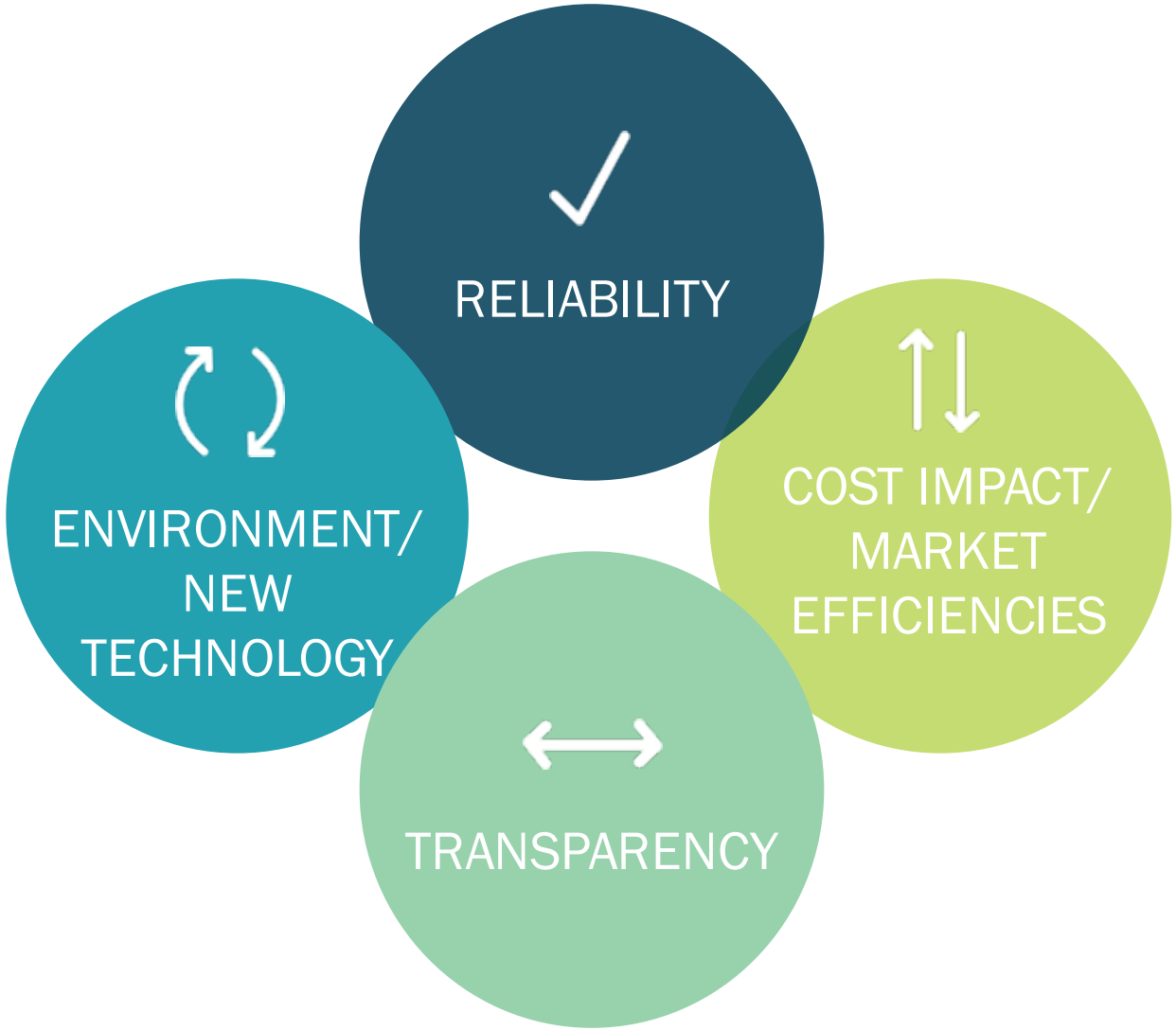
Methodology

Methodology

- The Consumer Impact Analysis looks to qualitatively assess the short and long-term impacts of the individual tracks of the Modeling Improvements for Capacity Accreditation project under the four CIA evaluation areas



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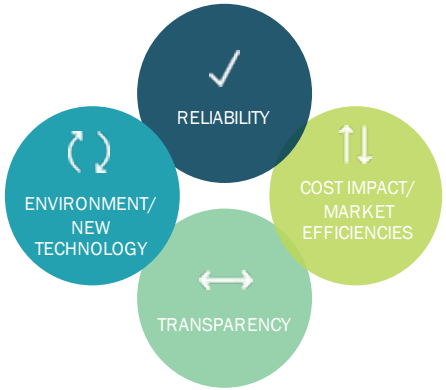
Methodology



- **Some quantitative data is available from the MMU**
  - 2022 State of the Market report (Section VII.F.)
    - Estimates that "capacity that was sold in the capacity market in Summer 2022 but that was unavailable in real time" because it was (1) capacity above the normal operating limit, (2) ambient water temperature dependent, or (3) ambient air humidity dependent.
    - Estimates that "approximately 1,200 MW of ICAP was functionally unavailable on the hottest days" and capacity above the normal operating limit accounted for approximately 400 MW of ICAP.
- **The December 2021 *Modifications to the BSM Construct in the NYISO Capacity Market Analysis of Potential Capacity Market Competitiveness and Reliability Outcomes* study by Paul Hibbard and Charles Wu (Analysis Group) is also available**

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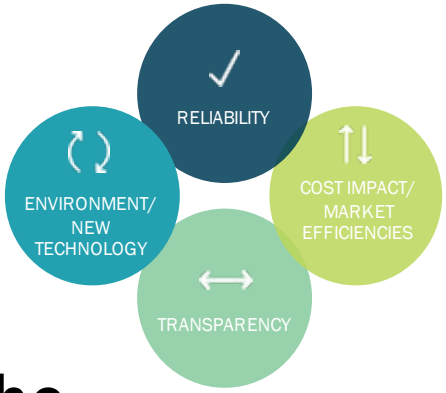
Methodology



- But the data available is not sufficient to understand how the changes will impact resource adequacy modeling and the resultant IRM and LCRs or the associated capacity supply changes and the resulting capacity and energy market impacts (short or long term)
- Data that would allow us to project how these changes would impact the capacity and energy markets going forward is not available
- Therefore, the focus is on qualitative assessments in all four CIA areas.
  - And there was not a stand-alone methodology presentation

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Correlated Derates

Correlated Derates

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Correlated Derates	The number of units allowed to participate as Capacity Limited Resources (CLRs) has been reduced over time. The proposal is to sunset the CLR classification in 2025. Finalizing DMNC rules for air cooled and once-through-water-cooled units. Thermal units affected by humidity will now need to correct to those curves. Proposal will also require water-cooled units to test during July/August period when water temperatures are typically near peak	Capacity Limited Resource can currently sell capability into the ICAP market that is only available during emergencies. Sunsetting the CLR classification will require the ICAP equivalent of UCAP sold to be available to the energy market. While improving ambient derates for thermal units will better capture resource capability expected during system peak conditions		X	X

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Summary of Proposed Changes: Correlated Derates

- **Capacity Limited Resources:**
  - A Capacity Limited Resource (CLR) is an energy supplier that is able to take extraordinary measures to reliably increase its output and has sold UCAP based on taking those extraordinary measures
  - These units will no longer be able to test by taking extraordinary measures, and therefore must test using the same configuration as normally offered in the energy market
- **Ambient Derates:**
  - Currently, DMNC tests on internal combustion, combustion units and combined cycle units must be ambient temperature adjusted
  - This project expands ambient adjustment to include humidity adjustment for all thermal units, including humidity adjustments for units with inlet cooling systems, and testing restrictions for units with once-through water cooling.
    - Water-cooled units will provide data from actual operation in July or August

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Correlated Derates: Cost Impact/ Market Efficiencies

- **Capacity Market**
  - Capacity Limited Resources and ambient adjusted units may offer less capacity into the ICAP market. The Potomac Economics estimate is approximately 400MW on peak days however it is not possible to know how that might translate to changes in quantities of capacity offered and cleared in the Capacity Market.
- **Energy Market**
  - Capacity Limited Resources may offer more MWs at normal upper operating limits, thus increasing the capacity available in the energy market
  - For Ambient Adjusted units, correcting output curves to peak ambient condition may reduce the amount of MWs available in the energy market, but cause a reduction in real-time ambient derates

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Correlated Derates: Environmental Impacts

- No environmental impacts expected

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Correlated Derates: Reliability Impacts

- Better correlation between MW sold and MW available during peak conditions should improve planning and operations and lead to improved reliability
- Better Resource Adequacy modeling

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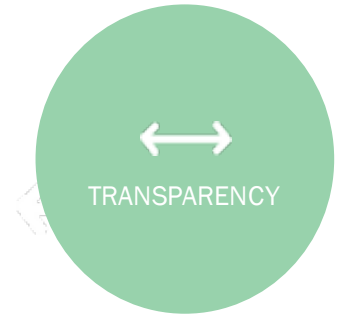
Correlated Derates: Impacts on Transparency



- Better transparency in the amounts of resources available

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Gas Constraints

Gas Constraints

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Gas Constraints	Examine and recommend how to account for natural gas constraints in the availability of non-firm fuel resources in the IRM/LCR model by developing a methodology to identify and quantify natural gas constraints, identify resources impacted by those constraints, and develop a methodology to account for the impact of natural gas constraints in GE MARS	The primary purpose of this market design effort is to put in an administrative process for units to make a CARC election based on their anticipated fuel supplies and to develop eligibility requirements for firm units	X	X	

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Summary of Proposed Changes: Gas Constraints

- Market design changes involve the development of Capacity Accreditation Resource Classes which reflect the contributions to reliability provided by thermal generators based on fuel supply and arrangements in addition to:
  - Developing an administrative process for making class elections
  - Developing class requirements
- Modeling enhancements are being developed in GE MARS to reflect natural gas constraints and the availability of thermal generators

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Gas Constraints: Cost Impact/ Market Efficiencies

- **Capacity Market**
  - The better tailoring of CARCs to actual performance should align capacity payments with marginal contributions to reliability based on unit fuel arrangements however it is not possible to know how that might translate to changes in quantities of capacity offered and cleared in the Capacity Market.
- **Energy Market**
  - No impact is expected

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Gas Constraints: Environmental Impacts

- Minimal environmental impacts related to potential increase in testing for dual fuel units

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Gas Constraints: Reliability Impacts

- Better IRM/LCR modeling consistent with actual unit performance

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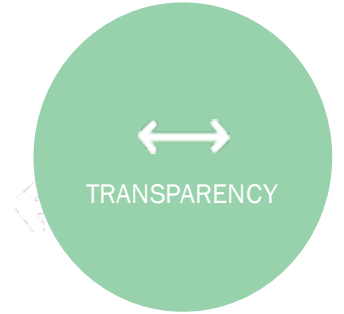
Gas Constraints: Impacts on Transparency



- Better visibility of fleet capabilities

SCR Modeling

SCR Modeling

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
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Summary of Proposed Changes: SCR Modeling

- **The NYISO has developed an enhanced methodology for modeling 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
  - See the 10/04/2023 presentation to the NYSRC Installed Capacity Subcommittee for a detailed summary of the enhanced SCR modeling
- **If the NYSRC adopts the enhanced SCR modeling into the final IRM base case for the 2025-2026 Capability Year, SCRs would receive SCR-specific CAFs for the 2025-2026 Capability Year**
  - Until changes are made to the SCR modeling in the IRM/LCR base case, SCRs will be valued in the ICAP Market using the Capacity Accreditation Factor of the 4-hour Energy Duration Limited Capacity Accreditation Resource Class
  - The enhanced SCR modeling is not being considered for inclusion in the final IRM base case for the 2024-2025 Capability Year

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SCR Modeling: Cost Impact/ Market Efficiencies

- **Capacity Market**
  - By enhancing the modeling of SCRs in the IRM/LCR model, SCRs can be treated as a separate CARC for which to separately calculate CAFs. These CAFs will better reflect the marginal reliability contribution of SCRs and contribute to increased capacity market efficiency by valuing SCRs consistent with their specific marginal reliability contribution.
  - It is not possible to know how that might translate to changes in quantities of capacity offered and cleared in the Capacity Market.
- **Energy Market**
  - No impact is expected

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SCR Modeling: Environmental Impacts

- No environmental impacts are expected

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SCR Modeling: Reliability Impacts

- Better accounting of the expected performance and obligations of SCRs in the IRM/LCR model will lead to resource adequacy requirements more reflective of expected operating conditions

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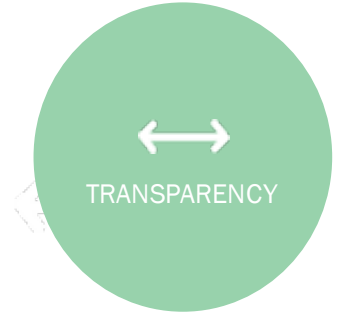
SCR Modeling: Impacts on Transparency



- Increased transparency of the specific marginal reliability contribution of SCRs toward meeting the NYSRC resource adequacy requirements

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Startup Time

Startup Time

Modeling Improvements for Capacity Accreditation					
	Track Description	Overview of Design	Resource Adequacy Changes	Capacity Market Changes	Energy Market Changes
Startup Time	Examine if/how startup notification requirements of non-baseload units should be accounted for in the IRM/LCR model by identifying whether startup notification requirements of non-baseload units impact the ability of those units to be called upon to serve load under conditions of high loss of load risk. If found to have an impact, the NYISO will evaluate and recommend how to incorporate that impact into the IRM/LCR model	Verify start-up times do not inhibit a capacity supplier's ability to meet NY capacity needs under peak conditions without being scheduled through out of market actions		X	

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Summary of Proposed Changes: Startup Time

- The NYISO is not proposing any change in the 24-hour threshold for the startup time requirements during forecasted seasonal peak load days because of indications that, for some units, it may increase emissions and wear and tear on aging plants.

- ~~The NYISO is evaluating a 24-hour threshold for the startup time requirements during forecasted seasonal peak-load days to make more units to be available for Day-Ahead Market commitment to serve load under such conditions.~~
  - ~~This startup capability will be reflected in the ICAP suppliers' bidding obligations for peak-load days.~~
- ~~This change would require capacity suppliers be available to meet NY capacity needs under peak conditions without being scheduled through out of market actions and increase uniformity and transparency in startup time requirements for non-baseload units~~

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~~Startup Time: Cost Impact/ Market Efficiencies~~

- ~~Energy Market~~
  - ~~Reduce out of market actions~~
  - ~~On peak days, more units may be available in the DAM which may reduce Energy Market LBMPs and Ancillary Service prices however we do not know the magnitude of the change.~~
- ~~Capacity Market~~
  - ~~Changes to capacity market bidding obligations~~
  - ~~No expected impacts to the capacity market outcomes~~

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~~Startup Time: Environmental Impacts~~

- ~~No environmental impacts are expected~~

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~~Startup Time: Reliability Impacts~~

- ~~Increased reliability on peak load days because additional units are expected to be available for Day-Ahead Market commitment.~~

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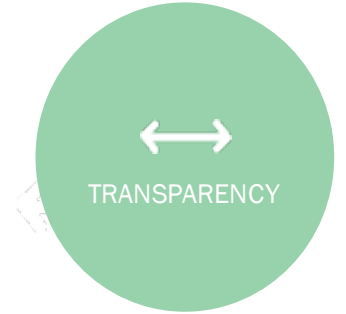
~~Startup Time: Impacts on Transparency~~



- ~~No impact on transparency expected.~~

Next Steps

Next Steps for Modeling Improvements for Capacity Accreditation

- Expected BIC vote December 13

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Modeling Improvements for Capacity Accreditation: Previous Discussions

Previous Discussions on Modeling Improvements for Capacity Accreditation

Date	Working Group	Discussion Points and Links to Materials
January 23, 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	Correlated Derates - Overview: https://www.nyiso.com/documents/20142/36499713/Correlated_Derates_MIWG_022823_FINAL.pdf/35eaab46-740e-aed0-9e2d-2207c06a0659 Natural Gas Constraints - Overview: https://www.nyiso.com/documents/20142/36499713/Gas%20Constraints%2002_28_2023%20ICAPWG_Final.pdf/e258d867-12f9-8453-c93b-49bc94b8e803 SCR Modeling - Overview: 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	Natural Gas Constraints - Gas Availability Estimates and Classification: https://www.nyiso.com/documents/20142/37254128/Natural%20Gas%20Constraints%202023_04_27_Final.pdf/0821aba8-bdcd-b1ce-96f3-2d8a740e1356 SCR Modeling - Current IRM Modeling and Historic SCR Performance, Exploratory Testing https://www.nyiso.com/documents/20142/37254128/2023-04%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/30382824-7468-24d2-e567-56c770d6a185 Startup Notifications - Project Overview: https://www.nyiso.com/documents/20142/37254128/Start-up%20notification%20time%20-%20ICAPWG%204.27.2023%20v0.2%20clean.pdf/b44eb773-6f7d-e895-e202-a12f2fb6e24e
May 8, 2023	ICAPWG	Correlated Derates - Ambient Adjustments and Emergency Capacity: https://www.nyiso.com/documents/20142/37431277/5%20Correlated_Derates_ICAPWG_050823.pdf/a1e9a0f4-d922-503d-06d0-682b49c46c4c

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Previous Discussions on Modeling Improvements for Capacity Accreditation

Date	Working Group	Discussion Points and Links to Materials
June 1, 2023	ICAPWG	Natural Gas Constraints – Potential methods for quantifying firm capacity, CARC designation, and fuel election timelines: https://www.nyiso.com/documents/20142/37883690/Natural%20Gas%20Constraints%2006_01_2023_ICAPWG_Final.pdf/d479ea64-a0d0-86d1-388a-f93d01ff1e10
June 7, 2023	ICAPWG	SCR Modeling – Exploratory Testing Methodology: https://www.nyiso.com/documents/20142/38023757/2023-06-07%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/250f8f1d-9dfe-5756-640b-c1e31f3a6328
June 27, 2023	ICAPWG	Natural Gas Constraints – Addressing Stakeholder feedback and discussion on simpler framework for classifying units: https://www.nyiso.com/documents/20142/38423065/2%20Natural%20Gas%20Constraints_06_23_2023_ICAPWG_Final.pdf/177ad95e-1fa3-5c57-a626-d06182b55c9b
July 11, 2023	ICAPWG	SCR Modeling – Exploratory Testing Methodology Results: https://www.nyiso.com/documents/20142/38699263/2023-07-11%20ICAPWG%20Modeling%20Improvements%20-%20SCR%20Modeling%20v2%20-%20clean.pdf/2f27473b-2292-31d4-ecb7-5d30d6b860f0
July 27, 2023	ICAPWG	Correlated Derates - Ambient Adjustments and Emergency Capacity: https://www.nyiso.com/documents/20142/39044934/Correlated_Derates_ICAPWG_072723_final.pdf/0f80f8f2-8100-b8f7-0c65-0098242634e1 Startup Time – Long Start-up Time and Considerations: https://www.nyiso.com/documents/20142/39044934/Startup%20time%20-%20ICAPWG%207.27.2023_v2.pdf/bbf6fa0d-b45e-6b7f-1697-2c002442b1de
August 8, 2023	ICAPWG	Gas Constraints – Classification Proposal, Requirements for Firm Units, and Data Submittal Timeline: https://www.nyiso.com/documents/20142/39257338/Natural%20Gas%20Constraints_08_09_2023%20ICAPWGv4%20(002).pdf/de6053e0-030d-5520-ed59-18f2225f0f92

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Previous Discussions on Modeling Improvements for Capacity Accreditation

Date	Working Group	Discussion Points and Links to Materials
September 5, 2023	ICAPWG	Correlated Derates – Ambient Adjustments: https://www.nyiso.com/documents/20142/39768278/5%20Correlated_Derates_ICAPWG_090523_final.pdf/5aa71990-e873-166b-a520-e8e6c44b42e1
September 18, 2023	ICAPWG	Startup Notification - Recommendation and Draft Tariff Revisions: https://www.nyiso.com/documents/20142/40044890/7%20Start-up%20Time%20Proposed%20Capacity%20Tariff%20Revision%20-%20ICAPWG%2009-18.pdf/9d6e8c5e-b7cd-384c-b713-be93507912ed
September 20, 2023	ICAPWG	Gas Constraints – Updated Requirement, Data Verification Timeline and Shortfall Penalty: https://www.nyiso.com/documents/20142/40085480/Natural%20Gas%20Constraints_9_20_2023_v4.pdf/8c76a250-d1e0-d30a-2c24-115f10268c65
October 3, 2023	ICAPWG	SCR Modeling – Project Update: https://www.nyiso.com/documents/20142/40342797/2023-10-03%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/e5b6faa3-7865-c92a-dbf2-39e1ea6c65e8
October 4, 2023	ICS	Modeling Improvements for Capacity Accreditation – SCR Modeling: https://www.nysrc.org/wp-content/uploads/2023/09/11_SCR_Modeling.pdf
October 10, 2023	ICAPWG	Modeling Improvements for Capacity Accreditation: Natural Gas Constraints: https://www.nyiso.com/documents/20142/40481418/2%20Natural%20Gas%20Constraints_10_10_v3.pdf/7f39851d-f477-6a12-d7d2-52f52af87fcb Modeling Improvements for Capacity Accreditation: Correlated Derates https://www.nyiso.com/documents/20142/40481418/3%20Correlated_Derates_ICAPWG_101023_final.pdf/76326e11-e97f-cb93-2ca4-902d11365bda

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Previous Discussions on Modeling Improvements for Capacity Accreditation

Date	Working Group	Discussion Points and Links to Materials
October 19, 2023	ICAPWG	Startup Time Capacity Tariff Discussion: https://www.nyiso.com/documents/20142/40696384/Start-up%20Time%20Capacity%20Tariff%20Discussion-%20ICAPWG%2010-19.pdf/247ea46c-9bc3-60c5-9363-69d787bb78c9
October 26, 2023	ICAPWG	SCR Modeling – Updated Results: https://www.nyiso.com/documents/20142/40834869/2023-10-26%20Modeling%20Improvements%20-%20SCR%20Modeling.pdf/7d81b04c-e08a-0298-eaa6-cf99d92aa88c

New York ISO

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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