New York ISO
Independent System Operator

Capacity Accreditation

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ICAPWG/MIWG

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- Resource Specific Derating Factor Proposal for Performance-based Resources
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Previous Discussions

Previous Discussions

Date	Working Group	Discussion Points and Links to Materials
August 5, 2021	ICAPWG	Review of Existing Capacity Accreditation Rules: https://www.nyiso.com/documents/20142/23590734/20210805%20NYISO%20-%20Capacity%20Accreditation%20Current%20Rules%20Final.pdf
August 9, 2021	ICAPWG	Capacity Accreditation Proposal: https://www.nyiso.com/documents/20142/23645207/20210809%20NYISO%20-%20Capacity%20Accreditation%20Straw%20Proposal.pdf
August 30, 2021 & August 31, 2021	ICAPWG	Capacity Accreditation Proposal: https://www.nyiso.com/documents/20142/24172725/20210830%20NYISO%20-%20Capacity%20Accreditation_v10%20(002).pdf
September 28, 2021	ICAPWG	Comprehensive Mitigation Review Proposal and Tariff: https://www.nyiso.com/documents/20142/24925244/20210928_NYISO_-CMR_Final.pdf/769828a1-f224-0140-240b-0762ec18efec
October 18, 2021	ICAPWG	Comprehensive Mitigation Review Proposal and Tariff Updates: https://www.nyiso.com/documents/20142/25440628/20211018%20NYISO%20-%20CMR%20v9.pdf/4475e775-159c-75c7-9cf8-7050dad9a363
October 29, 2021	ICAPWG	Comprehensive Mitigation Review Proposal and Tariff Updates: https://www.nyiso.com/documents/20142/25780701/20211029%20NYISO%20-%20CMR.pdf/ea8494b0-0860-b260-89b6-0c418d28a91d

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Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
November 2, 2021	ICAPWG	NYISO CMR Consumer Impact Analysis: https://www.nyiso.com/documents/20142/25835955/CIA%20-%20Comprehensive%20Mitigation%20Review.pdf/36d447d4-5b33-8ab1-2654-90a529ff1dfe Potomac CMR Consumer Impact Analysis: https://www.nyiso.com/documents/20142/25835955/MMU%20ICAP%20Accreditation%20Consumer%20Impact%20Analysis%201-02-2021.pdf/637ba21e-db75-a4c1-5b41-f770dd26e529
November 9, 2021	BIC	Comprehensive Mitigation Review Proposal and Tariff: https://www.nyiso.com/documents/20142/25928340/5%20202111109%20NYISO%20-%20CMR%20v3.pdf/84d8b429-126c-68dd-0308-caa50886de92 Comprehensive Mitigation Review Approved Motion: https://www.nyiso.com/documents/20142/25928340/110921%20bic%20final%20motions.pdf/785d5869-1e04-9f97-e330-e2e632ae7a9c
November 17, 2021	MC	Comprehensive Mitigation Review Proposal and Tariff: https://www.nyiso.com/documents/20142/26119798/05%20CMR.pdf/11217ade-152a-74a2-d478-6b5ae5e21207 Comprehensive Mitigation Review Approved Motion: https://www.nyiso.com/documents/20142/26119798/111821%20MC_Final_Motions.pdf/bbf15d66-4108-7173-1596-9b20677914e6

Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
January 20, 2022	ICAPWG	2022 Market Projects: https://www.nyiso.com/documents/20142/27799605/2022%20Projects%20Presentation.pdf/4553eb95-177d-7cbc-f2fe-7754b7c66644
February 3, 2022	ICAPWG	Improving Capacity Accreditation Plan: https://www.nyiso.com/documents/20142/28227906/Improving%20Capacity%20Accreditation%20Plan.pdf/92560e95-5703-4c57-45cb-7706c36f4656
February 24, 2022	ICAPWG	Improving Capacity Accreditation Project Kick Off: https://www.nyiso.com/documents/20142/28687884/Capacity%20Accreditation%20Kick%20Off%2002-24-22%20v7.pdf/5ab742c4-650b-5094-6a22-d41a2f29da6f MARS Review (GE Consulting): https://www.nyiso.com/documents/20142/28687884/GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0224-v4.pdf/d302df1c-5607-16a8-ba01-fba700d5bbd1
March 3, 2022	ICAPWG	CMR Draft Deficiency Response: https://www.nyiso.com/documents/20142/28897222/CMR%20Deficiency%20Draft%20Responses%2003-03%20ICAPWG.pdf/0a3c8303-515e-7725-dee5-a9dda1398672

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Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
March 16, 2022	ICAPWG	Capacity Accreditation Resource Class Criteria, Resource-Specific Derating Factors, and Areas of Needed Change: https://www.nyiso.com/documents/20142/29177064/Capacity%20Accreditation%2003-16-22%20v7.pdf/b26e6a99-5f4e-29cc-c60c-47608c78c983
March 31, 2022	ICAPWG	Capacity Accreditation Representative Unit Modeling: https://www.nyiso.com/documents/20142/29607069/2%20CA%20Representative%20Unit%20Modeling%2003-31-22%20ICAPWG.pdf/1c3af8ac-625a-5066-3977-8c3d9ae0ddda ELCC and MRI Overview (GE): https://www.nyiso.com/documents/20142/29607069/3%20GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0331.pdf/08355c9a-d104-e1b6-6b8a-8266c61b74a3
April 19, 2022	ICAPWG	Capacity Accreditation Adjusted Resource Specific Derating Factors and External Resources: https://www.nyiso.com/documents/20142/30025560/04-19-22%20CA%20Adjusted%20Derating%20Factors%20and%20External%20Resources.pdf/5dd1f4b2-092d-6a6a-3b99-4d768ea6c5eb

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Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
April 28, 2022	ICAPWG	Preliminary Capacity Accreditation Resource Classes: https://www.nyiso.com/documents/20142/30276257/04-28-22%20Capacity%20Accreditation%20-%20Preliminary%20CARCs.pdf/c82c47c5-28c2-cf19-c602-16bf3cfc4aca Preliminary ELCC and MRI Results (GE): https://www.nyiso.com/documents/20142/30276257/GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0428.pdf/3c761f16-7bc0-b469-b1e8-c2a69feb58ef
May 24, 2022	ICAPWG	Updated Preliminary CARCs and Annual Process to Establish CARCs: https://www.nyiso.com/documents/20142/30888946/3%2005-24-22%20Capacity%20Accreditation.pdf/cd61d855-f634-0fe8-6109-7d8c0547beda Additional Preliminary ELCC and MRI Results (GE): https://www.nyiso.com/documents/20142/30888946/2%20GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0524.pdf/0976330d-f4eb-4db3-2613-c8be9bafe452
June 16, 2022	ICAPWG	Sensitivity Scenarios and Seasonal CAFs: https://www.nyiso.com/documents/20142/31532822/2%20Capacity%20Accreditation%20v6.pdf/4ffe4fa9-bdaf-2c23-77be-d49ed04c5ea5

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Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
June 28, 2022	ICAPWG	Annual Peak Load Window (PLW) Review and Energy Duration Limitation Proposals: https://www.nyiso.com/documents/20142/31790818/06-28-22%20PLW%20and%20EDL%20Proposal.pdf/ffca7c8a-767e-3de1-9b46-404f661351b3 Revised Shape-based Resource Results and ELR Modeling Functionality in MARS (GE): https://www.nyiso.com/documents/20142/31790818/GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0628.pdf/999c7dfa-0b5d-a6bc-a57a-b35a1cda5aa4
July 21, 2022	ICAPWG	Capacity Accreditation: Project Schedule Update: https://www.nyiso.com/documents/20142/32356084/7-21-2022%20ICAPWG%20Project%20Schedule.pdf/958ef86a-12de-32a1-c115-5c1af39abb54
July 28, 2022	ICAPWG	Capacity Accreditation: SCR CAF Results and Proposal: https://www.nyiso.com/documents/20142/32491922/2%207282022%20ICAPWG%20Capacity%20Accreditation.pdf/3f991228-5011-7cc2-cfd3-a7762fa8c8f6 Sensitivity Scenario Methodologies (GE): https://www.nyiso.com/documents/20142/32491922/3%20GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_0728.pdf/9fd89cbc-2baa-3c54-dc74-17c2e8cf588a

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Previous Discussions (cont.)

Date	Working Group	Discussion Points and Links to Materials
August 9, 2022	ICAPWG	Modeling Discussion and ICAP Manual Revision Process Options: https://www.nyiso.com/documents/20142/32687686/08-09-22%20Capacity%20Accreditation.pdf/1009a4dc-bb9f-17f3-bb34-908fd8d5704d
August 29, 2022	ICAPWG	Annual CAF Proposal, Winter PLW Assessment, and CAF Interaction with the ICAP Demand Curves: https://www.nyiso.com/documents/20142/32977661/Capacity%20Accreditation%2008292022%20ICAPWG.pdf/13c04d12-f77f-3184-15c4-8f0b22897f3d Compiled Preliminary CAF Results: https://www.nyiso.com/documents/20142/32977661/GE-Support%20for%20NYISO%20Capacity%20Accreditation%20Project_LCR-results.pdf/e9fdeb01-1ee0-7651-6a3f-0823aedcef1d

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Background

Background

- **The NYISO has begun stakeholder discussions to (1) develop the implementation details and technical specifications for establishing Capacity Accreditation Factors (CAFs) and Capacity Accreditation Resource Classes (CARCs) and (2) propose necessary ICAP Manual revisions**
  - The NYISO has contracted with GE Energy Consulting to support the NYISO and its stakeholders in the development of the implementation details and technical specifications
- **The 2022 Improving Capacity Accreditation project deliverable is a Q3 Market Design Complete**
  - Completion of the project is delayed. The NYISO is now targeting a Q4 Market Design Complete

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CAFs vs Resource Specific Derating Factors

Capacity Accreditation Factors

- **CAFs will reflect the marginal reliability contribution of the representative unit of each CARC for each location that is evaluated**
- **The impact of the following characteristics would be captured by CAFs:**
  - Energy Duration Limitations
  - Correlated unavailability due to weather and/or fuel supply limitations
  - Synergistic and antagonistic effects
  - Start-up notification time limitations

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Resource Specific Derating Factors

- **As discussed previously, resource specific derating factors will capture differences in availability that is specific to an individual resource and not captured in the CAF of the resource's CARC**
  - Examples:
    - Forced outages, forced derates, failed starts, etc.
    - Resource output that is different from the modeled production profile of the CARC
- **Generally, a Resource's UCAP will be determined by combining the Resource's ICAP, CAF, and resource specific derating factor as illustrated below**
  - UCAP = Adjusted ICAP x (1 – resource specific derating factor)
    - Where:
      - Adjusted ICAP = ICAP * CAF
      - ICAP = min(DMNC, CRIS)
    - So, UCAP = min(DMNC, CRIS) * CAF * (1 – resource specific derating factor)
  - For more information on current resource-specific derating factors, see the 03/16/22 ICAPWG presentation

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Resource Specific Derating Factor Proposal for Performance-based Resources

Proposal Background

- **The NYISO presented its initial proposal for the calculation of resource specific derating factors for performance-based resources at the 04/19/2022 ICAPWG**
  - Performance-based resources include Intermittent Power Resources (*i.e.,* solar, onshore wind, offshore wind, and landfill gas) and Limited Control Run of River Hydro
- **In its initial proposal, the NYISO proposed to use 1 minus an "Average Capacity Factor Ratio" as the resource specific derating factor for performance-based resources**
  - UCAP = ICAP * CAF * (1 – resource specific derating factor)
    - Where:
      - Resource specific derating factor = 1 – Average Capacity Factor Ratio
      - Average Capacity Factor Ratio =

$$\frac{Average\ Capacity\ Factor\ of\ Individual\ Resource\ during\ Peak\ Load\ Window\ over\ the\ last\ two\ like\text{–}Capability\ Periods}{Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ Peak\ Load\ Window\ over\ last\ five\ like\text{–}Capability\ Periods}$$

- **Combined with the NYISO's proposal to use annual CAFs for the initial implementation of Capacity Accreditation, the initial resource specific derating factor proposal could result in distorted winter UCAPs for resource types with much smaller winter capacity factors than annual CAFs**
  - Example on next slide
  - This near-term issue is only present in the winter due to annual CAFs largely reflecting resources' marginal reliability contributions to meeting summer LOLE. There is currently little to no winter LOLE risk in the current IRM/LCR model

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Proposal Background

- **Distorted Winter UCAP Example 1:**
  - Hypothetical assumptions for illustrative purposes
    - ICAP of individual solar unit: 100 MW
    - Solar annual CAF: 30%
    - Average winter capacity factor of individual solar unit: 1%
    - Average winter capacity factor of representative unit: 0.5%
  - Current Proposal
    - UCAP = ICAP * CAF * (1 – resource specific derating factor)
    - Resource specific derating factor = 1 – Average Capacity Factor Ratio
    - Average Capacity Factor Ratio =

$$\frac{Average\ Capacity\ Factor\ of\ Resource\ during\ measurement\ window}{Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ measurement\ window}$$

  - Results
    - Average Capacity Factor Ratio = $\frac{1\%}{0.5\ \%} = 2$
    - UCAP = ICAP * CAF * (1 – (1 – Average Capacity Factor Ratio)) = 100 MW * 30% * (1 – (1 - 2)) = 30 MW * 2 = 60 MW
      - **The effective capacity value of this resource (*i.e.*, UCAP divided by ICAP) should be closer to the 30% annual CAF but is artificially inflated due to the ratio impact of small absolute differences in low average capacity factors compared to the annual CAF**

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Proposal Background

- **The NYISO considered an alternative derating factor methodology (*i.e.*, the difference approach) that adds the difference between the average capacity factor of the individual and representative units to the annual CAF to calculate the UCAP of an individual resource**
  - Example:
    - Hypothetical assumptions for illustrative purposes:
      - ICAP of individual solar unit: 100 MW
      - Solar annual CAF: 30%
      - Average winter capacity factor of individual solar unit: 1%
      - Average winter capacity factor of representative unit: 0.5%
    - Difference approach
      - UCAP = ICAP * (CAF + Average Capacity Factor Difference)
      - Average Capacity Factor Difference =

$$Average\ Capacity\ Factor\ of\ Resource\ during\ measurement\ window\ -Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ measurement\ window$$

    - Result
      - Average Capacity Factor Difference = 1% - 0.5% = 0.5%
      - UCAP = 100 MW * (30% + 0.05%) = 30.5 MW
- **The difference approach resolves the large divergences between effective capacity values and annual CAFs for resource types with lower winter average capacity factors than annual CAFs. However, the difference approach can result in zero or negative UCAP for resources with much lower annual CAFs than average capacity factors in the winter**
  - Example on next slide

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Proposal Background

- **Distorted Winter UCAP Example 2:**
  - Hypothetical assumptions for illustrative purposes
    - ICAP of individual wind unit: 100 MW
    - Wind annual CAF: 10%
    - Average winter capacity factor of individual wind unit: 20%
    - Average winter capacity factor of representative unit: 30%
  - Difference approach
    - UCAP = ICAP * (CAF + Average Capacity Factor Difference)
    - Average Capacity Factor Difference =

$$Average\ Capacity\ Factor\ of\ Resource\ during\ measurement\ window\ -\ Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ measurement\ window$$

  - Result
    - Average Capacity Factor Difference = 20% - 30% = - 10%
    - UCAP = 100 MW * (10% - 10%) = 0 MW
      - **The difference approach can result in zero or negative UCAP for resources with lower annual CAFs than average capacity factors in the winter**

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Updated Proposal

- To remedy the issues that the two approaches produce when used in isolation, the NYISO is proposing to initially calculate the UCAP for each performance-based resource under each approach. After calculating the UCAPs under each approach, the NYISO will assign to each resource the UCAP that results in the closer alignment between the resource's effective capacity value and annual CAF
  - Example of application on the next slide
- Initial calculation methodologies:
  - Methodology 1: Ratio approach
    - Where:
      - UCAP = ICAP * CAF * (1 – resource specific derating factor)
      - Resource specific derating factor = 1 – Average Capacity Factor Ratio
      - Average Capacity Factor Ratio =

$$\frac{Average\ Capacity\ Factor\ of\ Resource\ during\ measurement\ window}{Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ measurement\ window}$$

  - Methodology 2: Difference approach
    - Where:
      - UCAP = ICAP * (CAF + Average Capacity Factor Difference)
      - Average Capacity Factor Difference =

$$Average\ Capacity\ Factor\ of\ Resource\ during\ measurement\ window\ -\ Average\ Capacity\ Factor\ of\ Representative\ Unit\ during\ measurement\ window$$

[1] The measurement window under all approaches will be the Peak Load Window over the applicable months of the last two-like Capability Periods for both the individual and representative units. The applicable months for the Summer Capability Period are June, July, and August. The applicable months for the Winter Capability Period are December, January, and February

Updated Proposal

- **Distorted Winter UCAP Example 1:**
  - Hypothetical assumptions for illustrative purposes
    - ICAP of individual solar unit: 100 MW
    - Solar annual CAF: 30%
    - Average winter capacity factor of individual solar unit: 1%
    - Average winter capacity factor of representative unit: 0.5%
  - Ratio approach
    - UCAP = ICAP * CAF * (1 – (1 –(1% /0.5%))) = 100 MW * 30% * (1 – (1 - 2)) = 30 MW * 2 = 60 MW
    - Effective capacity value = UCAP/ICAP = 60%
  - Difference approach
    - UCAP = 100 MW * (30% + (1% - 0.5 %)) = 30.5 MW
    - Effective capacity value = UCAP/ICAP = 30.5%
  - The UCAP of 30.5 MW under the difference approach would be assigned to the resource since the effective capacity value is closest to the annual CAF

- **Distorted Winter UCAP Example 2:**
  - Hypothetical assumptions for illustrative purposes
    - ICAP of individual wind unit: 100 MW
    - Wind annual CAF: 10%
    - Average winter capacity factor of individual wind unit: 20%
    - Average winter capacity factor of representative unit: 30%
  - Ratio approach
    - UCAP = 100 MW * 10% * (1 – (1 – (20%/30%))) = 6.7 MW
    - Effective capacity value = UCAP/ICAP = 6.7%
  - Difference approach
    - UCAP = 100 MW * (10% + (20%- 30%) = 0 MW
    - Effective capacity value = UCAP/ICAP = 0%
  - The UCAP of 6.7 MW under the ratio approach would be assigned to the resource since the effective capacity value is closest to the annual CAF

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Updated Proposal

- **The NYISO tested the updated proposal using historic performance data for all performance-based resources in the ICAP Market for Capability Year 2021-2022 and concluded that the proposal:**
  - 1) Removes the distorted winter UCAP values that result from the application of either approach in isolation
  - 2) Provides a reasonable UCAP value for all resources

Total UCAP (MWs) by Approach				ICAP	CAF
	Winter 2021 - 2022				
Resource Type	Difference	Ratio	Proposal		
Biomass	68	68	68	100	65%
LCROR	483	463	463	930	36%
Onshore Wind	88	127	127	1574	9%

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CAF Interaction with ICAP Demand Curves

CAF Interaction with ICAP Demand Curves

- At the 08/29/2022 ICAPWG, the NYISO proposed to account for the applicable CAF of the relevant peaking unit as part of the translation of the ICAP Demand Curves to UCAP terms. With this change, a question arose regarding how the applicable CAF would be incorporated in the evaluation of potential peaking unit technologies during the Demand Curve Reset
- MST 5.14 allows the independent consultant to consider a variety of factors in its evaluation of potential peaking unit technologies that are economically viable. The applicable CAFs of potential peaking unit technologies would be considered as one such factor

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ISO Review of Peak Load Windows

ISO Review of Peak Load Windows

- **The NYISO proposed the annual review process for the Peak Load Windows (PLWs) for the Summer and Winter Capability Periods at the 06/28/2022 and 08/29/2022 ICAPWGs, respectively**
  - The PLW from the prior Summer Capability Period will be compared to the hourly LOLE from the final LCR model and adjusted if the previous PLW does not capture at least 90% of LOLE in the Summer Capability Period
  - The current PLW for the Winter Capability Year (HB 16-21) will be maintained until winter modeling assumptions and approaches have been updated in the IRM/LCR model
- **The NYISO is proposing an additional ISO review of the PLWs that result from the previously presented annual review process**
- **The NYISO proposes to review the PLWs that result from the previously presented annual review process for consistency with expected hours of reliability risk based on operating experience and/or expected grid conditions for the upcoming Capability Year**
  - If the ISO determines a PLW is inconsistent with the expected hours of reliability risk based on operating experience and/or expected grid conditions, the ISO may propose a new PLW for the upcoming Capability Year. The new PLW must be approved by the NYISO Operating Committee and posted by March 1st
  - If the new PLW is not approved by the NYISO Operating Committee by March 1st, the PLW from the previously presented annual review process will be maintained for the upcoming Capability Year

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Modeling At Criteria vs Level of Excess

Modeling At Criteria vs Level of Excess

- **Following this presentation, GE will present the capacity value results from the 2022 LCR database adjusted to level of excess ("LOE") conditions**
  - LOE conditions are achieved in the model through the addition and removal of perfect capacity, such that the net increase in capacity to the NYCA is approximately the Installed Capacity of the peaking unit for the ICAP Demand Curve of the NYCA[1]
    - This methodology is based on previous practice of modeling LOE conditions. Currently, there is no approved methodology for modeling LOE conditions
  - The LOE database has a smaller LOLE of 0.0548 days/year compared to the 0.1006 days/year of the 2022 LCR database at criteria
  - In addition to having fewer loss of load events, the LOE database has on average shorter loss of load events than the 2022 LCR database at criteria (5.3 hours vs 5.4 hours)
- **The change in duration and number of loss of load events impact the capacity value of resources. However, the NYISO maintains that modeling the system at criteria is the appropriate modeling approach for calculating CAFs**
  - Modeling at LOE conditions will introduce volatility in CAFs as the peaking unit for the ICAP Demand Curve changes
  - Modeling at LOE conditions will increase in complexity if the peaking unit for the ICAP Demand Curve does not yet exist in the NYISO system
  - There is no approved methodology for modeling LOE conditions

[1]Due to the nested nature of capacity regions, perfect capacity is added to the NYC and LI Localities and removed from Rest of State

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Next Steps

Next Steps

- The NYISO plans to return to the ICAPWG in October with the Consumer Impact Analysis for Capacity Accreditation and further sensitivity scenario results

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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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