Energy Storage Resources: ICAP Manual Changes

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Agenda

- Background
- Incremental Revisions to ICAP Manual
- Incremental Revisions to ICAP Manual Attachments
- Next Steps
- Appendix

Background

A Grid in Transition – The Plan

Aligning Competitive Markets and New York State Clean Energy Objectives

- **Carbon Pricing**
- **Comprehensive Mitigation Review**
- **DER Participation Model**
- **Energy Storage Participation Model**

Valuing Resource & Grid Flexibility

- **Enhancing Energy & Shortage Pricing**
  - Ancillary Services Shortage Pricing
  - Constraint Specific Transmission Shortage Pricing
  - Enhanced Fast Start Pricing
- **Review Energy & Ancillary Services Product Design**
  - More Granular Operating Reserves
  - Reserve Enhancements for Constrained Areas
  - Reserves for Resource Flexibility

Improving Capacity Market Valuation

- **Enhancements to Resource Adequacy Models**
- **Revise Resource Capacity Ratings to Reflect Reliability Contribution**
  - Expanding Capacity Eligibility
  - Tailored Availability Metric
- **Capacity Demand Curve Adjustments**

NEW YORK INDEPENDENT SYSTEM OPERATOR

FERC Order No. 841

- On February 15, 2018, FERC issued a final rule to remove barriers to the participation of Energy Storage Resources (ESRs) in the competitive wholesale markets
- On December 3, 2018, NYISO filed proposed tariff revisions to comply with Order No. 841 to accommodate and establish rules for participation of ESRs in the ISO-administered markets
- On December 20, 2019, FERC issued an Order accepting the majority of the NYISO's proposed tariff revisions
  - The NYISO is undertaking a small number of further compliance obligations directed in the December 20, 2019 Order

Purpose of Today's Meeting

- **Review incremental changes to the ICAP Manual and ICAP Manual Attachments that are necessary to administer the ESR tariff revisions**
  - The initial ICAP Manual revisions to accommodate ESRs were presented at the July 10, 2019 ICAPWG
  - Note that the revisions capture only the rules proposed in the NYISO's ESR compliance filing
    - Additional revisions are anticipated to be proposed in 2021 to address DER and Expanding Capacity Eligibility
- **A redlined version of the proposed changes to the ICAP Manual and Attachments are posted with today's meeting materials**
  - Incremental revisions since the December 5, 2019 ICAPWG are highlighted in green in the ICAP Manual and ICAP Manual Attachments

Incremental Revisions to ICAP Manual

Incremental Revisions to ICAP Manual

- **Section 4.5 –Calculation of the Amount of Unforced Capacity each Resource may Supply to the NYCA**
  - Revisions have been made to clarify the default derating factor used for the Resource's initial UCAP value

Incremental Revisions to ICAP Manual

- **Section 4.8.1 – Generators and System Resources**
  - Revisions have been made to the Bid, Schedule, Notify requirement for Energy Storage Resources
    - ESRs that are Installed Capacity Suppliers must Bid, Schedule, or Notify the maximum of the inverse of its Installed Capacity Equivalent or the Lower Operating Limit
    - Removed requirement for ESRs to bid as ISO-Managed in DAM

Incremental Revisions to ICAP Manual Attachments

Revisions to ICAP Manual Attachments

- **Attachment J of the ICAP Manual includes incremental revisions since the December 5th ICAPWG to the following sections:**
  - 3.4 – Calculation of UCAP for Intermittent Power Resources
  - 3.5 – Calculation of UCAP for Installed Capacity Delivered over UDR Facilities
  - 3.6 – Calculation of UCAP for Installed Capacity Delivered over EDR Facilities
  - 3.7 – Calculation of UCAP for Energy Storage Resources

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Sections 3.4, 3.5, and 3.6 includes ministerial edits
    - Superscript for $UCAP^{Q}_{gm}$ changed to $UCAP^{P}_{gm}$ for consistency with other sections

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Section 3.7 includes revisions to terminology and formatting as follows:
    - Definition of Total Available ICAP $Seconds_{gn}$ has been revised to account for correct terminology
    - Definition of Total Monthly $Seconds_{gh}$ has been changed to Total Expected Monthly $Seconds_{gh}$ to more accurately capture concept
    - The equation for Energy Level $Availability_{gi}$ has been reformatted for clarity

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Section 3.7 includes revisions to the following terms for clarity:
    - Energy Level Availability$_{gi}$, Interval Seconds$_{gi}$, UOL$_{Ngi}$, Adjusted ICE$_{gi}$, LOL$_{Ngi}$, Adjusted Storage$_{gi}$, Committed Energy Level$_{gr}$, Energy Level$_{gr}$, DAM Energy$_{gr}$, DAM Reserves$_{gr}$

Next Steps

Next Steps

- **Pending additional feedback, the NYISO is seeking to bring the proposed revisions to the ICAP Manual and appropriate Attachments to an upcoming BIC**
  - The ICAP Manual revisions will become effective in accordance with the effective date for the tariff revisions

Feedback/Questions?

Email additional feedback to: scarkner@nyiso.com and deckels@nyiso.com

Appendix

The following slides were included in the December 5, 2019 ICAPWG presentation

Overview of revisions to ICAP Manual

Revisions to ICAP Manual

- **The following sections of the ICAP Manual include revisions to account for ESRs:**
  - Sections 4.2.5, 4.5, and 4.6
    - Ministerial edits
  - Sections 4.2.2, 4.5, and 4.8.1
    - Revisions to explicitly include ESRs

Proposed Installed Capacity Manual Changes

- **Minor revisions were made throughout the ICAP Manual in the following sections:**
  - Section 4.2.5 – Required DMNC Generating Capability Test Data
    - Revisions to formatting
  - Sections 4.5 – Calculation of the Amount of Unforced Capacity each Resource may Supply to the NYCA
    - Revisions to correct reference to NYISO Services Tariff
    - Changed "Resource" to "Generator" in some instances to account for correct resource types
  - Section 4.6 – Operating Data Default Value and Exception for Certain Equipment Failures
    - Revisions to correct reference to NYISO Services Tariff

Proposed Installed Capacity Manual Changes

- **Section 4.2.2 – Resource Specific Test Conditions**
  - Revisions have been made to include DMNC testing requirements for Energy Storage Resources
    - Measures maximum sustained output over 4 consecutive hours
    - Resources can derate to meet the 4 hour duration requirement

Proposed Installed Capacity Manual Changes

- **Section 4.5 – Calculation of the Amount of Unforced Capacity each Resource may Supply to the NYCA**
  - Revisions have been made to include Energy Storage Resources in the UCAP Calculation Procedure
    - Clarify the resource types applicable to different UCAP calculations
    - Specifically include ESRs as a resource type
      - Details on the ESR UCAP calculation are included in Attachment J of the ICAP Manual
    - Clarify the default derating factor for different resource types, including ESRs
      - Until there are 3 ESRs in the ISO Capacity market the default derating factor for ESRs will be the NERC class average of Pumped Hydro
      - Once there are 3 or more ESRs in the ISO Capacity market, the default derating factor will be the NYISO class average for ESRs

Incremental Revisions to ICAP Manual

- **Section 4.5 – Calculation of the Amount of Unforced Capacity each Resource may Supply to the NYCA**
  - Revisions to formatting
  - Revisions to more explicitly address the default derating factor for different resource types
    - Explicitly include existing process that initial UCAP value (i.e. default derating factor) is applicable to all months in appropriate derating factor calculation
    - Clarify existing process that the NYISO class average is calculated based on resources of the same type with sufficient operational data

Proposed Installed Capacity Manual Changes

- **Section 4.8.1 – Generators and System Resources**
  - Revisions have been made to include the Bid, Schedule, Notify requirement for Energy Storage Resources
    - ESRs that are Installed Capacity Suppliers must Bid, Schedule, or Notify the maximum of the negative Installed Capacity Equivalent or the maximum withdrawal
    - Obligation extends to Installed Capacity Equivalent of UCAP sold for the Capacity Month

Overview of revisions to ICAP Manual Attachments

Revisions to ICAP Manual Attachments

- **The following Attachments include revisions to account for ESRs:**
  - Attachment D – DMNC/PMPC Test Form
  - Attachment J – Unforced Capacity for Installed Capacity Suppliers
  - Attachment K – Reportable Operating Data

Proposed Revisions to ICAP Manual Attachment D

- **Attachment D – DMNC/PMPC Test Form**
  - The DMNC/PMPC Test Form has been updated to include Energy Storage Resources
  - The form for ESRs is similar to that of Hydro Generation

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Sections 3.1, 3.2, 3.4, 3.5, and 3.6 include ministerial edits and revisions to formatting
    - Sections 3.1 and 3.2
      - The following language has been removed from the definition of $DMNC_{gm}$
        - "as of the close of business on the last business day preceding the Monthly Installed Capacity Auction that is conducted during the month preceding month *m*"
    - Sections 3.4, 3.5, and 3.6
      - Subsection titles (a), (b), and/or (c) have been revised for consistency of terminology between sections
    - Sections 3.5 and 3.6
      - Titles have been revised to say "Calculation of UCAP" rather than "Calculating UCAP" for consistency

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Revisions were made to Sections 3.1 and 3.2 to correct the months used in the EFORd calculation
    - The Winter Capability Period uses 12-month periods ending with months January, February, March, April, May and June
    - The Summer Capability Period uses 12-month periods ending with months July, August, September, October, November and December

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Revisions were made to Section 3.4 to include all Intermittent Power Resources
    - The language has been generalized to include all Intermittent Power Resources rather than just wind generation
    - The revisions mirror the language in Section 4.5 of the ICAP Manual

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - A new section, 3.7, has been added to include the details of the UCAP calculation for Energy Storage Resources
    - This calculation uses the same timeframe as the EFORd calculation (described in Sections 3.1 and 3.2)
    - The Unavailability Factor for ESRs will be based on the resource's availability to the Real-Time Market System

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Section 3.7 includes revisions to terminology as follows:
    - The following terms have been renamed for consistency with earlier sections of Attachment J
      - "Unavailability Factor" changed to "Average Unavailability Factor"
      - "ICAP Sold for DAM" changed to "ICE"
    - The following terms have been renamed for clarity
      - "Total Available ICAP" changed to "Total Available ICAP Seconds"
      - "Total Expected ICAP" changed to "Total Expected ICAP Seconds"

Proposed Revisions to ICAP Manual Attachment J

- **Attachment J – Unforced Capacity for Installed Capacity Suppliers**
  - Section 3.7 includes revisions to the procedure for calculating Unforced Capacity values for Energy Storage Resources
    - Two additional parameters were added to the "Total Available ICAP Seconds" equation to more accurately measure the availability of the storage asset has in the Real-Time Market
      - Energy Level Availability
        - » Measure the ratio of the Resource's real-time Energy Level to the sum of its DAM Energy and Reserves schedule
      - LOL Availability
        - » Measure the ratio of the Resource's real-time LOL to the negative ICAP equivalent of UCAP sold
    - Additional terms have been added to Section 3.7 to elaborate on the Energy Level Availability and LOL Availability equations

Proposed Revisions to ICAP Manual Attachment K

- **Attachment K – Reportable Operating Data**
  - Revisions have been made to remove details on GADS Reporting Requirements
    - The concept with additional details are captured correctly in Attachment J
    - Attachment J has been revised to explicitly include ESRs as a resource type for this requirement

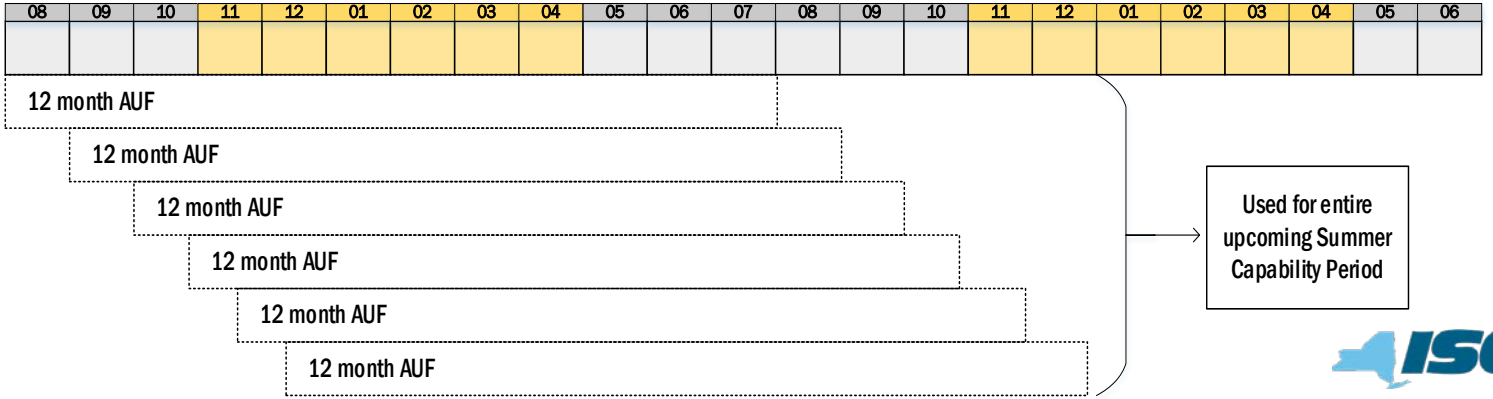
Derating Factor Example

ESR Derating Factor

- **The unavailability calculation for ESRs will use the same time frame as the existing EFORd methodology**
  - Derating factor to determine Summer UCAP uses a 12 month period ending in July, August, September, October, November, and December from the prior year
  - Derating factor to determine Winter UCAP uses a 12 month period ending in January, February, March, April, May, and June from the current year
  - Derating Factor = 1 – Unavailability Factor
- **The following slides include examples on the ESR derating factor calculation**

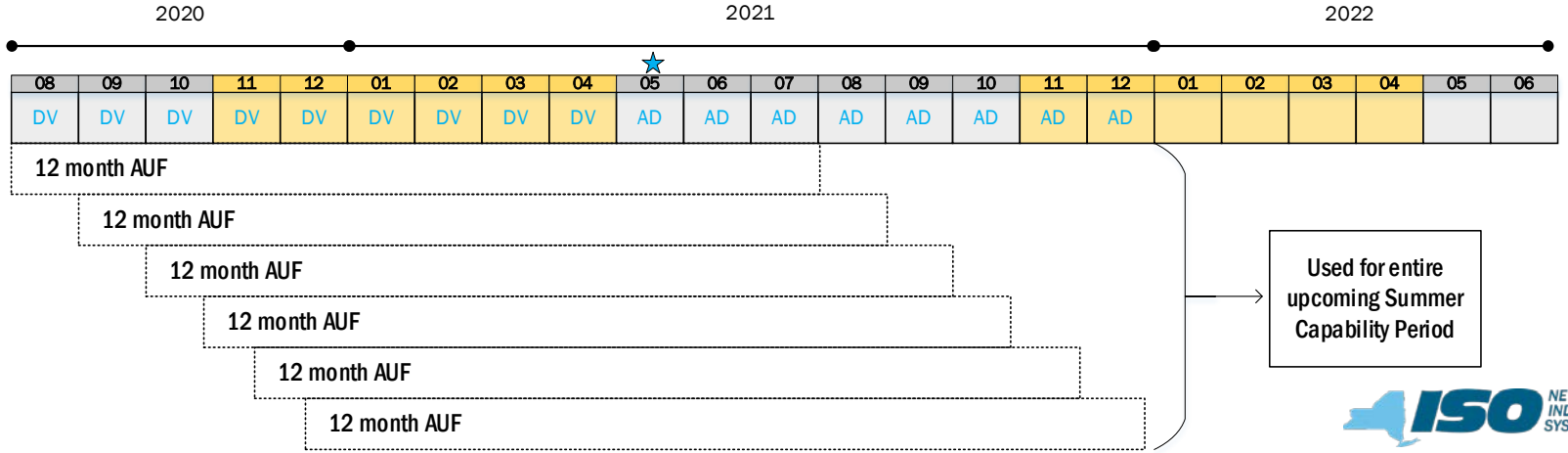
Derating Factor Example

- The current methodology for calculating a Capability Period AEFORd is the average of six consecutive (rolling) 12-month EFORd calculations
  - The derating factor calculation for ESRs will use this same time frame
  - The Capability Period value for ESRs will be the Average Unavailability Factor (AUF)
- For a Summer Capability Period, the derating factor value will be calculated based on the following months:



Derating Factor Example

- **The following example shows the derating factor calculation for the Summer 2022 Capability Period for an ESR that entered the ICAP market in May 2021**
  - The months where the default value is used for the calculation are noted by “DV”
  - The months where the availability data is used for the calculation are noted by “AD”



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- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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