New York ISO
Independent System Operator

Evolving Resource Adequacy Models: Unit Size

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Agenda

- Background
- CAF Calculation Review
- Testing Framework
- Next Steps

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Background

Background

- Continuing the work started with the Improving Capacity Accreditation and Modeling Improvements for Capacity Accreditation projects, this project will research the need for other potential changes to the assumptions, inputs, and modeling used in the NYISO's current resource adequacy analysis software
- By identifying areas of potential enhancement and proposing any necessary recommendations, this project will help ensure the New York State installed reserve margins and Capacity Accreditation Factors (CAFs) accurately reflect the system reliability risks of the evolving grid
- NYISO Project Deliverable: Q4 Study Complete
  - The completed study will be presented to the ICAPWG and NYSRC's Installed Capacity Subcommittee (ICS) for consideration of any recommendations/next steps

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Background

- **The NYISO will research three areas for potential enhancements as part of this project:**
  - Correlated outages
    - Last discussed at the 04/02/24 ICAPWG meeting
  - Min/max operating temperatures
    - Last discussed at the 03/20/24 ICAPWG meeting
  - Unit size
    - Last discussed at the 02/07/2024 ICAPWG meeting

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Unit Size

- Unit size may impact a resource's marginal reliability contribution because outages of individual large resources can have a greater impact on system reliability compared to the outages of multiple small resources
- The NYISO will test the impact of unit size on marginal reliability contributions to determine if unit size should be considered in the determination of Capacity Accreditation Resource Classes (CARCs) and CAFs

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CAF Calculation Review

CAF Calculation Review

- Under the Marginal Reliability Improvement ("MRI") technique, the CAF for any CARC is calculated as:

$$CAF = \frac{LOLE_i - LOLE_{mca}}{LOLE_i - LOLE_{pa}}$$

- *Where:*
  - $LOLE_i$ = the starting loss of load expectation of the resource adequacy model
  - $LOLE_{mca}$ = the loss of load expectation of the resource adequacy model with the addition of a 100 MW representative unit of the evaluated Capacity Accreditation Resource Class to the applicable modeling zone that corresponds to the relevant capacity zone
  - $LOLE_{pa}$ = the loss of load expectation of the resource adequacy model with the addition of 100 MWs of perfect capacity to the applicable modeling zone that corresponds to the relevant capacity zone
- See Section 7.2.1 of the ICAP Manual for a complete description of the CAF calculation process

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Importance of Marginal Unit Size

- The NYISO marginal accreditation framework was developed such that each MW of UCAP provides the same marginal reliability contribution to the system
- In support of this, the NYISO uses the same marginal unit size (100 MWs) to determine the CAFs for all CARCs
- When testing the impact of unit size, we will continue to use 100 MWs as the "marginal unit size" for the CAF calculations. However, that 100 MWs will be connected to units of different sizes that will be added to the base case
  - The initial testing framework is fully described in the following section

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Testing Framework

Testing Framework

- **To test the impact of unit size on marginal reliability contributions, the NYISO will compare the CAF of a standalone 100 MW representative unit to the CAF of a 100 MW increase to a generic unit added in the starting base case**
  - By comparing the CAFs under the two approaches, we can assess if unit size has an impact on marginal reliability contributions
  - Because it is the combination of a unit's size and its outage rate that can impact system reliability, we will be calculating the CAFs under different EFORd values
    - This is a divergence from the current CAF calculation approach for availability-based resource CARCs, which utilizes a representative marginal unit with no forced outages
  - The testing requires 5 main tasks that are described on the following slides

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Task 1: Re-establish starting base case and $LOLE_i$ with a generic unit added

- **Step 1: Start with the Final Base Case ("FBC") of the New York State Reliability Council's 2024 Installed Reserve Margin ("IRM") study ("2024 IRM FBC")**
- **Step 2: Add an X MW generic unit with a Y% EFORd ("Unit X")**
  - This generic unit (Unit X) will vary by size and EFORd and is added to the database to facilitate subsequent testing to assess unit size impact
- **Step 3: Rebalance the case to 0.1 LOLE ($LOLE_i$)**
  - This is now the starting base case for Tasks 2 through 4

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Task 2: Calculate $LOLE_{pa}$ with 100 MW perfect unit added to starting base case

- **Step 1: Add a perfect 100 MW unit in the same location as Unit X**
- **Step 2: Calculate the resulting LOLE ($LOLE_{pa}$)**
  - This is the $LOLE_{pa}$ that will be used in the denominator of the CAF calculations in Tasks 3 and 4

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Task 3: Calculate the CAF for a 100 MW Increase of Unit X

- Step 1: Increase Unit X by 100 MWs
- Step 2: Calculate the resulting LOLE ($LOLE_{mca}$)
- Step 3: Calculate the CAF as: $\frac{LOLE_i - LOLE_{mca}}{LOLE_i - LOLE_{pa}}$
  - Where $LOLE_i$ is from Task 1 and $LOLE_{pa}$ is from Task 2

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Task 4: Calculate the CAF for an Isolated 100 MW Representative Unit

- Step 1: Add a separate 100 MW representative unit with the same EFORd and in the same location as Unit X
- Step 2: Calculate the resulting LOLE ($LOLE_{mca}$)
- Step 3: Calculate the CAF as: $\frac{LOLE_i - LOLE_{mca}}{LOLE_i - LOLE_{pa}}$
  - Where $LOLE_i$ is from Task 1 and $LOLE_{pa}$ is from Task 2

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Task 5: Compare the CAFs from Task 3 and 4

- **The impact of unit size for an X MW unit and Y% EFORd will be the difference between the CAFs from Task 3 and Task 4**
  - If the CAFs differ between Tasks 3 and 4, that will indicate unit size has an impact on the marginal reliability contribution of the unit
- **Tasks 1-5 will be repeated for each capacity zone and various combinations of unit sizes and EFORds for Unit X**
  - Initial recommendation is to test unit sizes in 100 MW increments from 100 to 1300 and test EFORds in 5% increments from 0% to 20%

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Next Steps

Next Steps

- Return to stakeholders in July 2024 with initial testing results

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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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Questions?