New York ISO
Independent System Operator

Modeling Improvements for Capacity Accreditation: Correlated Derates

Michael Swider
Senior Market Design Specialist
Capacity Market Design

ICAPWG/MIWG
February 28, 2023

Agenda

- Background
- Current NYISO Practices
- Proposed Methods for Evaluation of Correlated Derates
- Next Steps

New York ISO

Previous Discussions

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

Background

Background: Modeling Improvements for Capacity Accreditation

- As part of the 2022 Improving Capacity Accreditation project the NYISO identified that the functionality in the current resource adequacy analysis used to establish New York State IRMs may limit the basis of determining Capacity Accreditation Factors
  - Includes the modeling of and accounting for attributes, such as correlated fuel unavailability for non-renewable resources, long start up notification requirements, and non-fuel-related correlated outages
  - Resolving these limitations 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 focus of this presentation is correlated derates. Other modeling improvements will be discussed separately
- The Modeling Improvements for Capacity Accreditation project deliverable is a Q4 Functional Requirements

New York ISO

Background: Correlated Derates

- **Potomac Economics Q3 2022 State of the Market Report highlighted "functionally unavailable capacity" that may not be properly modeled in the IRM/LCR**
  - Ambient water-related deratings for steam units
  - Humidity-adjustments for combined and simple cycle combustion turbines
  - Emergency-only capacity that may not be reliably available in RT

Quarterly Report on the New York ISO Electricity Markets First Quarter of 2022 (nyiso.com)

New York ISO

Current Practice

DMNC

- Dependable Maximum Net Capability ("DMNC") is the sustained maximum net output of a Generator, as demonstrated by the performance of a test or through actual operation, averaged over a continuous time period as defined in the ISO Procedures
- The DMNC is used to establish a generating resource's Installed Capacity (ICAP) value

New York ISO

Ambient Air Derating

- **All DMNC tests on internal combustion, combustion turbines and combined cycle units are temperature adjusted**
  - The Average Ambient Temperatures used for DMNC adjustments are calculated as the average of the ambient temperatures recorded at the time of the Transmission District's seasonal peak during the previous four like-Capability Periods
- **In the IRM/LCR model combustion turbines and combined cycles are further adjusted at various load levels that are close to or surpassing the 50-50 peak load forecast, as high ambient temperatures are correlated with high loads**
  - These are intended to estimate the reduced capability of combined cycle and combustion turbines at temperatures above the Average Ambient Temperatures

New York ISO

Ambient Water Temperature

- Certain steam units rely on the passing of cooling water through a condenser to reduce output temperatures
- When water temperatures increase the cooling water losses capacity to extract heat, which may reduce the output of water-cooled steam generators, but there is no ambient water temperature adjustment

New York ISO

Humidity

- High relative humidity reduces the air's ability to accept water vapor, which reduces the effectiveness of evaporative cooling systems
- There is no adjustment for the impact of humidity on generator output

New York ISO

Capacity Limited Resources

- A Capacity Limited Resource (CLR) is an ICAP supplier that is able to take extraordinary measures to increase its output above its Normal Upper Operating Limit (UOL_N) and can sell UCAP based on taking those extraordinary measures
  - Generally, these units have a configuration that limits operation to UOL_N, absent coordinated operator action
- In the event of changing load conditions NYISO operators may "raise the UOL_{Ns} of Capacity Limited Resources … to their UOL_E levels"
  - MST Section 4.2.3.1

New York ISO

Evaluation Approach

Ambient Water Derates

- Perform a statistical analysis of the impact of ambient water temperature on steam units and any related reduction in capacity during peak periods
- Report on whether there are units, or classes of units, that should be adjusted in the IRM model and or in the ICAP Market

New York ISO

Humidity

- Assess correlation of humidity to peak periods and performance of combustion turbines
- Report on whether a statistically significant correlation exists that warrants a humidity adjustment in the IRM model and/or in the ICAP Market

New York ISO

Capacity Limited Resources

- Evaluate past performance of Capacity Limited Resources on peak days
- Assess whether operating procedures or DMNCs should be updated to better reflect resource adequacy values of CLRs

New York ISO

Next Steps

Next Steps

- Targeting Q2 2023 to begin reporting initial results of analysis with stakeholders

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

New York ISO