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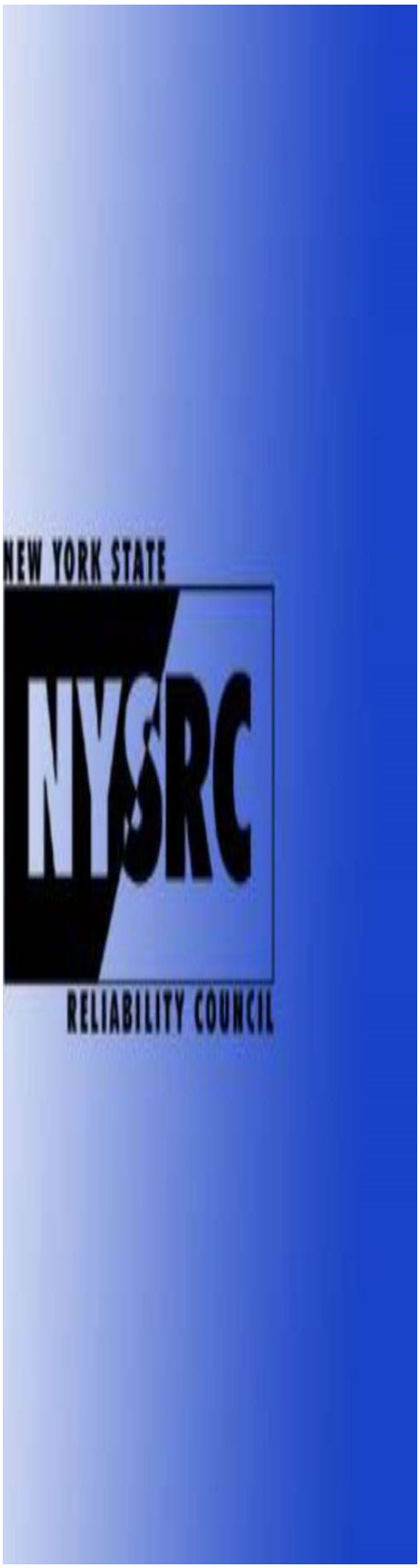
NEW YORK STATE RELIABILITY COUNCIL



2020 Installed Capacity Subcommittee Report

June 5th, 2021

About the New York State Reliability Council

The New York State Reliability Council (NYSRC) is a not-for-profit corporation responsible for promoting and preserving the reliability of the New York State power system by developing, maintaining and, from time to time, updating the reliability rules which must be complied with by the New York Independent System Operator and all entities engaging in electric power transactions on the New York State power system. One of the responsibilities of the NYSRC is the establishment of the annual statewide Installed Capacity Requirement for the New York Control Area.

Introduction

The Installed Capacity Subcommittee (ICS) is a working subcommittee of the NYSRC formed to establish New York Control Area ("NYCA") installed capacity requirements consistent with NPCC Standards and NYSRC Reliability Rules. The ICS shall also perform other technical studies as specified by the NYSRC Executive Committee.

The purposes of the annual report of the ICS are; 1) to report the results of the annual IRM technical study along with any requested technical studies performed and, 2) outline recent, current, and future improvements in the processes and assumptions used in the execution of the Installed Capacity Reserve Margin (IRM) study and other analyses.

Responsibilities

1. Annually, recommend to the NYSRC Executive Committee updates to the NYCA installed capacity requirement for the next capability year. A report shall be prepared by the ICS covering the studies for updating the NYCA installed capacity requirement, in accordance with NYSRC Reliability Rules. A draft of this report shall be transmitted to the NYSRC Executive Committee for review in November, with final approval scheduled in December.
2. For its calculation of NYCA installed capacity requirements, the ICS shall recommend to the NYSRC Executive Committee:
    a. Procedures for calculating installed capacity requirements
    b. Appropriate computer model(s)
    c. Generating unit ratings
    d. Generating unit outage rates (forced, scheduled, partial)
    e. Representation of interconnected control areas
    f. Load shape model and load uncertainty representations
    g. Transmission interface capabilities
    h. Emergency operating procedure representation
    i. Other appropriate modeling assumptions
3. Recommend updates to the NYISO Manual for Installed Capacity Requirements, as required, to ensure its conformance with NYSRC Reliability Rules and procedures.

4. Assist the NYSRC Reliability Compliance Monitoring Subcommittee ("RCMS") as required in monitoring NYISO compliance with those NYSRC Reliability Rules associated with the NYISO's establishment of Load Serving Entity ("LSE") and locational capacity requirements.
5. Recommend to the Reliability Rules Subcommittee ("RRS"), if appropriate, updates to those NYSRC Reliability Rules associated with resource adequacy and resource and demand data requirements.
6. Monitor NYISO ICAP Working Group activities.
7. Prepare and submit status reports to the NYSRC Executive Committee.
8. Perform other technical studies as specified by the NYSRC Executive Committee.

2020 Studies

The 2021 installed capacity requirements technical study resulted in an IRM of 120.7%[1]. The 2021 IRM Study also determined initial LCRs of 82.6% and 95.1% for the New York City and Long Island localities, respectively.

The ICS was also asked to conduct a study on the impacts of adding 12,000 MWs of intermittent renewable resources[2] which had the effect of raising the 2020 IRM requirement from 18.6% To 42.9%.

Modeling and Study Improvements

The ICS has worked for over twenty years on improving the modeling and assumptions used in the IRM study. Along the way, participants of the subcommittee along with the New York State Independent System Operator (NYISO) and General Electric, the software vendor for the MARS program, have worked to improve, update, and adapt the modeling capabilities of the program.

Appendix A shows a list of some of the past papers worked on in the ICS. These papers can be found under IRM Model White Papers at **http://nysrc.org/IRM%20White%20Papers.html**

2020 IRM Improvements

In 2020, the ICS;

-adopted new Confidential information process,

-implemented an enhanced method for prioritizing whitepapers,

-modeled newly qualified Energy Limited Resources (ELRs) with a previously used simplified representation,

-enhanced load shape modeling by incorporating shape adjustment automation,

-conducted a review and assessment of the LFU Model as a precursor to identifying potential LFU issues.

[1] "New York Control Area Installed Capacity Requirement, Technical Study, For the Period May 2021 to April 2022, December 4, 2020" at http://nysrc.org/PDF/Reports/2021%20IRM%20Study%20Report%20Body%20Final.pdf

[2] "The Impacts of High Intermittent Renewable Resources, New York State Reliability Council Installed Capacity Subcommittee April 9, 2020" at http://nysrc.org/PDF/Reports/HR%20White%20Paper%20-%20Final%204-9-20.pdf

Current Improvements (2021)

The below table shows the modeling and study improvements currently being studied for the 2021 IRM study.

Table 1

Current Efforts on Study Improvements

High Renewable Phase II	
Continue Phase 1 of study by adding an additional 4,000 MW of intermittent resources	
Examination of Transmission Security Limits in the IRM Study	
Determine if operational limits are different the emergency limits	
Modeling Energy Limited Resources	
Advance the "simplified" modeling to using software enhanced modeling	
Evaluate Improvements to Modeling SCR Duration Limits	
Explore modeling SCRs with duration limitations and other improvements	
LFU Modeling Phase II	
Phase 1 examined load/temperature correlation. Phase II examines modeling impacts/options	
Inclusion Rules for New Resources	
These are the NYISO criteria for inclusion of new resources into the IRM study	
Examination of five-year versus ten-year EFORd rates for Generation	
Preliminary work suggesting a ten-year rate would provide more stability in the IRM.	
Review of Operating Reserves	
A review of existing Reserves and their locations	

Future Improvement Challenges

The resource mix of the New York state system, along with the NYCA neighbors is undergoing rapid change. Going forward, we will need to understand the impacts and options of adding a large volume of intermittent renewables resources as well as other technical challenges. Table 2, below, shows a list of possible future improvement endeavors.

Table 2

Potential Future Study Improvements

#	Description
1	Explore use of Simplified External Area Models or other avenues such as fixing the EA from neighbors to steady annual changes
2	Revisit the selection of the Load Shapes
3	Review the parameters (i.e., zonal EFORd's) when performing the Zonal Shifts in the Tan 45 process
4	Determine the IRM sensitivity to changes in the UPNY-CONED topology ratings
5	Examine the incorporation of operational Transmission Security Limits into the IRM Study (follow up of current work)
6	Recommend how to model generation resources coupled with (possibly remote) storage facilities (batteries, flywheel, etc.)
7	Investigate whether the variability and extreme weather events of wind/solar resources are fully captured.
8	Test the Study Year Issue resolution recently provided by GE
9	Determine the Impacts to the IRM with various Con Ed Series Reactor scenarios
10	Examine the use of the ELR modeling for energy Storage Resources (ESR)
11	Explore the use of the Model Behind-the-Meter (BTM) solar contributions as resources instead of load adjustments
12	Study the use of Seasonal EFORd for certain resources
13	Review of extreme weather events
14	Explore the use of other loss of load metrics
15	Examine how to model resources that only operate in the winter
16	What are the process changes needed to model a winter peaking system
17	Should the IRM use forecast wind/solar data when historical generation data is unavailable (offshore wind)
18	How does the tan45 methodology fare with more intermittent resources and/or less congestion, etc.
19	Can the Tan45 process accommodate additional ICAP Market Localities
20	Study the use of the optimizer to set all capacity requirements
21	Develop scope for a paper on five-year versus ten-year EFORd rates for Resources

Conclusions

The Installed Capacity Subcommittee reached the following conclusions with regard to its 2020 activities:

1) An Installed Capacity Reserve Margin (IRM) of 120.7% is sufficient for the Capability Period of May 2001 to April 2022. The 2021 IRM Study also determined initial LCRs of 82.6% and 95.1% for the New York City and Long Island localities, respectively.
2) The impacts of adding 12,000 MWs of intermittent renewable resources[3] had the effect of raising the 2020 IRM requirement from 18.6% To 42.9%.
3) NYISO Staff continued to provide timely and valued assistance to ICS during 2020
4) ICS provides an active forum for discussion of NYS reliability technical matters among all parties including Transmission Owners, Developers, the public, and NYISO staff.
5) ICS considers that the NYCA Bulk Power System will experience significant operating and transmission planning challenges in the next decade with the ongoing retirement of NYCA fossil and nuclear resources, and a corresponding increase in renewable resources.
6) ICS will continue to improve the modeling of the NYCA with the goal of providing realistic representations of the changing BPS in order to accurately determine the minimum resources needed for reliability.

[3] "The Impacts of High Intermittent Renewable Resources, New York State Reliability Council Installed Capacity Subcommittee April 9, 2020" at http://nysrc.org/PDF/Reports/HR%20White%20Paper%20-%20Final%204-9-20.pdf

Appendix A
List of ICS White Papers and Presentations

The following is a list of White Papers worked on by the ICS over the past 20 years:

Energy Storage

- Energy Storage Whitepaper
- Inclusion of Energy Storage Resource
- Duration Limited Resource Modeling
- Duration Limited Resource Modeling Follow-Up
- Energy Limited Resource Modeling

External Area

- Modeling of Emergency Operating Procedures (EOP's) and Demand Resources (DR) in External Areas in IRM Studies
- A Review of PJM Modeled LOLE
- MARS Emergency Assistance Modeling -- Findings, Conclusions and Recommendations
- External Area Whitepaper

Generator Forced Outage Rate

- Development of Generator Transition Rate Matrices for MARS that are Consistent with EFORD Reliability Index

Load Shape

- Modeling Multiple Load Shapes in Resource Adequacy Studies
- Multiple Wind Shape Probabilistic Modeling with GE MARS for the Installed Reserve Margin Study

Renewable Resources

- The Impacts of High Intermittent Renewable Resources on Installed Reserve Margin for New York 4-9-2020
- The Effect of Wind Resources on the NYCA IRM and UCAP Markets (Source, 2010 IRM Report)
- Evaluation of Wind Modeling -- Using Actual NYCA Wind Production Data (Source, 2014 IRM Appendices)
- Correlation of Intermittent Resources

Special Case Resources

- Special Case Resources: Evaluation of the Performance and Contribution to Resource Adequacy
- SCR Sensitivity Proposal
- Final 2021 SCR Model Values

Study Year

- 2021-2022 IRM Study: Study Year

Below is a list of some of the presentations brought before the ICS:

Alternative LCR Method

- 2019 Alternative LCR as Calculated using the 2019 IRM PBC (September 5, 2018)
- Alternative LCR Method Update and Informational LCR Result (October 30, 2018)
- Alternative LCR Methodology (August 1, 2018)
- Alternative Method for Determining LCR Final Market Design (October 30, 2017)
- Alternative Method for Determining LCR - Transmission Security Limits (October 30, 2017)
- NYISO Alternative LCR Proposal (November 28, 2017)

Export Capacity

- Analysis Update: NYCA Resources Capacity Obligations to ISO-NE (April 1, 2019)
- Conclusion from NYISO's Presentation on HQ Sales to ISO-NE Wheeled through NYISO (September 5, 2018)
- Emergency Assistance Modeling at HQ Border (September 5, 2018)
- ICAP Market External Control Area Sales (June 5, 2019)
- Impacts on the IRM of Model Updates to the HQ Interface (June 5, 2019)
- Modeling Methods for Existing ICAP Wheeling Transactions in the IRM Study, the LCR Study and the Import Rights Process (January 29, 2018)
- NYCA Resources Capacity Obligations to ISO-NE (February 27, 2018)
- NYCA Resources Capacity Obligations to ISO-NE (April 4, 2018
- Probabilistic Locality Exchange Factor Analysis (June 23, 2017)
- Probabilistic Locality Exchange Factor Analysis (August 22, 2017)

External Area

- Evaluation of External Area Modeling in NY IRM Studies and Scope of Work for Next Steps (January 29, 2019)
- Examination of IRM Results Due to Replacing External Area Representations in the 2019 IRM Study (September 5, 2018)
- External Area Modeling (June 3, 2020)
- Options for Adjusting External Area Representation in the 2019 IRM Study (July 3, 2019)

Generator Forced Outage Rate

- Analysis of Using 5 Year vs 10 Year EFORd Value in IRM Studies (February 27, 2019)
- NYISO Proposal to Update Weighted EFORd Figures in the IRM Assumptions Matrix and IRM Report (October 3, 2018)
- Updated EFORd Figures in the IRM Assumption Matrix (July 30, 2019)
- 2018-2019 IRM Study: Summer Maintenance Assumption -- 2016 Summer Maintenance Analysis (June 27, 2018)
- 2019-2020 IRM Study: Summer Maintenance Assumption -- 2017 Summer Maintenance Analysis (June 27, 2018)
- 2020-2021 IRM Study: Summer Maintenance Assumption -- 2018 Summer Maintenance Analysis (July 30, 2019)

Locational Capacity Requirement

- 2018 Informational LCR Results (November 30, 2018)
- 2019 Informational LCR Results (October 2, 2019)
- 2019-2020 Capability Year Locational Minimum Installed Capacity Requirements (January 17, 2019)
- 2020 Transmission Security Limit Report (September 25, 2019)

Load Forecast Uncertainty

- Evolution of Load Forecast Uncertainty (April 28, 2020)

- Load Forecast Uncertainty Models for the 2018 IRM Study (June 28, 2017)
- Load Forecast Uncertainty Models for the 2020 IRM Study (July 30, 2019)
- Load Forecast Uncertainty Models for the 2021 IRM Study (April 28, 2020)

Load Shape

- Daily and Hourly Load Duration (May 1, 2019)
- Evaluating Load Shapes in the IRM Study (April 3, 2019)
- Load Duration Curve Review 2002-2018 (April 3, 2019)
- Load Shape Discussion (June 27, 2018)
- Selection of Hourly Load Shapes for use in Resource Adequacy Studies (February 27, 2018)

Special Case Resource

- Comparison of SCRs with 15 Calls per Year versus 5 Calls per Month (April 28, 2020)
- Demand Response - Preliminary Model Values for 2019 IRM Studies (June 27, 2018)
- Demand Response - Preliminary Model Values for 2020 IRM Studies (June 5, 2019)
- Demand Response - Final Model Values for 2020 IRM Studies (July 30, 2019)
- Treatment of Energy Storage Resources in IRM Studies (February 26, 2019)
- Valuing Capacity for Resources with Energy Limitations (September 27, 2018)

Tailored Availability Metric

- High Renewable Resource Unforced Capacity under the Tailored Availability Metric (June 3, 2020)
- Tailored Availability Metric (April 28, 2020)

Tan 45 Method

- Unified Methodology and IRM Anchoring Method (June 3, 2020)