2016/2017 NYSRC RELIABILITY RULE A.2 REQUIREMENTS R1, R2, R3 COMPLIANCE SUBMITTAL

COVERING THE NEW YORK CONTROL AREA
For the 2016–2017 Capability Year

Presented to the
Reliability Compliance Monitoring Subcommittee of the
New York State Reliability Council

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LOCATIONAL MINIMUM INSTALLED CAPACITY REQUIREMENTS STUDY

COVERING THE NEW YORK BALANCING AUTHORITY AREA
For the 2016 – 2017 Capability Year

NYISO Operating Committee
January 14, 2016

Locational Minimum Installed Capacity Requirements Report

I. Recommendation

This report documents a study conducted by the New York Independent System Operator (NYISO) to determine Locational Minimum Installed Capacity Requirements (LCRs) for the Localities of New York City (Load Zone J), Long Island (Load Zone K), and the G-J Locality (Load Zones G, H, I, and J) for the 2016 - 2017 Capability Year beginning May 1, 2016.

Currently, for the 2015 – 2016 Capability Year, the New York City (NYC) LCR is 83.5% of the NYC forecast peak load and the Long Island (LI) LCR is currently 103.5% of the Long Island forecast peak load. The G-J Locality requirement is currently 90.5% of the G-J forecast peak load.

The New York State Reliability Council (NYSRC) approved the 2016-2017 Installed Reserve Margin (IRM) at 17.5% on December 4, 2015. The NYISO then determined the LCRs taking into consideration changes that have occurred since the NYSRC approved the IRM base case. After adjusting the model to use the approved IRM, the only change to the database for this analysis is the final 2016 ICAP load forecast.

The below table shows the difference between the load forecasts used in setting the 2015 LCR values versus the 2016 LCR values.

Area	Final 2015 ICAP/LCR Load Forecast (MW) (12/2014)	Final 2016 ICAP/LCR Load Forecast (MW) (12/2015)	Change (MW)
Zone J (NYC)	11,929	11,794	-135
Zone K (LI)	5,539	5,479	-60
Zones G-J	16,340	16,309	-31
NYCA	33,567	33,360	-207

Based on the NYSRC base case for the 2016 – 2017 Capability Year and the changes identified above, the NYISO's calculations result in decreasing the currently effective LCR of 83.5% of the forecast peak load for the New York City to **80.5%**. The NYISO's calculations also result in decreasing the currently effective LCR of 103.5% of the forecast peak load for the Long Island Locality to **102.5%**. Lastly, the NYISO's calculations result in decreasing the currently effective LCR of 90.5% for the G-J Locality to **90.0%**.

II. Updating LCR Values

As its starting point, the NYISO LCR study utilized the statewide Installed Reserve Margin (IRM) study directed by the NYSRC. The IRM study is available on the NYSRC web site[1].

[1] www.nysrc.org

The only adjustment the NYISO has made to the final IRM base case is the inclusion of the final 2016 ICAP/LCR peak load forecast. This forecast updated the October 2015 peak load forecast used in the IRM study. The NYCA system peak had a decrease of 18 MW while Zones J and K had a net 39 MW increase. Zones G-J had a net decrease of 66 MW. These changes in the peak forecast used in the LCR study had only a small impact on the final LCR values.

The LCR analysis is an optimization process for the NYCA system to meet the LOLE reliability criteria by setting minimum requirements for each of the defined localities. As the outcome of the process, the NYC, LI, and G-J LCRs decreased, with respect to the 2015-2016 LCR values.
Factors identified in the IRM study as the major drivers in the change to the IRM were also the major drivers in the change in the LCRs from last year's study. These are:

1. The TOTs projects.
2. The increased capacity and lower load forecast of the PJM systems.
3. Lower NY generator EFORds.
4. Lower load forecasts.

III. Summary of Study

The calculations made in this study, and its supporting analysis, are based on the NYISO process for setting the LCRs, which is posted on the NYISO website[2].

The final 2016 IRM base case maintains the Loss of Load Expectation (LOLE) criterion at not more than 0.1 days/year with a statewide reserve margin of 17.5% and locational requirements of 80.8% and 102.4% for NYC and LI, respectively. The NYISO's LCR study then examined the effects of the final 2016 ICAP/LCR peak load forecast to determine the final LCRs for the three localities.

Based on the NYSRC's final IRM base case for the 2016 – 2017 Capability Year and the NYISO's final 2016 ICAP/LCR peak forecast, the LOLE criterion of 0.1 days/year is met with an LCR of **80.5%** for the New York City (Zone J) Locality, an LCR of **102.5%** for the Long Island Locality (Zone K), and an LCR of **90.0%** for the Zones G-J Locality.

[2] http://www.nyiso.com/public/markets_operations/market_data/icap/index.jsp

Section II
Additional Information to Satisfy Reliability Rule A.2 Requirements R1, R2, R3

The NYSRC Reliability Rule A.2 has the following requirements:

"**R1.** *LSEs* shall be required to procure sufficient *resource capacity* for the entire *NYISO* defined *obligation procurement period* so as to meet the statewide *IRM* requirement determined from A.1. Further, this *LSE capacity* obligation shall be distributed so as to meet *locational ICAP requirements*, considering the *availability* and capability of the *NYS Transmission System* to maintain A(R1) *reliability* requirements."

"**R2.** *ICAP* from *resources* external to the *NYCA* for satisfying a portion of *LSE ICAP* requirements must be demonstrated to be available and deliverable to the *NYCA* borders. *ICAP* from *resources* external to the *NYCA* shall be permitted to the extent A.1 *reliability* requirements are satisfied."

"**R3.** The *NYISO* shall prepare a report for the next *Capability Period* showing (1) *LSE IRM* and *ICAP* requirements so as to meet the statewide *IRM* requirement, (2) *LSE locational ICAP requirements* for applicable *NYCA zones*, such as New York City and Long Island, and (3) the allowable amount of *LSE ICAP* requirements that may be located externally to the *NYCA*. The report shall include the procedures, factors, and assumptions utilized by the *NYISO* to determine these *LSE ICAP* requirements. The *NYISO* Installed Capacity Manual shall include procedures to establish *LSE ICAP* requirements."

The following compliance measure serves to fulfill the NYSRC Reliability Rule A.2 requirements R1, R2, R3. This measure states that:

"**M1.** The *NYISO* conducted an annual analysis to establish *LSE* and locational *installed capacity* (ICAP) requirements for the next *Capability Year*. The analysis was based on NYCA ICAP requirements established by the *NYSRC* and utilizes models and assumptions consistent with those used by the *NYSRC* for its ICAP requirement study. A report was prepared in accordance with R3, which addresses the results of the study, models utilized, study procedures and assumptions, and other study considerations. The report demonstrates that the *LSE* and *locational ICAP requirements* established by the *NYISO* and the allowable amount of LSE ICAP that may be located externally to the NYCA meets *NYSRC* Reliability Rules, in accordance with R1 and R2, respectively."

In addition, the "Compliance Documentation Requirements" column of the appendix to the NYSRC "scorecard"[3] states that:

> "A NYISO Locational Capacity Requirement Report, covering the 2016-17 Capability Year, shall be provided. The NYISO shall also provide the allowable amount of LSE ICAP requirements that may be located externally to the NYCA, and how this was calculated. An appropriate NYISO staff person shall be available at the RCMS meeting to discuss this information and answer questions."

A. Approval of Locational Capacity Requirements

On January 14th, 2016, the NYISO Operating Committee (OC) voted to approve Locational Capacity Requirements (LCRs) of 80.5% of the forecast peak load for the New York City Locality and 102.5% of the forecast peak load for the Long Island Locality. For information, the OC also approved an LCR of 90.0% of the forecast peak load for the G-J Locality. This approval was based on the Locational Installed Capacity Requirements Study in Section I.

B. Report on the IRM Base Case Alignment

Report on Adjustments to the IRM Base Case Database

To Align the Established IRM to the IRM Study Database
(For the 2016 IRM Study)

Introduction

On July 10, 2015, the NYSRC Executive Committee (EC) approved Policy 5-9. This policy is the foundation for the procedure to calculate a technical installed reserve margin for the upcoming Capability Year. Policy 5-9 was utilized to produce results for the 2016-2017 Capability Year. Appendix D of that policy provides instruction to the NYSRC Installed Capacity Subcommittee (ICS) on final database adjustments needed to align the IRM database to the established statewide Installed Reserve Margin (IRM). The aligned database is used, by the NYISO, as a starting point in setting the final LCR values.

This report documents the relationship between the technical IRM result and the established IRM set by the NYSRC to determine the correct course of action to be used to implement Appendix D of the policy. The report also documents the results of that alignment, if warranted.

[3] The NYISO and the NYSRC create a matrix that outlines the due dates for many of the reliability rules compliance documents. This "scorecard" is called "New York State Reliability Council 2016 Reliability Compliance Program".

Description of Process

When the NYSRC establishes an IRM that is higher than the value found in the IRM study report, the database is adjusted to match the higher IRM. The adjustment, using the same method indicated in Policy 5-9, is done by adding capacity to the excess capacity rich zones west of the Central East interface. This adjustment usually results in a lower LOLE value which then becomes the target when the NYISO sets the LCRs. For established IRMs that are lower than the technical study report IRM value, the database of the base case is adjusted to meet the 0.1 days/year LOLE criterion by adding an adjustment step in the EOP table prior to load shedding across all zones until 0.1 days/year is achieved at the established IRM value.

The 2016 IRM Base Case Alignment

For the 2016-2017 Capability Year, the NYSRC set the IRM at a value of 17.5%. The technical study results were for an IRM of 17.4%. Per Appendix D, an alignment of the technical database was performed to match the 17.5% IRM. When the database was run at the approved IRM level of 17.5%, the LOLE was driven to 0.099 days/year which is slightly better than the criterion. The new LOLE of 0.099 days/year then became the benchmarking point to calculate the LCRs. This resulted in a final database that satisfies the LOLE criterion at the approved 17.5% IRM with corresponding preliminary LCRs of 80.8% and 102.4% for Zones J and K, respectively.

C. Identification of Zones Requiring LCRs

Table 1 shows the installed capacities, loads, and transfer capabilities for the NYCA zones depicted in the MARS model for this study. As can be seen in Table 1, the two individual zones that have low ratios of "capacity plus import capability to expected load" (column 5) are Load Zone J (New York City) and Load Zone K (Long Island). These zones have the potential to impact the NYCA LOLE most significantly. Thus, in order to maintain compliance with the NYSRC/NPCC LOLE criteria while maintaining the NYSRC statewide base case IRM requirement, these two zones must maintain a minimum level of locational ICAP.

For information, in addition to the two zones identified above, the NYISO, in response to a FERC order, established the G-J Locality which includes Load Zones G, H, I, and J. The G-J Locality is located on the constrained side of the Upstate New York to Southeast New York (UPNY/SENY) interface which is a constrained portion of the New York State bulk transmission system during high load conditions. The import limits into the G-J Locality are more limiting than the zonal interface limits within the G-J Locality. As a result, Table 1 shows that although each of the Load Zones G, H, and I theoretically have a large import capability, the constraints into the G-J Locality actually result in a smaller import capability than the sum of all its individual zones. Due to this influence, the G-J Locality has a low ratio in column 5 of Table 1 and reinforces the need to meet the 90.0% LCR from a reliability perspective.

Table 1
Year 2016
Installed Capacities, Loads, and Transfer Capability in the MARS model

(1) Zone	(2) Capacity[4]	(3) Peak Load[5]	(4) Import Capability[6]	(5) Ratio (2+4)/(3)
A	4,118	2,719	4,249	3.1
B	840	2,022	2,950	1.9
C	6,719	2,837	4,199	3.8
D	2,730	667	3,590	9.5
E	1,119	1,375	11,700	9.3
F	4,499	2,397	5,899	4.3
G	3,069	2,318	8,599	5.0
H	2,113	674	7,209	13.8
I	21	1,553	10,939	7.1
J	10,593	11,794	6,410	1.4
K	6,084	5,479	1,956	1.5
G-J Locality	15,796	16,309	7,782	1.4

D. Comparison of Forecast Loads and Resources

The NYISO has forecast a NYCA peak load of 33,360 MW for the 2016–2017 Capability Year. The 17.5% statewide Installed Reserve Margin adopted by the NYSRC and the 33,360 MW peak load forecast produce an ICAP requirement for the NYCA of 39,198 MW.

The forecast peak load, existing capacity (based on CRIS adjusted summer DMNC testing) and proposed resources, and the current locational ICAP requirements for New York City, Long Island, and the G-J Locality produce the statistics as shown in Table 2.

Table 2 indicates that the statewide ICAP requirement for the New York Control Area (NYCA) and the Locational Capacity Requirements for New York City, Long Island, and the G-J Locality can be met with expected ICAP resources in 2016–2017 Capability Year.

[4] These data are based on the "2015 Load & Capacity Data" Report's (Gold Book) summer capacity with changes identified in the 2016 IRM and LCR study reports including unit additions, retirements, re-ratings, UDRs, SCRs and net imports.
[5] The zonal peaks when combined with the hourly load shape in MARS model yield a system peak of 33,360 MW.
[6] As a matter of convenience for this table, import capability does not include any ties with potential UDRs modeled on them. That capability is already included in the data of column 2.

Table 2
2016–2017 Capability Year
Forecast peak load, Installed Capacity, and Locational Capacity Requirements (LCRs)

Locality	Peak Load (MW)	ICAP LCR (% of peak load)	ICAP LCR (MW)	Existing Capacity (MW) [7]	Expected ICAP (MW) [8]
New York City	11,794	80.5	9,494	9,534	10,553
Long Island	5,479	102.5	5,616	5,287	6,112
G-J Locality	16,309	90.0	14,678	14,629	15,729
NYCA	33,360	117.5	39,198[9]	38,318	41,529

E. Locational Capacity Requirements References and Procedures

This section shows the LCR references and procedures and where those documents exist.

The *NYISO Market Administration and Control Area Services Tariff* provides the rules governing the NYISO markets. Capacity obligations for LSEs are contained in Section 5.11 and Locational Capacity Requirements are defined in Section 5.11.4. The *NYISO Market Administration and Control Area Services Tariff* is available on the NYISO Web site at the following URL:
http://www.nyiso.com/public/markets_operations/documents/tariffviewer/index.jsp

The NYISO ICAP Manual goes into more detail. Section 3 of the manual addresses LSE requirements in procuring capacity to meet the NYSRC's annually set Installed Reserve Margin. Section 3.6.2, titled "Minimum Unforced Capacity Requirements for LSEs Serving Loads in a Locality", outlines the derivation of LSE locational Capacity Requirements. The ICAP Manual is available on the NYISO Web site at the following URL:
http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp

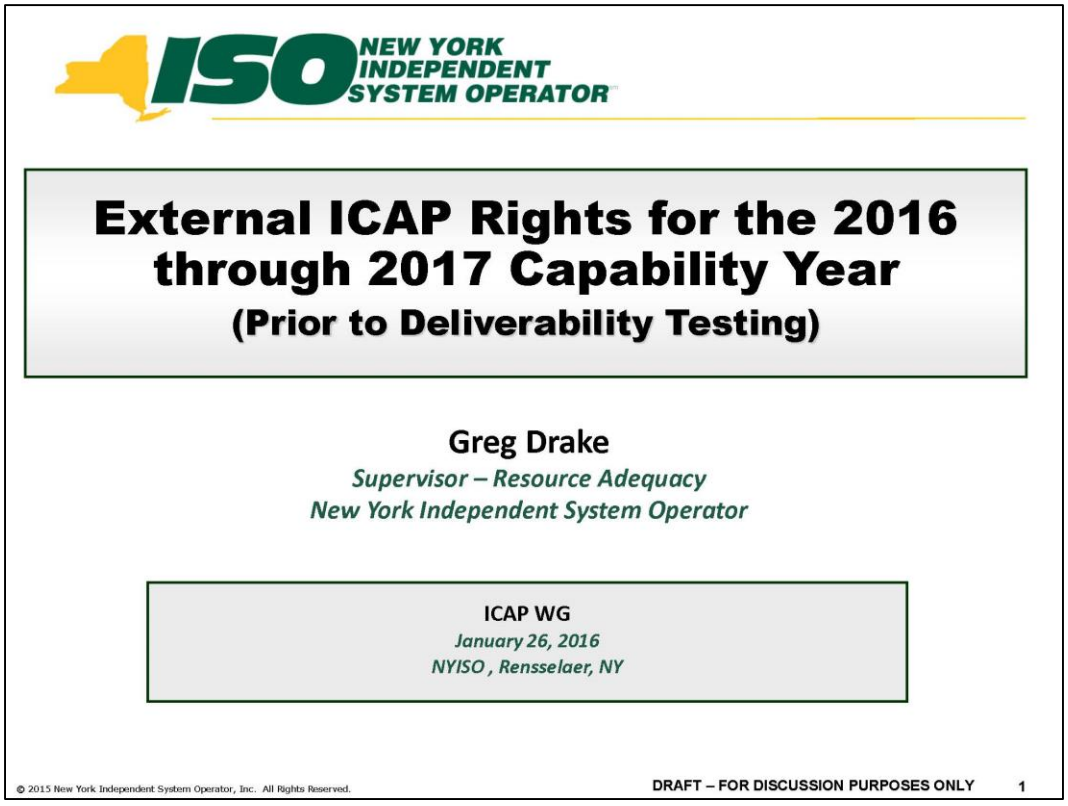
NYSRC IRM Policy 5-9 and the latest IRM study report indicate that there is an inverse relationship between IRM values and Locational Capacity Requirement values. The policy then prescribes the use of a balance point using the "tan 45" methodology. Because the IRM and LCRs are established through a unified methodology, the procedure used to generate the LCR-IRM curve (see Appendix A of NYSRC Policy 5-9) is the same procedure used by the NYISO to determine recommended LCRs for New York City and Long Island.

A full description of the Locational Capacity Requirement Calculation Process is available on the NYISO's website at the following URL:
http://www.nyiso.com/public/markets_operations/market_data/icap/index.jsp

[7] This is the sum of CRIS adjusted DMNC values for each unit based on the 2015 summer tested capacity.
[8] This is the existing capacity plus expected unit additions, retirements, re-ratings, UDRs, SCRs and net imports.
[9] This is the statewide Installed Capacity Requirement, expressed in terms of MW of ICAP.

Section III
2016/2017 External ICAP Allowances

A. Presentation to ICAP Working Group on January 26th, 2016



NEW YORK INDEPENDENT SYSTEM OPERATOR

External ICAP Rights for the 2016 through 2017 Capability Year
(Prior to Deliverability Testing)

Greg Drake
Supervisor – Resource Adequacy
New York Independent System Operator

ICAP WG
January 26, 2016
NYISO , Rensselaer, NY

DRAFT – FOR DISCUSSION PURPOSES ONLY 1

Objective

- To determine the maximum amounts of import capacity allowed from neighboring Control Areas (CAs) (Sec 4.9.6 ICAP Manual)
- MARS simulations were performed on the LCR MARS database to determine the sum of the individual capacity import contributions without violating the LOLE criterion

Ties Excluded

- Interface facilities having UDRs
- Controllable lines from PJM into NY
- The NUSCO 1385 (NNC) line
- Note: Ontario ties were considered for one of the two studied cases

Methodology

- Initial MARS Database: 2016-2017 IRM database as updated for the LCR study
- Model Grandfathered imports consistent with the IRM study
- Determine the maximum imports for each Control Area individually by increasing imports on each CA's ties until the LOLE levels in the base case are met

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Methodology - Continued

- Perform simultaneous runs by increasing the ICAP imports based on the individual limits (beyond the Grandfathered imports) until the LOLE levels in the base case are met
- These ICAP imports, when added to the Grandfathered imports, to calculate the total simultaneous import limits

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Methodology Changes

- There were no changes in the methodology from last year
- The methodology performed for three CAs was also used in the event that four CAs (including IESO) participate in capacity imports

Calculations

Considering 3 Control Areas' Participation

	PJM	ISO-NE	Quebec	Row Totals
Initial Values (TTC Summer Ratings)	1450	1400	1500	4350
Grandfathered Rights*	1080	0	1090	2170
Individual Limits (above GF)	130	830	26	986
Simultaneous Limits (above GF)	70	446	14	530
Final Values	**1150**	**446**	**1104**	**2700**

* Includes ETCNL for these purposes

Calculations

Considering 4 Control Areas' Participation

	PJM	ISO-NE	Quebec	Ontario	Row Totals
Initial Values (TTC Summer Ratings)	1450	1400	1500	2000	6350
Grandfathered Rights*	1080	0	1090	0	2170
Individual Limits (above GF)	130	830	26	235	1221
Simultaneous Limits (above GF)	49	312	10	89	460
Final Values	**1129**	**312**	**1100**	**89**	**2630**

* Includes ETCNL for these purposes

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Comparison of last year's values and this year's values

	PJM	ISO-NE	Quebec	Ontario	Row Totals
Last Year					
Without Ontario	1189	447	1104	N/A	2740
With Ontario	1151	293	1099	202	2745
This Year					
Without Ontario	1150	446	1104	N/A	2700
With Ontario	1129	312	1100	89	2630

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B. Deliverability Tests on Capacity Imports

Once the Import Rights are determined, from a resource adequacy perspective, they are subjected to deliverability tests. These tests determine how much external area ICAP is deliverable to the New York system. The results of deliverability tests show that the external area ICAP of maximum Import Rights from resource adequacy calculation can be fully deliverable to the New York Control Area (NYCA).