New York State Reliability Council
Installed Capacity Subcommittee
Tan45 Methodology Review Whitepaper- 2024 Phase

Executive Summary

The five-year strategic plan for resource adequacy (RA) modeling improvements includes a review of the Tan45 methodology for establishing the New York Control Area (NYCA) Installed Reserve Margin (IRM).[1] This review aims to determine whether the Tan45 methodology will continue to properly calculate an IRM in the coming years as the NYCA system is anticipated to experience dynamic shifts. Specifically, significant changes are expected on the NYCA system that will alter the underlying locational differences between upstate and downstate that have historically existed. This change is the result of the ongoing renewable generation build out across NYCA, particularly offshore wind (OSW) development in New York City and Long Island, and transmission infrastructure improvements. The analysis shows that electric system changes as part of the transition to a clean energy grid in New York are likely to present challenges for the current Tan45 methodology. Such changes are likely to require enhancements to the current methodology and/or development of an alternative methodology for determining the IRM.

Notable findings observed during the preparation of the 2024 phase of this Tan45 Methodology Review Whitepaper (Whitepaper) include:

1. The addition of significant OSW resources in Load Zones J and K presents conditions under which the current Tan45 methodology may be unable to identify a unique Tan45 solution.
   i. For a case involving the assumed addition of 9,000 MW of OSW resources[2] the current Tan45 methodology was unable to establish an IRM.
   ii. Cases involving the combination of the Champlain Hudson Power Express (CHPE) transmission project, which is currently expected in-service in 2026, and 3,000 MW or 6,000 MW of OSW lead to Tan45 "curves" demonstrate the potential for volatile results using the current Tan45 methodology.

2. The removal of capacity from capacity-rich zones west of the Central-East Interface to identify the "low point" of the Tan45 curves, while maintaining Load Zones J and K "as found" as is done with the current Tan45 methodology, presents conditions in which the current Tan45 methodology is unable to properly identify the "lowest" IRM value.

3. The addition of large quantities of renewable resources is expected to produce significantly higher IRM and locational capacity requirement (LCR) values than historically observed.

[1] NYISO Resource Adequacy Modeling Improvements Strategic Plan (2025-2029), https://www.nysrc.org/wp-content/uploads/2024/08/RA-Modeling-Improvement-2025-Strategic-Plan-09042024-ICS34676.pdf
[2] The 2019 Climate Leadership and Community Protection Act calls for 9,000 MW of OSW resources by 2035.

The 2025 phase of this Whitepaper will seek to identify potential alternative methodologies and/or improvements to the current Tan45 methodology, focusing on the following key questions:

- What guiding principles from the current Tan45 process should be maintained when exploring alternative methodologies/enhancements?
- How should locational trade-offs be considered as the NYCA system shifts from its current dynamics?

<u>Introduction</u>

The Tan45 methodology (also known as Unified Methodology), which is described in NYSRC Policy No.5,[3] outlines the process by which the NYCA IRM requirements and related LCRs are established.[4] In 2006, the Tan45 methodology was adopted with the following four guiding principles for selecting an IRM:[5]

- Compliance with Reliability Rules
- Physical Considerations
  - Feasibility
  - Reflects current system configuration
  - Compatibility with zonal Loss of Load Expectation (LOLE) results
- Stability
  - Avoids small changes in IRM resulting in large changes to the LCRs
  - Computes the IRM/LCR relationship as accurately as possible
- Economic Considerations
  - Minimizes the delivered cost to New York consumers at an acceptable level of reliability
  - Ensures accurate price signals

The Tan45 methodology utilizes the General Electric Multi-Area Reliability Simulation (GE MARS) program to conduct a series of cases, which are compiled into IRM-LCR curves that are used to perform the Tan45 analysis. The first case, which is performed to establish the "low point" IRM, is conducted by removing capacity only from capacity rich load zones west of the Central-East Interface (<u>i.e.</u>, Load Zones A, C, and D in the 2024-2025 IRM Study and Load Zones C and D in the 2025-2026 IRM Study) until the 0.100 LOLE criterion is met. The remaining Load Zones in the NYCA system are held at their "as-found" levels. The low point is intended to be the "maximum possible LCR at lowest possible IRM." After the low point is determined, subsequent points are produced by increasing the IRM in 0.5% increments from the low point IRM while also shifting capacity upstate from Load Zones J and K in order to maintain the 0.100 LOLE criterion. This process continues until sufficient points have been produced to yield a smooth curve that includes the "anchor point" (as further described below) with several additional

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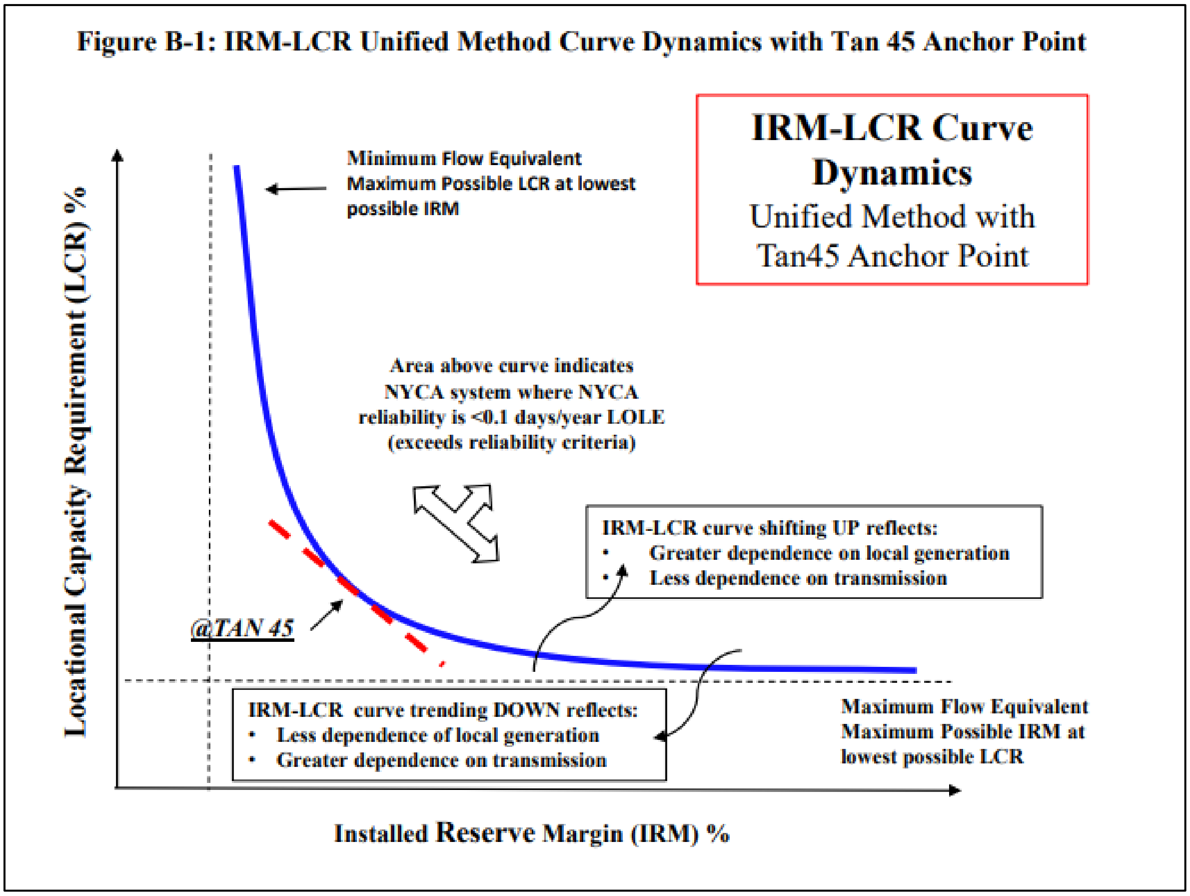
[3] *See* https://www.nysrc.org/wp-content/uploads/2024/06/NYSRC-Policy-5-18-06_14_24-Final.pdf

[4] The Policy No. 5 description of the Tan45 process is attached as Appendix II to this whitepaper.

[5] *"Tan 45" Anchor versus Free Flowing Equivalent for Establishing Statewide IRM,* Resource Adequacy Issues Task Force Meeting (August 3, 2006). *See* https://www.nyiso.com/documents/20142/1398547/RAITF_tan45_vs_FFE_080106.pdf/49a8db5c-0cce-7aaa-7dc8-ad1abcf5eae8

points on both sides of the Tan45 point. Chart 1 below from NYSRC Policy No. 5 provides an example of the Tan45 curve and anchor point dynamics.

Chart 1: IRM-LCR Unified Method Curve Dynamics with Tan 45 Anchor Point



Once the curves are compiled, a Tan45 (tangent of 45 degrees) analysis is performed to determine the point where the curve shows an equal tradeoff between the IRM increasing by 1% and the LCR of a Locality increasing by 1%. This is referred to as the "anchor point." Points on either side of the anchor point on the IRM-LCR curve may create disproportionate changes in LCR and IRM values so that small changes to the LCR can potentially lead to large changes in the IRM and vice versa. This disproportionate tradeoff between the LCR and IRM values becomes more extreme as you get further away from the anchor point. Therefore, the anchor point should result in a combination of IRM and LCR values at the least volatile IRM/LCR tradeoff on the curves.

A major objective of the Tan45 methodology is to establish an IRM that accounts for the locational differences between the upstate and downstate regions. The NYCA system has historically not been locationally "balanced." Major load centers are located downstate, and significant surplus generation is located upstate. Constraints on the transmission system between upstate and downstate also limit the effectiveness of using upstate capacity to reliably serve the load centers. Assuming greater reliance on supply located within the downstate region to serve the downstate load centers has historically resulted in downward pressure on the IRM, while assumed greater reliance on power transfers from the upstate region to serve the downstate load centers has historically placed upward pressure on the IRM.

Objective

The focus of the 2024 phase of this Whitepaper is to determine if it is feasible for the Tan45 methodology to identify IRM/LCR solutions under the various future scenarios listed below. To assess feasibility, expected future transmission projects and supply mix changes were added to the final 2024-2025 IRM study model prior to initiating the Tan45 calculation process. Feasibility was measured by a successful calculation of an IRM value as defined within NYSRC Policy No. 5. The analysis also showed other cases where the Tan45 methodology did not fail but produced results that would require additional analysis to ensure that the results are reasonable and consistent with expectations.

The future scenarios consist of several combinations of changes to the IRM model:

- Future Transmission Projects:
    - Addition of the CHPE transmission project - 1,250 MW, 375-mile submarine and underground high voltage direct current (HVDC) transmission project delivering power from Québec, Canada to Load Zone J proposed to be in-service in 2026
- Supply Mix Changes:
    - Addition of significant quantities of in-front-of-the-meter (FTM) solar, land-based wind (LBW), and OSW resources
- OSW and Transmission Combinations:
    - Addition of the CHPE transmission project along with significant OSW development

The final objective for the 2024 phase of this Whitepaper is to establish the scope for the 2025 phase, which is based on the findings and key takeaways from the testing performed in the 2024 phase, discussed below.

Testing Plan

The following testing plan was utilized to evaluate the Tan45 methodology under various future scenarios:

Table 1: Tan45 Methodology Review Testing Plan

Test Case Name	System Scenario	Description	Presented At:
BC	Base Case	2024 – 2025 IRM Final Base Case (23.1% IRM)	Base Case
TC-T1	Future Transmission Projects	Base Case + CHPE	5/1/2024 ICS
TC-G1		Base Case + 9,000 MW FTM Solar	5/1/2024 ICS

TC-G2	Increased Renewable Generation Resources	Base Case + 9,000 MW LBW	5/1/2024 ICS
TC-G3		Base Case + 9,000 MW OSW	5/1/2024 ICS
S-1	Sensitivities	Base Case + CHPE + 3,000 MW OSW	6/5/2024 ICS
S-2		Base Case + CHPE + 6,000 MW OSW	6/5/2024 ICS

FTM Solar and LBW Testing (TG-G1 /TC-G2)

The Tan45 cases testing the addition of 9,000 MW of FTM Solar and 9,000 MW of LBW resources showed that the current Tan 45 methodology was able to properly calculate an IRM value (refer to TC-G1 (FTM Solar) and TC-G2 (LBW) sections of Appendix I for additional information). For testing purposes, the FTM Solar and LBW resources were largely added in the upstate load zones where the NYISO interconnection queue has shown these resources are likely to be sited. These additions therefore did not alter the underlying locational differences present in the historical and current NYCA system. The Tan45 methodology aims to balance these locational differences. Because the locational differences remain unchanged in these test cases, no major issues were observed.

Both test cases resulted in an increase to the IRM from the base case. This change is consistent with expectations and observations from prior High Renewable Whitepapers and is due to higher derating factors for FTM Solar and LBW resources compared to thermal resources. One finding of note in the LBW test case is a substantial flattening of the Load Zone J and K curves produced through the Tan45 methodology compared to the base case curves. This occurrence seems to be due to a much lower derating factor of LBW being added in upstate, while downstate continues to include the majority of the thermal fleet. This result means that a small movement in the LCRs would mean a much bigger change for IRM, hence flattening the curves.

OSW Testing (TC-G3)

The Tan45 case testing the addition of 9,000 MW of OSW resources failed to calculate an IRM and subsequent LCR values that were compliant with the criteria outlined in NYSRC Policy No. 5 (refer to TC-G3 (OSW) section of Appendix I for additional information). The large addition of resources into the downstate area changes the underlying locational differences that have historically been present in the NYCA system. This change leads to some interesting observations regarding the establishment of the low point and the subsequent Tan45 curve points.

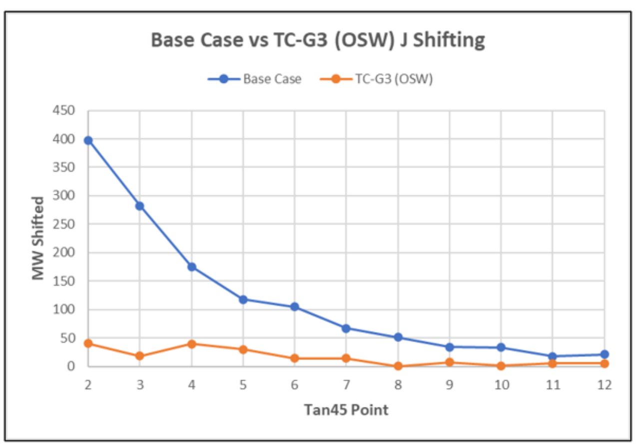
A large drop in the Load Zone J and K LCR values is observed from the low point to the first Tan45 point in this case. The large drop is due to capacity being less valuable to system LOLE in Load Zones J and K than upstate, which is a significant change from the currently observed system dynamics. To further analyze this phenomenon, additional testing of the low point was conducted. Alternative shifting methodologies to try to find IRM values that are lower than the low point established with the current Tan45 methodology while meeting the 0.100 LOLE criterion were attempted. The alternative methodologies attempted to remove capacity from Load Zones A, C, D, J, and K in varying ratios to evaluate if a lower IRM value could be produced if the LCRs are not held at the as-found level. Testing shows that a lower IRM value could be produced than the current Tan45 methodology (see Table 2). This alternative low point analysis shows that the curve dynamics of the current Tan45 methodology may not operate as intended in certain future scenarios with significant resource additions downstate. NYSRC Policy No. 5 outlines that the first point is intended to be the "Maximum Possible LCR at lowest possible IRM," but this is no longer the case under the future scenarios tested when capacity has been added in large quantities to the downstate areas.

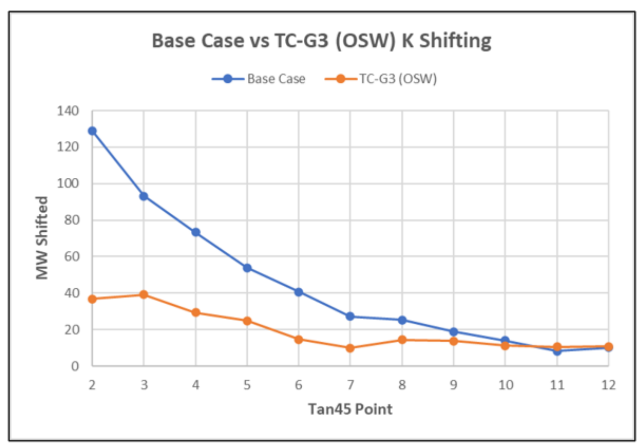
Table 2: TC-G3 Alternative Low Point Analysis

TC-G3 (9,000 MW OSW)	Tan45 Low Point	Alternative "Low Point"	Delta
IRM	39.99%	38.94%	-1.10%
J LCR	139.10%	122.29%	-12.79%
K LCR	174.12%	156.76%	-13.36%
LOLE	0.100	0.100	-

Another finding observed in the OSW testing is a significant flattening of the Load Zone J and K curves beyond the low point. Chart 2 below shows a comparison of how much capacity is required to be shifted out of Load Zones J and K along the Tan45 curves in the OSW case compared to the base case. The addition of significant amounts of capacity downstate leads to a decrease in the amount of capacity that needs to be shifted out of Load Zones J and K when the IRM increases along the curve to maintain the same 0.100 LOLE. This flattening leads to potential issues in establishing an IRM value that is compliant with the criteria outlined in NYSRC Policy No. 5.

Chart 2: OSW Test Case (TC-G3) Shifting Comparison





The main conclusion from the OSW testing is that the addition of large quantities of OSW resources in the downstate region changes the locational relationships present in the current NYCA system that allow the current Tan45 methodology to work successfully. With the expected addition of large amounts of

OSW resources in the coming years, it will be necessary to explore adjustments/alternatives to the current Tan45 methodology to ensure the continued determination of appropriate IRM and LCR values.

CHPE Testing (TC-T1)

The Tan45 case testing the addition of the CHPE transmission project was able to properly calculate an IRM value (refer to TC-T1 (CHPE) section of Appendix I for additional information). The addition of the transmission project as well as the associated Unforced Capacity Deliverability Rights (UDR) resource added to the Load Zone J supply does not alter the historical locational differences between upstate and downstate to a magnitude that presents conditions for which the current Tan45 methodology is unable to determine a NYSRC Policy No. 5 compliant IRM and associated LCR values. But the addition of the transmission project and associated UDR resource does significantly impact the shape of the Load Zone J curve. The Load Zone J curve is steeper for the first several points on the curve than in the base case, resulting in the anchor point being closer to the end of the curve. While the addition of the CHPE transmission project does not result in a failure of the current Tan45 methodology, additional analysis is needed to ensure that the results are reasonable and consistent with expectations, as the addition of the CHPE transmission project is likely to occur within the next couple IRM study cycles.

Sensitivity Testing (S-1 / S-2)

Following the testing for the future transmission projects and increased renewable generation resources cases, NYISO performed sensitivity cases with varying amounts of OSW resources added into Load Zones J and K to better understand the timeline/magnitude of changes necessary for issues to arise under the current Tan45 methodology. The CHPE transmission project was included in the sensitivity cases because it is expected to be in-service prior to the addition of these significant amounts of OSW resources.

The Tan45 sensitivity cases testing the addition of the CHPE transmission project plus 3,000 MW of OSW and the CHPE transmission project plus 6,000 MW of OSW properly calculated IRM values (refer to S-1 (CHPE + 3,000 MW OSW) and S-2 (CHPE + 6,000 MW OSW) sections of Appendix I for additional information). These cases have significantly altered the historical locational differences present in the NYCA system; as a result, the Load Zone J and K curves have been substantially impacted. In the TC-G3 (OSW) case, there is a large drop from the low point to the first Tan45 point and then a flattening of the curves beyond that. These significant structural changes to the Load Zone J and K curves could lead to added volatility when calculating the IRM and LCR values so that very similar combinations of LCR values could lead to drastically different IRM values that all meet the 0.100 LOLE criterion.

The issue observed in the results of the TC-G3 (OSW) case in which the Tan45 low point no longer produces the lowest IRM is also present in the S-2 (CHPE + 6,000 MW OSW) case. Although the same testing was not conducted for the S-1 case (CHPE + 3,000 MW OSW), it is likely that this issue would also be observed in such a case due to a similar impact to the Load Zone J and K curves. Table 3 below shows the same alternative “low point” analysis performed in the TC-G3 (OSW) testing with the S-2 (CHPE + 6,000 MW OSW) case:

Table 3: S-2 Alternative Low Point Analysis

S-2 (CHPE + 6,000 MW OSW)	Tan45 Low Point	Alternative "Low Point"	Delta
IRM	32.16%	31.34%	-0.83%
J LCR	132.38%	116.46%	-15.92%
K LCR	154.44%	142.35%	-12.09%
LOLE	0.100	0.100	-

These test cases show that issues with the current Tan45 methodology are likely to occur well before 9,000 MW of OSW is added to the NYCA system.

Summary of Findings

Based on the results from the test cases, the performance of the Tan45 methodology under the expected future NYCA system can be summarized as follows:

- The increased penetration of FTM Solar and LBW test cases maintain the meaningful IRM/LCR tradeoffs of the Tan45 methodology but lead to significantly flattened IRM-LCR curves, which can lead to increased volatility in the calculated IRM and LCR values.
- The increased penetration of OSW will change the underlying locational differences between upstate and downstate and adversely impact the current Tan45 methodology's production of meaningful IRM/LCR tradeoffs.
- The implementation of the CHPE transmission project (without other assumed changes) appears to maintain the meaningful IRM/LCR tradeoffs, but the observed outcomes could be driven by the specific modeling used for the project in the IRM study. Additional investigations are needed to further assess the impact of the CHPE transmission project.
- Certain combinations of the changes, especially those including the addition of significant quantities of OSW, present conditions that can result in the inability of the current Tan45 methodology to produce appropriate IRM/LCR outcomes.

The results of the testing led to the conclusion that further analysis of the Tan45 methodology is necessary in the near-term to ensure that there are no issues with setting the IRM in the coming years. In the longer term, the NYCA system changes occurring as part of the transition to a clean energy grid in New York adversely impact continued feasibility of the current Tan45 methodology. Such system changes are likely to require enhancements to the current methodology and/or development of an alternative methodology for determining the IRM.

Scope for the 2025 Phase of the Whitepaper

As future transmission projects are developed and the supply mix changes, the current Tan45 methodology may no longer operate to properly calculate an appropriate IRM. With this conclusion, several key considerations/questions arise that need to be explored in the 2025 phase of this Whitepaper:

- What guiding principles from the current Tan45 methodology should be maintained when exploring alternative methodologies/enhancements?
    - Alternative methodologies/enhancements include, but are not limited to, incorporating the transmission security limit (TSL) floor values into the Tan45 methodology and leveraging the NYISO's Locational Minimum Installed Capacity Requirements optimization methodology (LCR Optimizer)[6]
- How should locational trade-offs be considered as the NYCA system shifts from its current dynamics?
    - Does the Central-East Interface remain the border from which to shift capacity?
    - Is excess unforced capacity (UCAP) a reasonable metric by which to shift capacity?
        - If not, what other metrics should be considered to inform capacity shifts used to find the anchor point of the IRM/LCR curves?

The key objective of the 2025 phase of this Whitepaper will be to identify potential alternative methodologies and/or enhancements for determination of the IRM along with the potential revisions that may be required to aspects of the current NYSRC Policy No. 5. The scope of the 2025 phase of this Whitepaper will test additional shifting methodologies and interface boundaries and will analyze the implication of the forthcoming transmission expansion selected in response to the "Long Island Offshore Wind Export Public Policy Transmission Need" to assess future viability of the Tan45 methodology.

Additional considerations that may impact some of the testing results and analysis of future scenarios could potentially be explored in the 2025 phase of the whitepaper as well, including:

- Changes to the system resource mix, including potential deactivation of thermal resources, which could impact some of the observations from the test cases for this 2024 phase of the Whitepaper.
- Potential changes to translation factor assumptions used in the study for the resources added in the future scenarios, which could impact locational capacity differences as well as capacity shifting under the current Tan45 methodology.
    - In the future scenario testing for this 2024 phase of the Whitepaper, translation factors for resource additions were assumed based on estimates from similar existing resources.
- Conducting the Tan45 process by shifting perfect capacity or thermal average capacity as opposed to zonal average capacity as implemented under the current methodology.

[6] Locational Minimum Installed Capacity Requirements Determination Process: https://www.nyiso.com/documents/20142/21537892/LCR-determination-process-2021.pdf

Appendix I: Test Case Assumptions and Results

TC-G1 (FTM Solar):

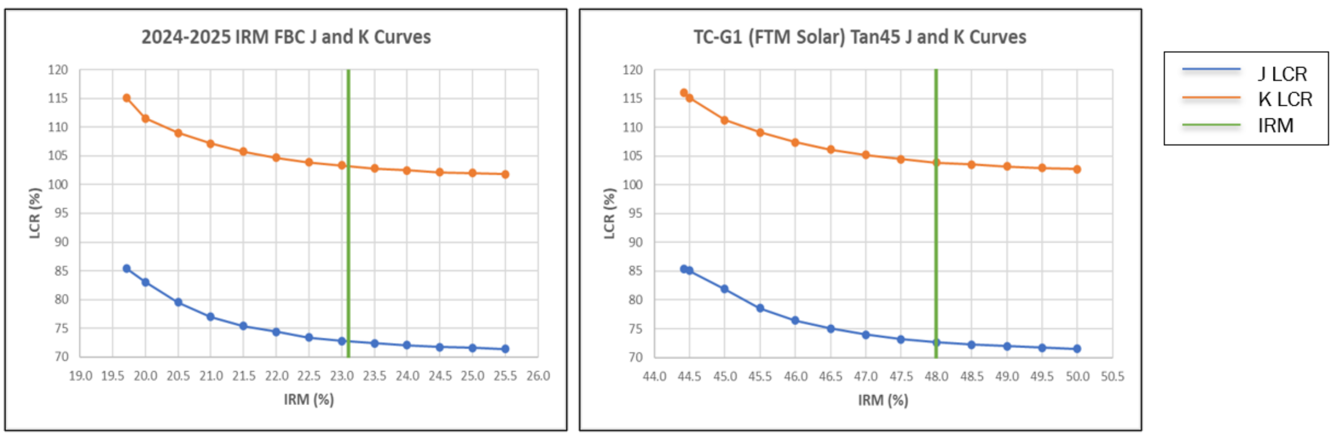
- Testing Assumptions:

Zone	A	B	C	D	E	F	G	H	I	J	K	Total
FTM Solar Additions (MW)	2,632.9	300.0	1,642.6		1,037.8	2,133.9	1,207.1				45.7	9,000.0

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
BC	23.1%	72.73%	103.21%	84.58%
TC-G1	48.0%	72.70%	103.97%	92.46%

- Tan45 Curve Comparison:



<u>TC-G2 (LBW):</u>

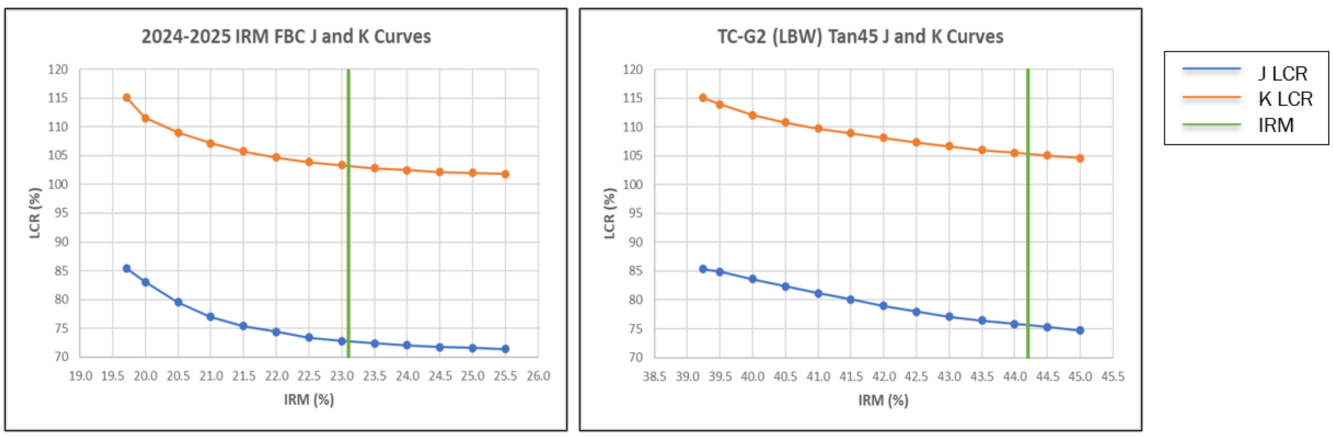
- Testing Assumptions:

Zone	A	B	C	D	E	F	G	H	I	J	K	Total
LBW Additions (MW)	2,345.1	322.1	2,473.4	1807.6	2,051.8							9,000.0

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
BC	23.1%	72.73%	103.21%	84.58%
TC-G2	44.2%	75.60%	105.37%	86.67%

- Tan45 Curve Comparison:



TC-G3 (OSW):

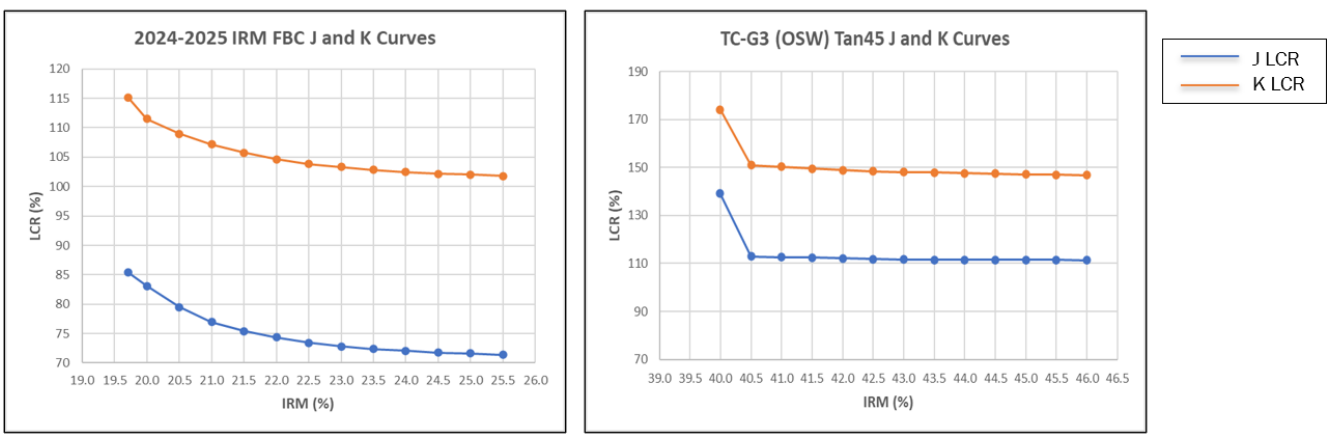
- Testing Assumptions:

Zone	Added ICAP (MW)	Translation Factor	Added UCAP (MW)
J	6,000.0	37.1%	2,225
K	3,000.0	39.7%	1,191
Total	9,000.0	38.0%	3,416

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
BC	23.1%	72.73%	103.21%	84.58%
TC-G3	Tan45 Failed to Calculate Compliant IRM-LCR values			

- Tan45 Curve Comparison:



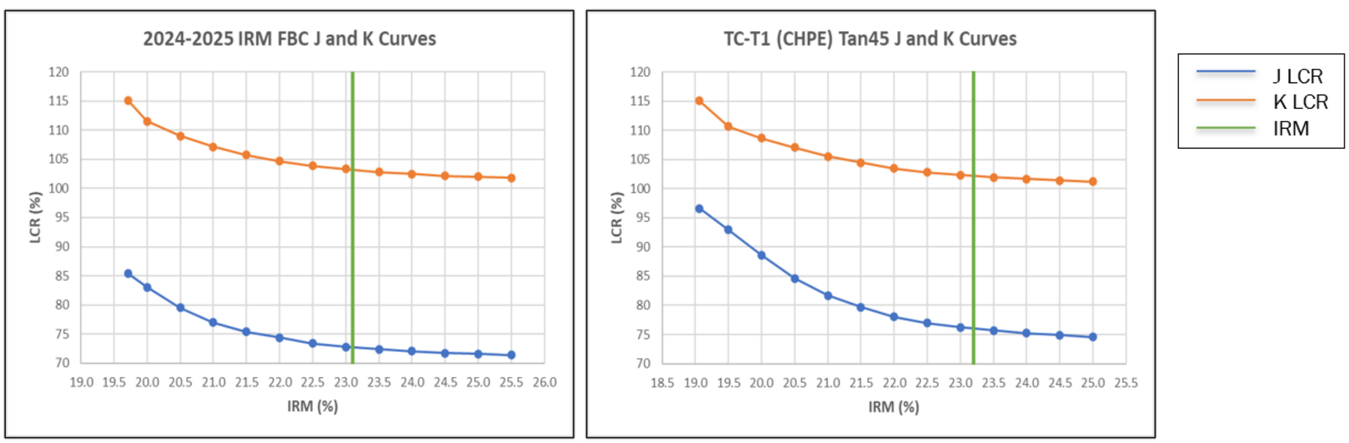
TC-T1 (CHPE):

- Testing Assumptions:
    - 1,250 MW connection from Hydro Quebec (HQ) to Load Zone J is backed by a 1,250 MW UDR resource located in a dummy zone modeled within the NYCA system.
    - Modeling is similar to other external transmission lines with UDR resources where the transmission line is available to provide emergency assistance in the event of the UDR being on outage.
    - The UDR resource is assumed to have an equivalent demand forced outage rate (EFORd) of 4.54% (NERC class average for hydro resources), and the transmission line is assumed to have an outage rate of 5%.

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
BC	23.1%	72.73%	103.21%	84.58%
TC-T1	23.2%	76.09%	102.18%	87.04%

- Tan45 Curve Comparison:



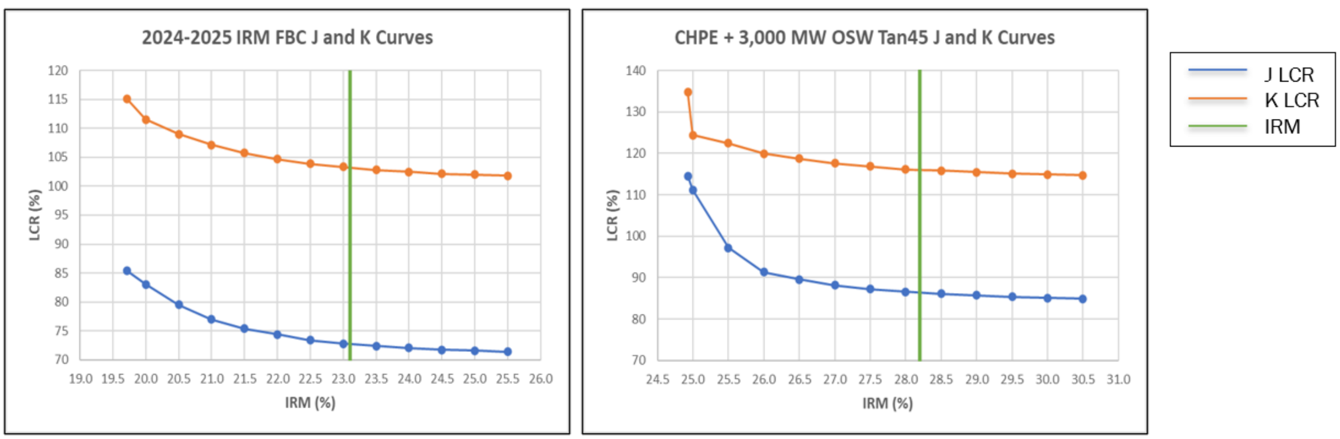
S-1 (CHPE + 3,000 MW OSW):

- Testing Assumptions:
    - Modeling of the CHPE transmission project is consistent with assumptions utilized in TC-T1.
    - Zonal ratio of OSW resources is consistent with assumptions utilized in TC-G3 (2/3 to Load Zone J and 1/3 to Load Zone K):
        - 2,000 MW OSW addition in Load Zone J and 1,000 MW OSW addition in Load Zone K

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
Base Case (BC)	23.1%	72.73%	103.21%	84.58%
CHPE + 3,000 MW OSW	28.2%	86.40%	116.01%	94.58%

- Tan45 Curve Comparison:



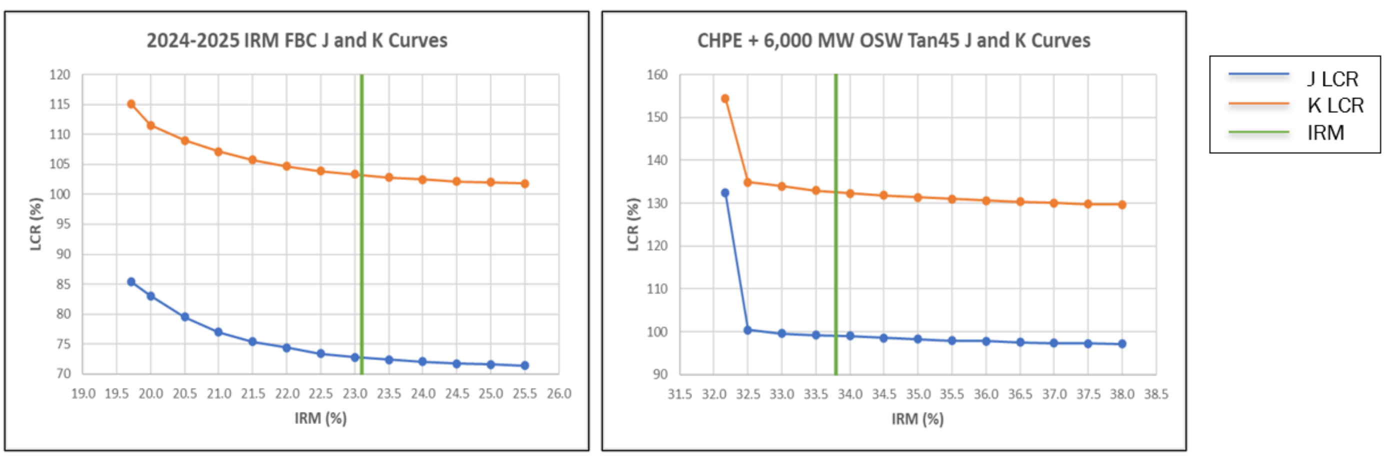
S-2 (CHPE + 6,000 MW OSW):

- Testing Assumptions:
    - Modeling of the CHPE transmission project is consistent with assumptions utilized in TC-T1.
    - Zonal ratio of OSW resources is consistent with assumptions utilized in TC-G3 (2/3 to Load Zone J and 1/3 to Load Zone K):
        - 4,000 MW OSW addition in Load Zone J and 2,000 MW OSW addition in Load Zone K

- Tan45 Results:

Case	IRM	J LCR	K LCR	G-J LCR
Base Case (BC)	23.1%	72.73%	103.21%	84.58%
CHPE + 6,000 MW OSW	33.8%	99.04%	132.57%	103.82%

- Tan45 Curve Comparison:



Appendix II: NYSRC Policy No. 5 Excerpt

NYSRC Policy No. 5 Section 3.4 (Policy No 5-18, published June 14, 2024):

3.4 Conduct of the MARS Analysis

Each year's MARS IRM analysis develops both a *preliminary base case* and a *final base case*.

The Preliminary Base Case

The preliminary base case is developed by starting with the previous year's final base case and inputting base case changes one parameter at a time. The LOLE results of each of these "parametric analyses" simulations are reviewed to confirm that the reliability impact of the change is reasonable and explainable. In addition, parametric results are used to show the incremental IRM change impact for individual parameters from the IRM for the previous capability year. This base case incorporates a preliminary peak load forecast (see Section 3.5.1). The preliminary base case is used to conduct sensitivity studies (see Section 3.6).

The Final Base Case

The final base case is prepared following receipt of the NYISO's fall load forecast (see Section 3.5.1). The final base case may also include data changes resulting from quality assurance reviews. The final base case is used to calculate the final IRM. The final base case includes updates or corrections, approved by ICS, which have occurred since the preliminary base case.

3.4.1 Unified Method for Establishing IRM Requirements

The procedure utilized for establishing NYCA IRM requirements is termed the *Unified Method* because it provides a coordinated approach that can also be used by the NYISO for its analysis of Locational Capacity Requirements (LCRs[1]). The Unified Method reflects a relationship between NYCA IRM and the LCRs as depicted graphically in Figure 3-2 on top of the next page.

Under this method capacity is removed from zones west of the Central-East interface that have excess capacity when compared to their forecast peaks until a study point IRM is reached. At this point, capacity is shifted from Zones J and K into the same zones as above until the 0.100 *Event-Days/ year* LOLE criterion is violated. Doing this at various IRM points yields a curve such as depicted in Figure 3-2, whereby all points on the curve meet the NYSRC 0.100 Event-Days/year LOLE criterion. Furthermore, all LCR "point pairs" for NYC and LI curves along the IRM axis represent a 0.100 *Loss of Load Event-Days/year* LOLE solution for NYCA. Appendix A provides a detailed description of the Unified Method.

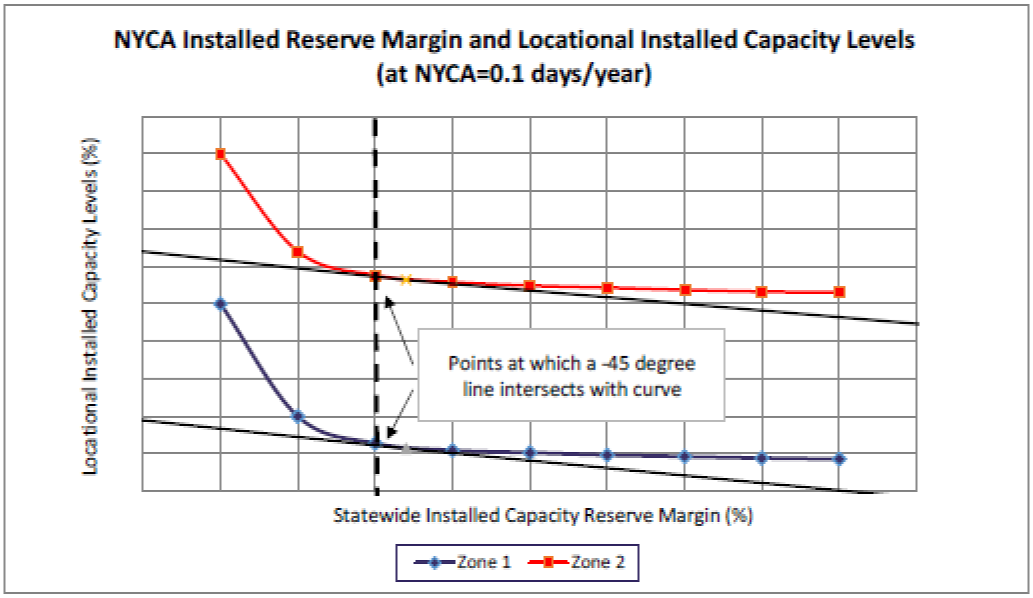


Figure 3-2: Unified Curve and IRM Anchor Point

[1] NYSRC Policy 5 does not specify the method by which the final LCRs are set. Rather, the NYISO determines the final LCRs for all Localities through its tariff and procedures. The LCRs set by the NYISO must be consistent with the state-wide IRM adopted by the NYSRC.

3.4.2 Base Case IRM Anchoring Methodology

This method establishes base case NYCA IRM requirements and related preliminary minimum LCRs from IRM/LCR curves established by the Unified Method described in Section 3.4.1. The *anchor point* on the curve in Figure 3-2 is selected by applying a tangent of 45 degrees ("Tan 45") analysis at the bend (or "knee") of the curve. Points on the curve on either side of the Tan 45 point may create disproportionate changes in LCR and IRM, since small changes in LCR can introduce larger changes in IRM requirements and vice versa. Appendix B describes the mathematical analysis for selecting Tan 45 points on the curves. Alternative anchoring methods will be periodically evaluated.

Appendix III: Past Presentations

Past Presentations

- 1/30/2024 ICS: Tan45 Methodology Review Whitepaper Scope
  - https://www.nysrc.org/wp-content/uploads/2024/02/Tan45-Methodology-Whitepaper-Scope-01302024-ICS-REVISED27280.pdf
- 2/27/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/02/Tan45-Methodology-Review-02272024-ICS28519.pdf
- 4/3/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/03/Tan45-Methodology-Review-04032024-ICS30726.pdf
- 5/1/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/04/Tan45-Methodology-Review-05012024-ICS30948.pdf
- 6/5/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/06/Tan45-Methodology-Review-06052024-ICS33405.pdf
- 6/26/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/06/Tan45-Methodology-Review-06262024-ICS33552.pdf
- 9/4/2024 ICS: Tan45 Methodology Review
  - https://www.nysrc.org/wp-content/uploads/2024/08/Tan45-Methodology-Review-09042024-ICS34677.pdf