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Independent System Operator

Demand Curve Reset (DCR) Process and Methodology Improvements – ICAP Demand Curve Shape & Slope

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DCR Process and Methodology Improvements: Project Tracks

- In the CMSR Issue Discovery Report, the NYISO identified four key areas for potential enhancements and further exploration with stakeholders:
  1. Proxy Unit Definition
  2. Net Cost of New Entry (CONE) Estimates
  3. DCR Process Enhancements
  4. ICAP Demand Curve Shape and Slope
- Today's presentation will begin the discussion of Item 4.

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DCR Process and Methodology Improvements: Project Tracks (cont.)

NYISO CMSR Design Ideas and Capacity Market Goals: DCR Process and Methodology Improvements Tracks	Accurately value resources according to their contribution to maintaining bulk system reliability.	Deliver transparent and predictable market outcomes	Operate cohesively with the Energy and Ancillary Services markets to meet the reliability requirements of the evolving grid.	Provide appropriate, non-discriminatory, price signals to existing and new resources.	Function without unnecessary administrative complexity.	Provide an economically efficient, durable, and stable market structure to facilitate investment.
Proxy Unit Definition	X		X	X		X
Net Cost of New Entry (CONE) Estimates	X	X	X	X	X	X
DCR Process Enhancements	X	X		X	X	X
ICAP Demand Curve Shape and Slope	X	X		X		X

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Agenda

- Background
- Alternative Prescribed Level of Excess and Zero Crossing Points
- ICAP Demand Curve Illustrations
  - Using NYC Locality data and 2025 MRI Curves
- Feedback & Next Steps
- Appendix
  - ICAP Demand Curve Options for Zone J with 2025 Data
  - Previous Presentations
  - Demand Curve Shapes 5/22/2025 ICAPWG

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Today's Objective

- **Explore modifying the current ICAP Demand Curve shapes and slopes to better reflect differing ICAP market and New York Control Area (NYCA) system conditions across Capacity Regions.**
  - The ICAP Demand Curve shapes and slopes govern the value of capacity, which provides resource investment and retirement signals.
- **Discuss and solicit stakeholder feedback on potential changes to Demand Curve shapes and slopes related to the following that could be used to develop an enhanced ICAP Demand Curve:**
  - Prescribed Level of Excess (LOE)
  - Zero Crossing Points (ZCPs)
  - Kinked ICAP Demand Curves

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Today's Objective (cont.)

- This presentation reflects the ICAP Demand Curve shapes and slopes that the NYISO has explored to date. It is for discussion purposes only and does not indicate an endorsement of any particular change or option.
- Note: The NYISO is analyzing the following areas that may be impacted by changes to the ICAP Demand Curve shapes and slope:
    - Cost of Reliability
    - Predictability of Investment Signals
    - Consumer Impacts
    - Market Power
    - Nested Localities

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Background

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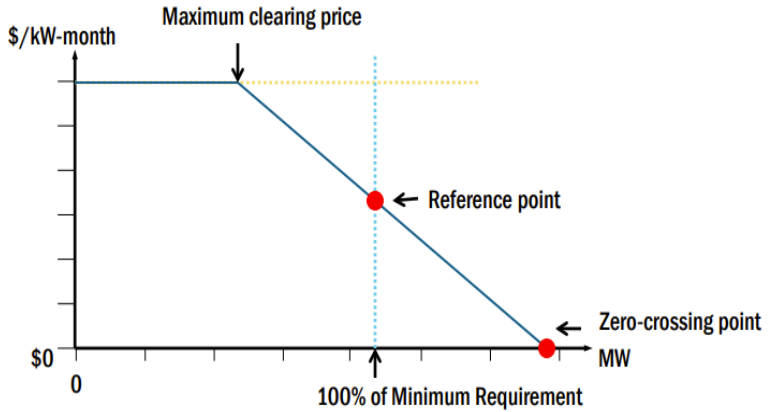
ICAP Demand Curve

- **The current ICAP Demand Curve is determined by the Reference Point, the ZCP and the maximum clearing price.**
  - Reference Point is determined from the net CONE, the Prescribed LOE, and the Locational Minimum Installed Capacity Requirement (LCR).
  - The ZCP is administratively set as the point where the marginal price for an additional MW of capacity is equal to zero.



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Prescribed Level of Excess

- The Prescribed LOE is "equal to the sum of (a) the minimum Installed Capacity requirement and (b) the peaking plant's capacity equal to the number of MW specified in the periodic review and used to determine all costs and revenues." MST Section 5.14.1.2.2.
- Prescribed LOE is currently set by the size of the proxy unit (200 MW).
  - In the Localities in particular, existing Resources may be larger than the 200 MW proxy unit .
- The Prescribed LOE has been designed for producing clearing prices to help attract new entry into the ICAP market while maintaining a level of capacity above the LCR. However, a single large Resource exiting the market at Prescribed LOE could push the ICAP market below the LCR.
  - Therefore, the NYISO is exploring modifying the Prescribed LOE margin to consider the impact of market entry and exit of these larger Resources.

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Zero Crossing Point

- The ZCP is administratively set as the point where the marginal price for an additional MW of capacity is equal to zero.
- The existing ZCPs for the NYCA and the Localities were established at the creation of each sloped demand curve and may no longer be indicative of reliability needs or the value of incremental capacity of the NYCA system today.
  - The existing ZCPs are as follows:
    - NYCA – 112%
    - G-J Locality – 115%
    - NYC Locality – 118%
    - Long Island Locality – 118%.
- Therefore, the NYISO is exploring modifying the ZCPs to reflect updated NYCA system conditions in the shape and slope of ICAP Demand Curve.

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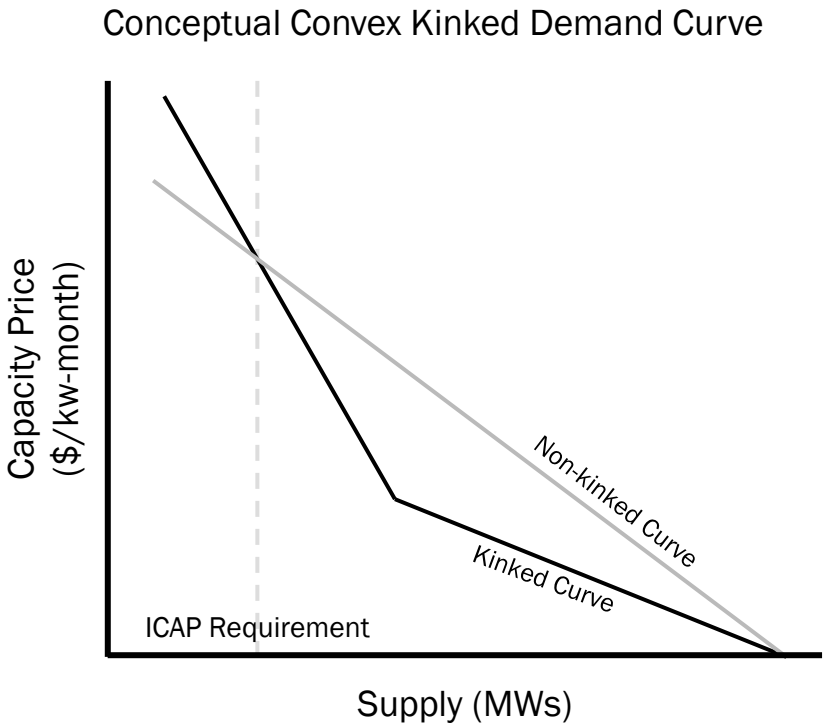
Kinked Demand Curve



- A kinked demand curve introduces multiple slope segments, allowing the curve to convey more nuanced market signals depending on where the market clears.

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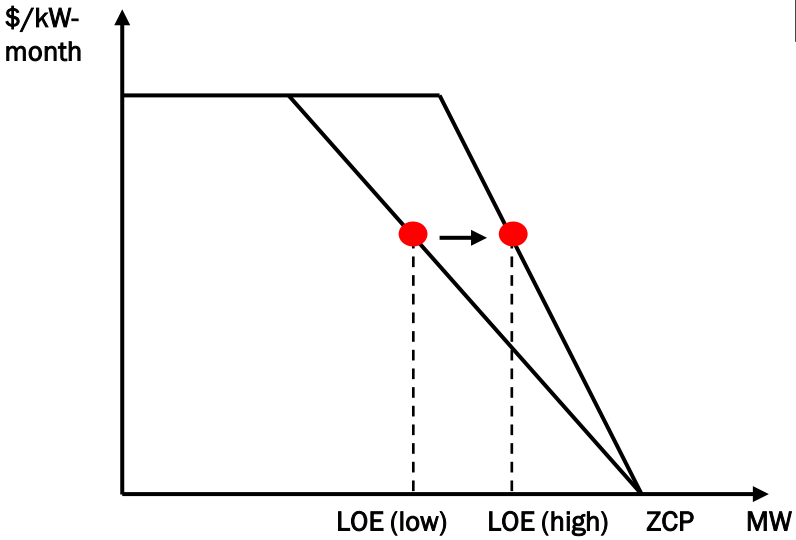
Change in ICAP Demand Curve Parameters: Prescribed LOE



Note: This graph is to illustrate the change in slope from modifying the LOE and does not show any corresponding change in net-CONE or reference price that a change in LOE can create.

- **All else equal, an increase in the Prescribed LOE results in**
  - Higher prices at a given capacity (MW) level
    - Impact: may encourage earlier and greater investment and help retain existing resources, therefore enhancing system reliability.
  - Steeper slope
    - Impact:
      - may cause prices to change more rapidly as capacity (MW) levels fluctuate, which may introduce greater volatility in capacity prices.
      - may increase the potential impact of exercised market power.

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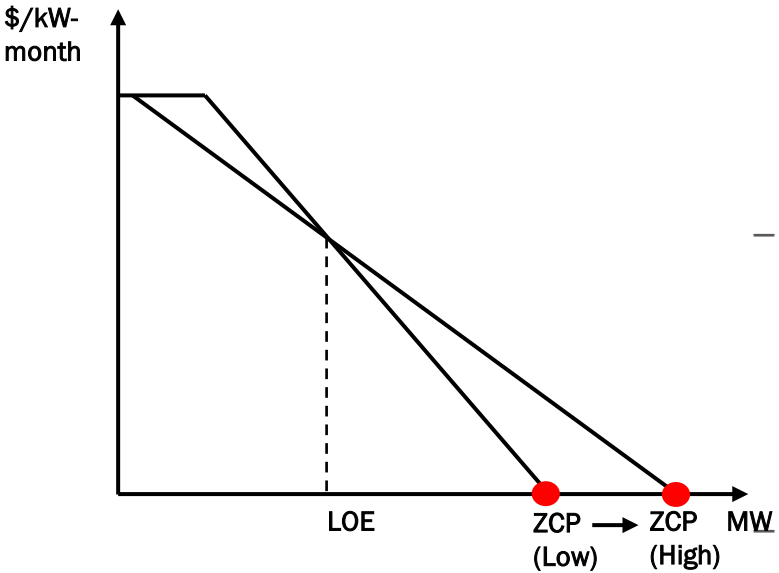
Change in ICAP Demand Curve Parameters: ZCP



- **All else equal, an increase in the ZCP results in**
  - Higher prices when NYCA system has excess levels greater than the Prescribed LOE
    - Impact:
      - may help reflect the value of additional capacity even when the system has excess beyond the Prescribed LOE.
  - Lower prices when the system is has less capacity supply than the Prescribed LOE
    - Impact:
      - may lead to lower costs for Load even when the system is critically below the minimum Installed Capacity requirements.

Less steep slope of the ICAP Demand Curve:

- Impact: prices may change less rapidly as capacity (MW) levels fluctuate, which may provide some degree of predictability for investors and consumers.

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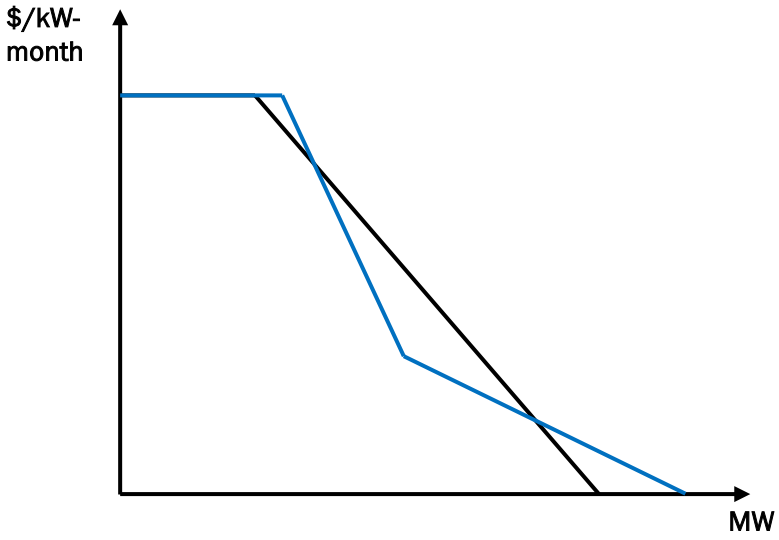
Change in ICAP Demand Curve Parameters: Kinked Demand Curve



- The additional slopes in a kinked demand curve provide either more stable or more dynamic prices.
- Convex kinked demand curves can be used to
  - Provide price stability in the flatter portions of the curve

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Alternative Prescribed LOE and ZCPs

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Alternative Prescribed LOE

- **Currently, the Prescribed LOE is the sum of (a) the applicable minimum Installed Capacity requirement and (b) the proxy unit's MW capacity.**
- **The NYISO would like to discuss the potential option of using the largest generation unit (G-1) to set the Prescribed LOE for the NYCA and each Locality.**
  - This is a similar concept to the use of N-1 contingency analyses in transmission system planning assessments.
- **If the Prescribed LOE is calculated as the minimum Installed Capacity requirement plus the largest generation unit (G-1),**
  - the Prescribed LOE may provide improved price signals to encourage earlier investment in new Resources.
  - such price signals may incentivize new entry that allows the NYCA system to continue to meet capacity requirements if the largest generation unit deactivates.

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Alternative Prescribed LOE (cont.)

- **The definition of the "largest generation unit" (G-1) may reflect the contingencies captured in the LCRs.**
- **In prior years, transmission security limit (TSL) floors have had a material impact on LCRs. Therefore, NYISO is evaluating two sets of LCRs: the current LCRs that incorporate consideration of TSL floors and alternative LCRs that exclude consideration of TSL floors (see Slide 19 for additional details).**
  - If LCRs include TSL floors, and these floors account for generation contingencies, an alternative Prescribed LOE for each Locality would be calculated as the applicable LCR plus the next largest generation contingency not considered in the TSL floors.
  - If LCRs exclude TSL floors, an alternative Prescribed LOE for each Locality would be calculated as LCR plus the largest generation contingency.

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Alternative ZCPs

- **The NYISO would like to discuss the following two alternatives for determining ZCPs:**
  - **Using the two largest generation units (G-1-1):**

  This approach would reflect a typical reliability contingency scenario. By setting the ZCP at ICR/LCR + G-1-1, the ICAP Demand Curves may compensate resources for capacity above this threshold.
  - **Using ZCPs derived from Marginal Reliability Impact (MRI) curves:**[1]

  This method would seek to inform the ZCP with the implied marginal reliability value from MRI curves. This approach seeks to provide a market signal that is consistent with the system's incremental reliability needs.
  - Before using an analysis derived from MRI curves, further consideration of the following would be needed: how to measure MRI, supply side mitigation impacts, price stability impacts, and interactions with other ICAP market design changes.
- **Similar to the potential alternative Prescribed LOE, the definition of the "two largest generation units" (G-1-1) for each Locality may reflect the contingencies captured in the LCRs and require consideration of the next largest generation contingency not considered in the TSL floors (see Slide 19 for additional details).**
- **MRI curves also depend on whether LCRs include consideration of TSL floors, as well as the Prescribed LOE point to which they are anchored.**

[1] For more information on MRI curves, see slides 55-64 in the appendix.

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Definition of G-1 and G-1-1

	G-1	G-1-1
LCR w/ TSL (TSL does not include any generation contingencies), or LCR w/o TSL	1st largest generation contingency	1st and 2nd largest generation contingencies
LCR w/ TSL (TSL already includes the largest generation contingency)	2nd largest generation contingency	2nd and 3rd largest generation contingencies
LCR w/ TSL (TSL already includes the two largest generation contingencies)	3rd largest generation contingency	3rd and 4th largest generation contingencies

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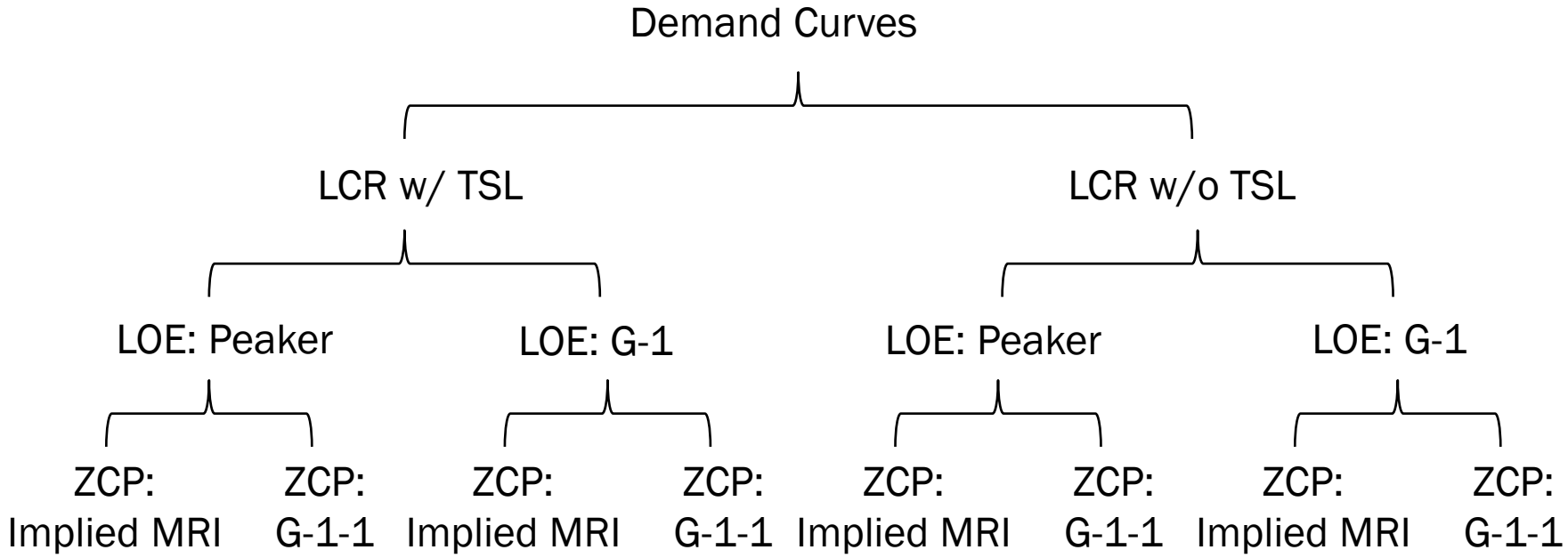
Alternative Prescribed LOE and ZCPs: Options



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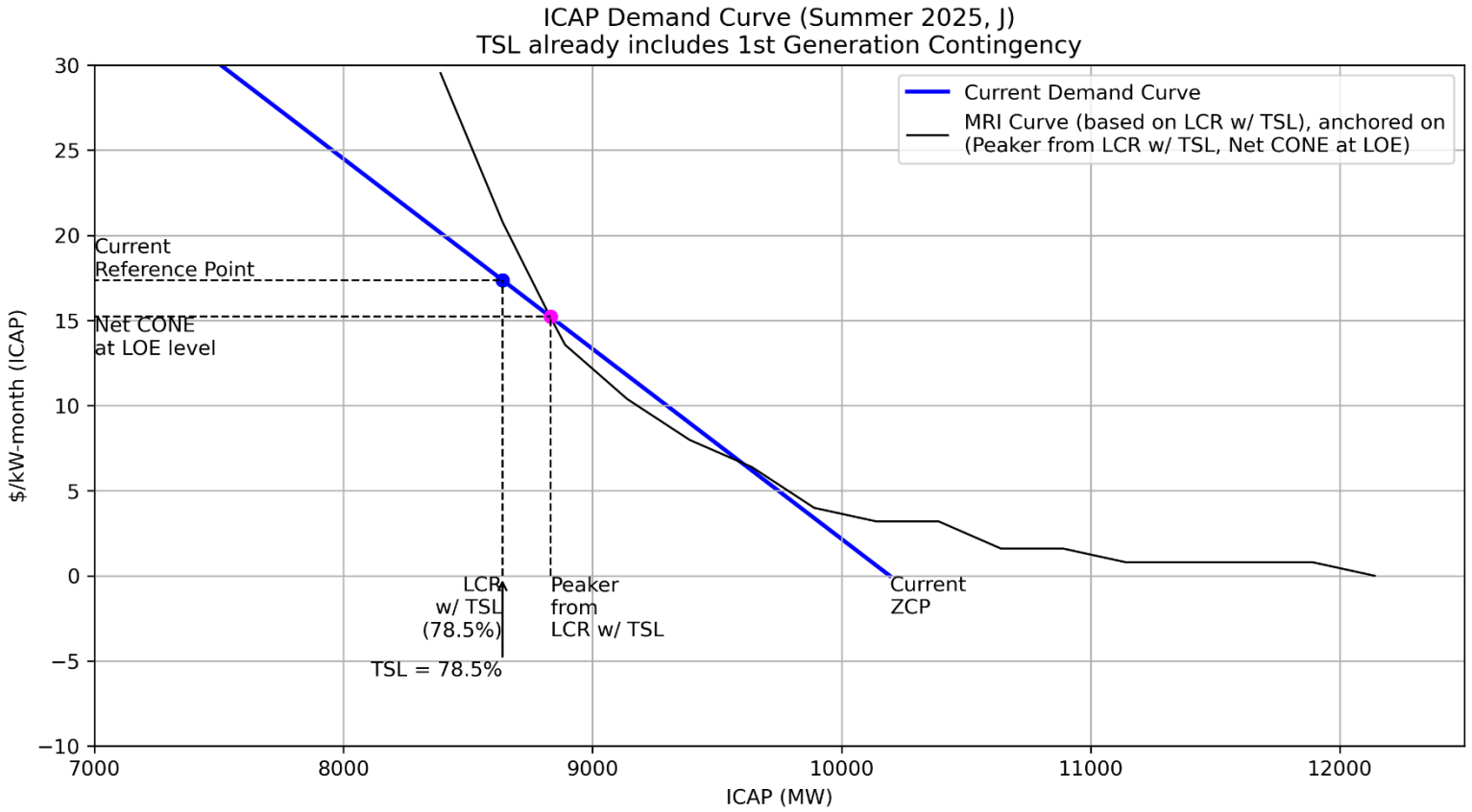
ICAP Demand Curve Illustrations (Using NYC Locality data and 2025 MRI Curves)



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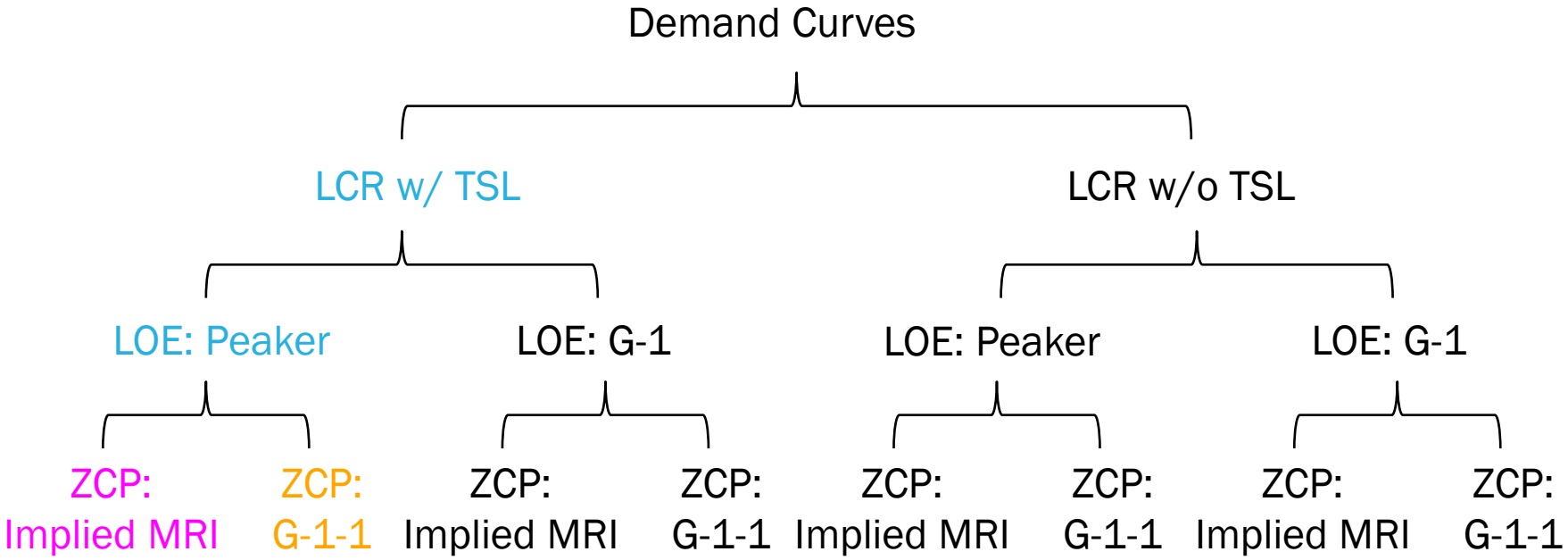
ICAP Demand Curve Illustration: First Scenario



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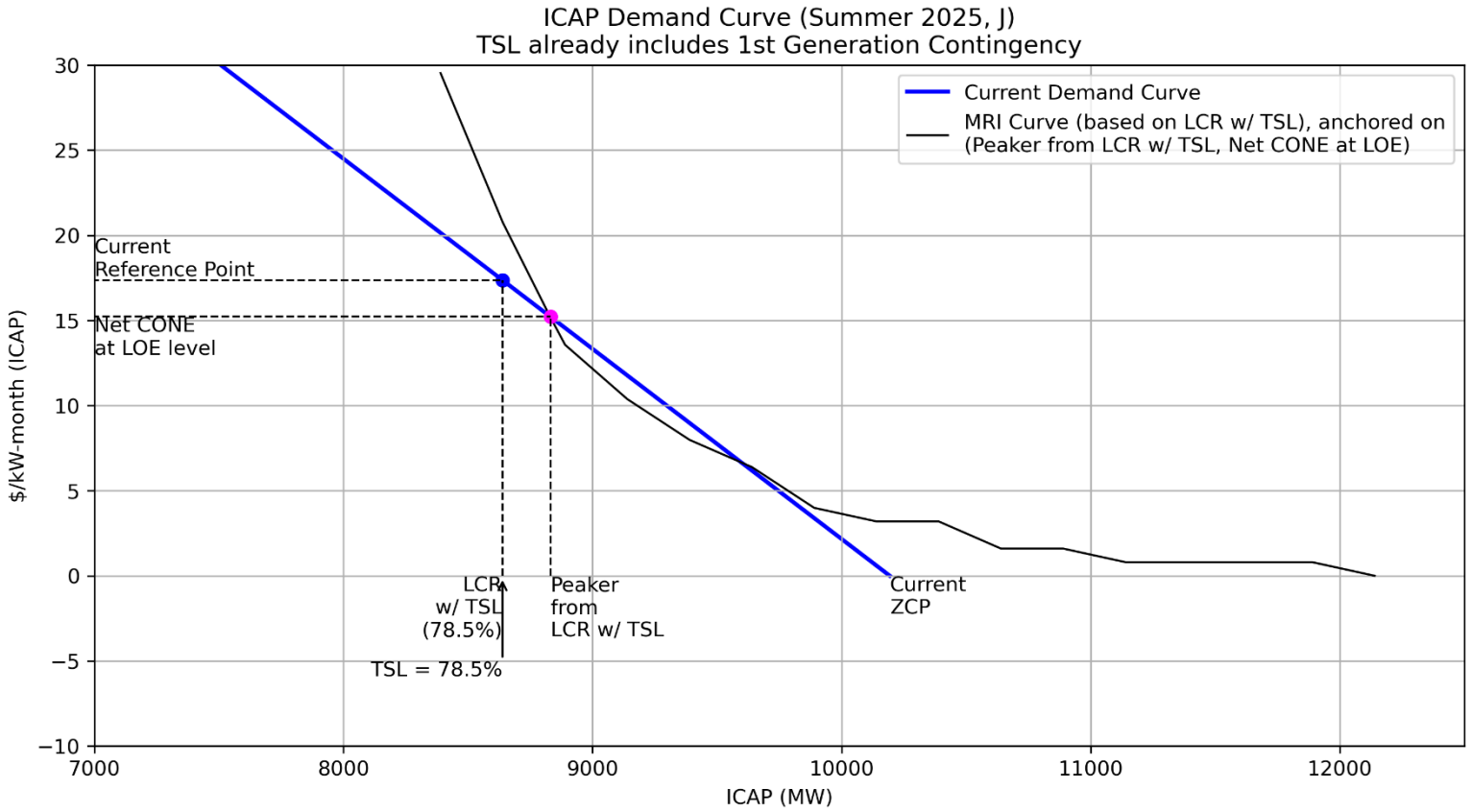

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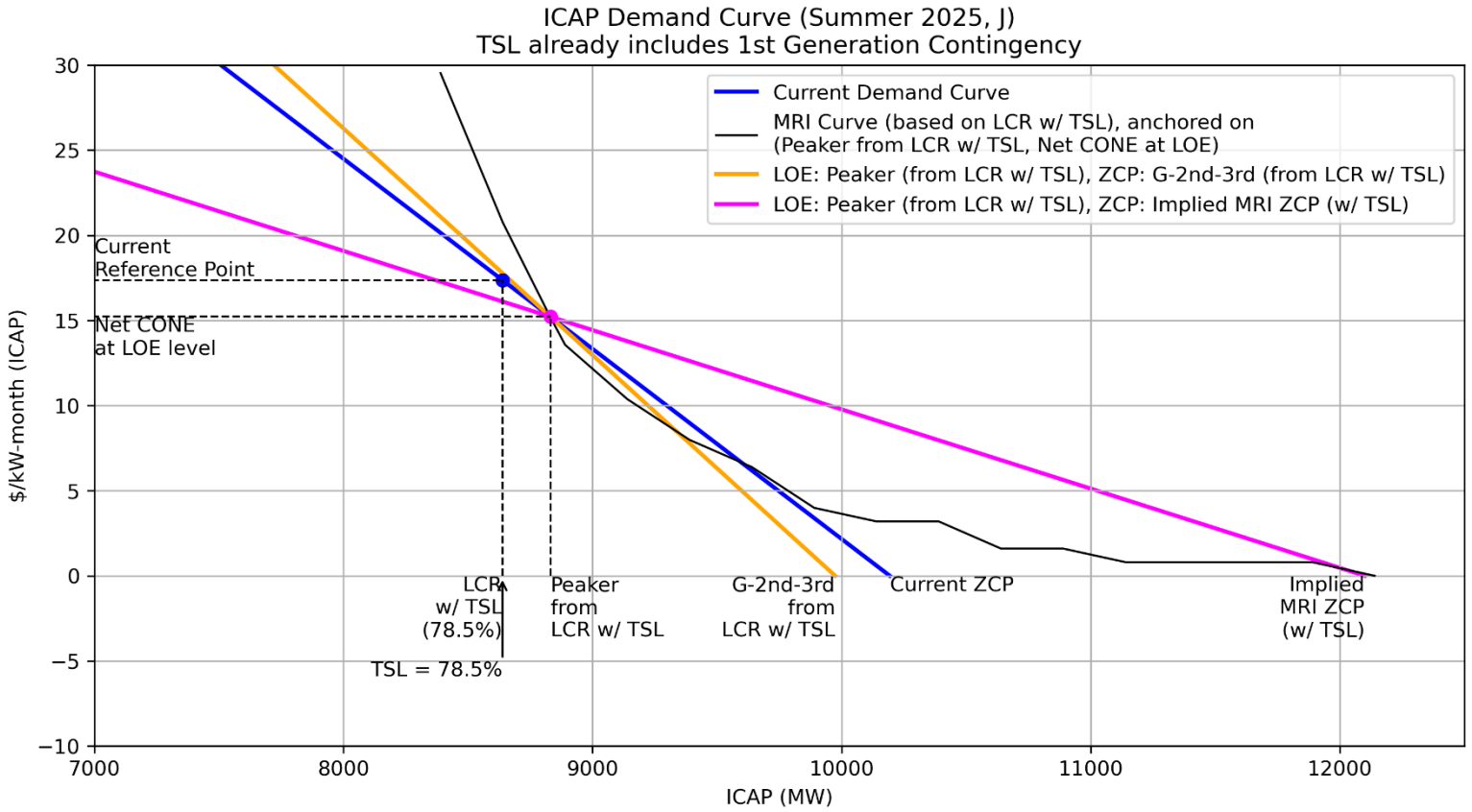

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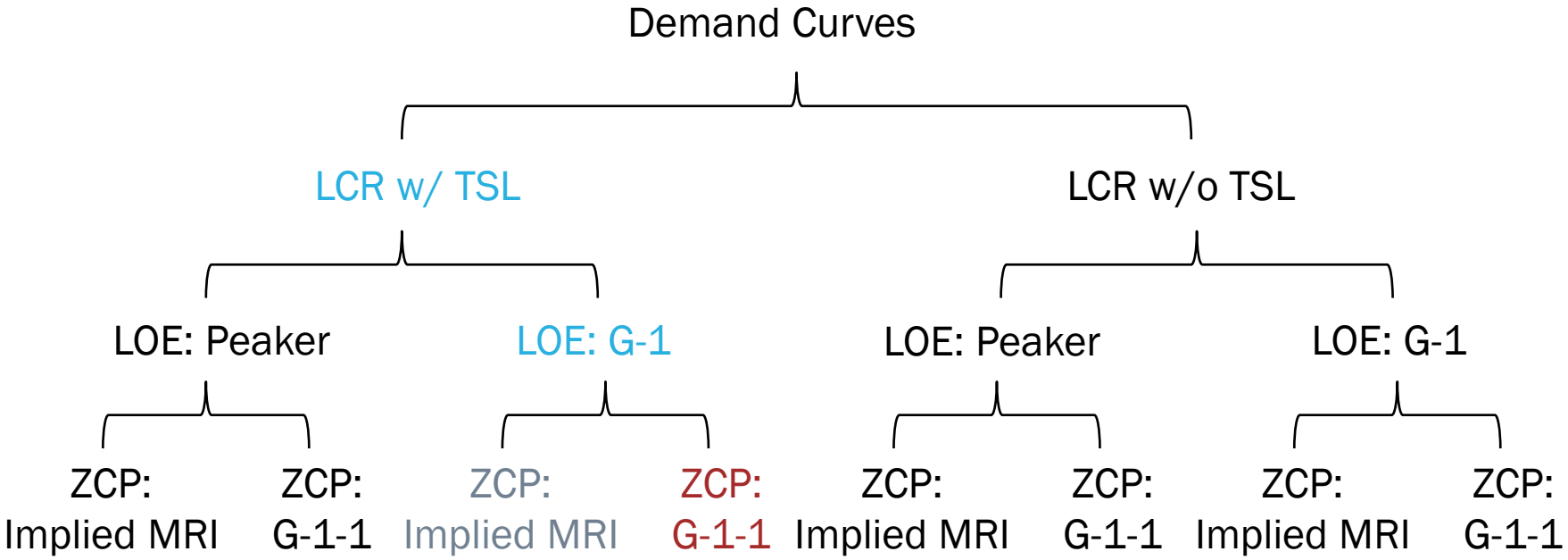
ICAP Demand Curve Illustration: Second Scenario



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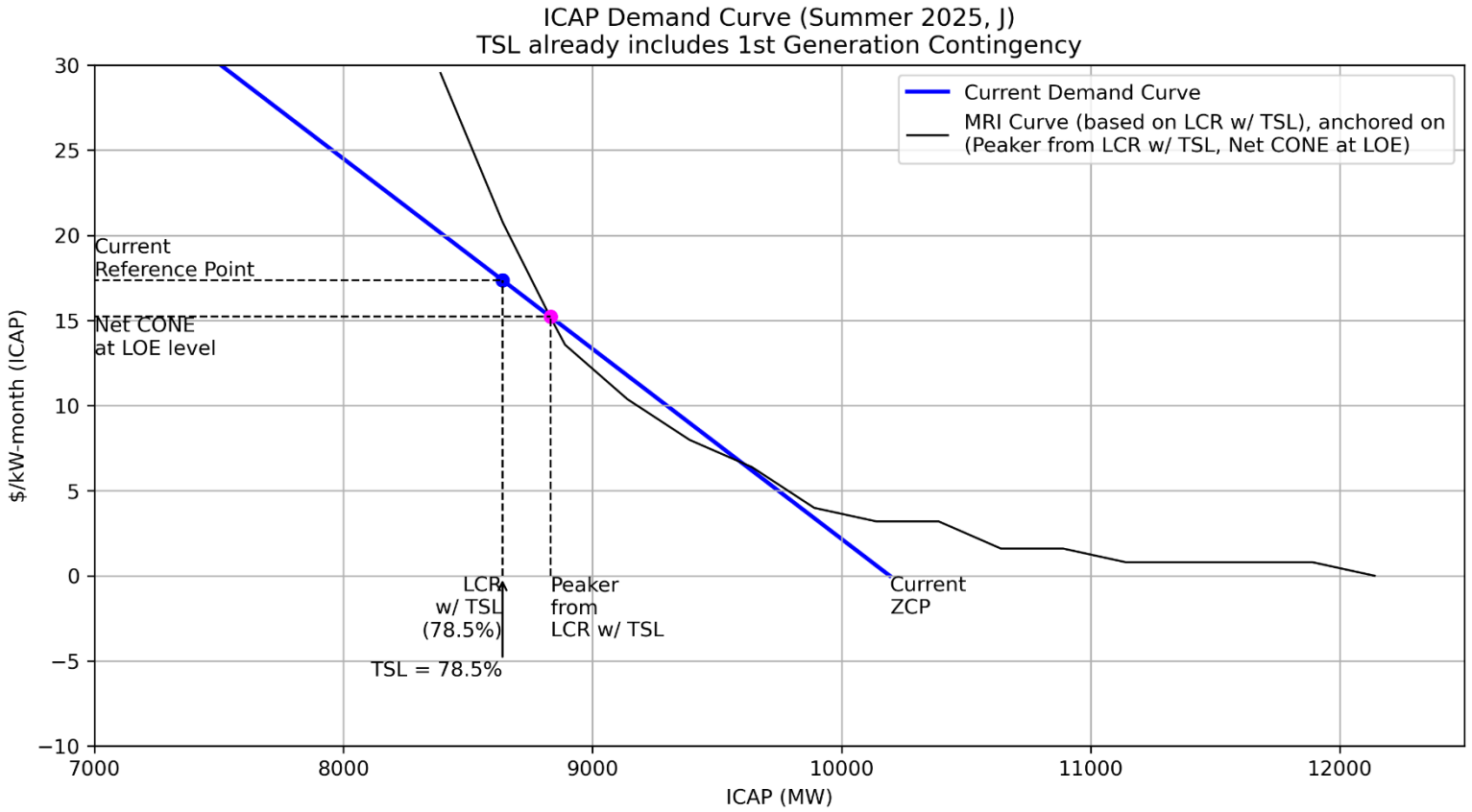

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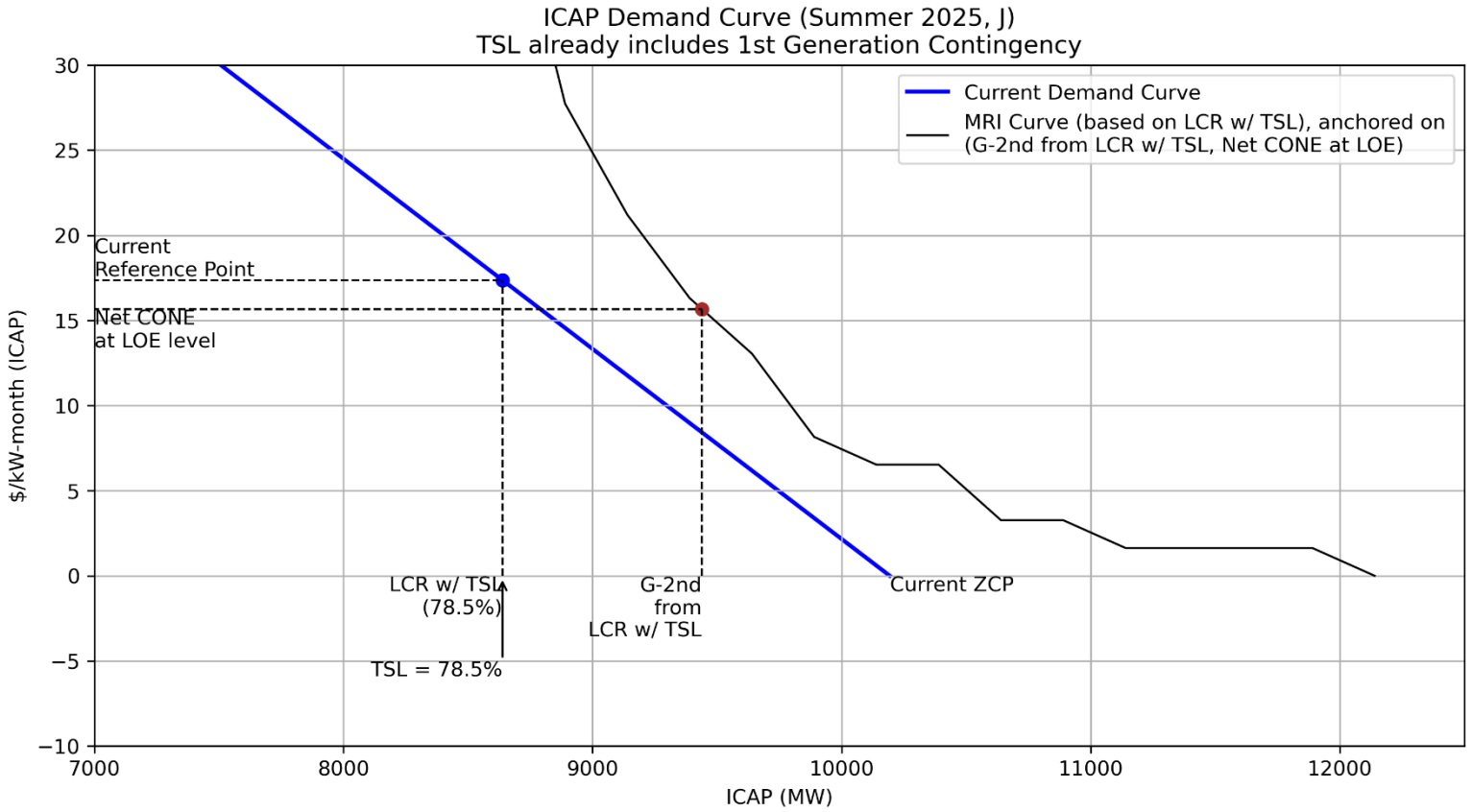

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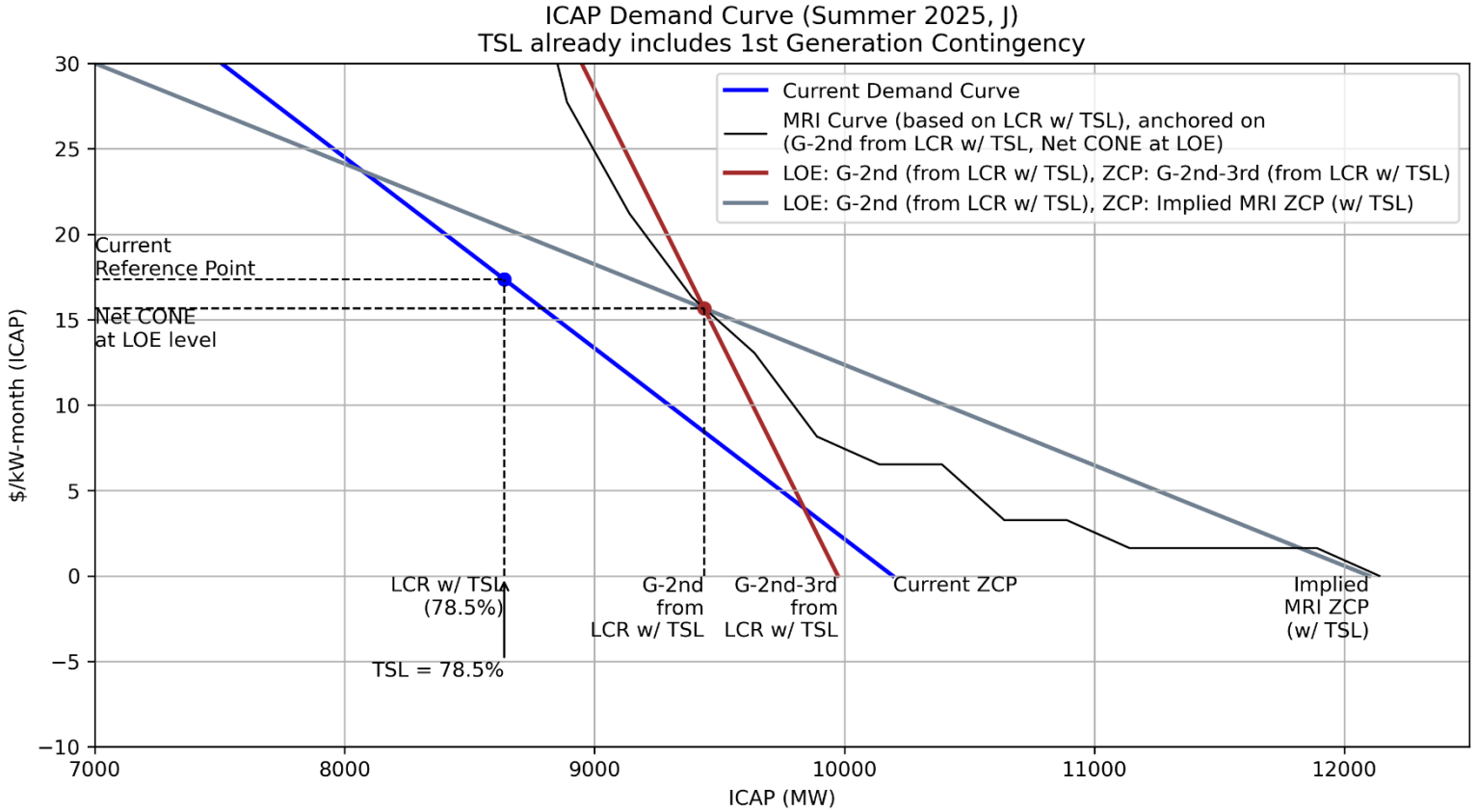

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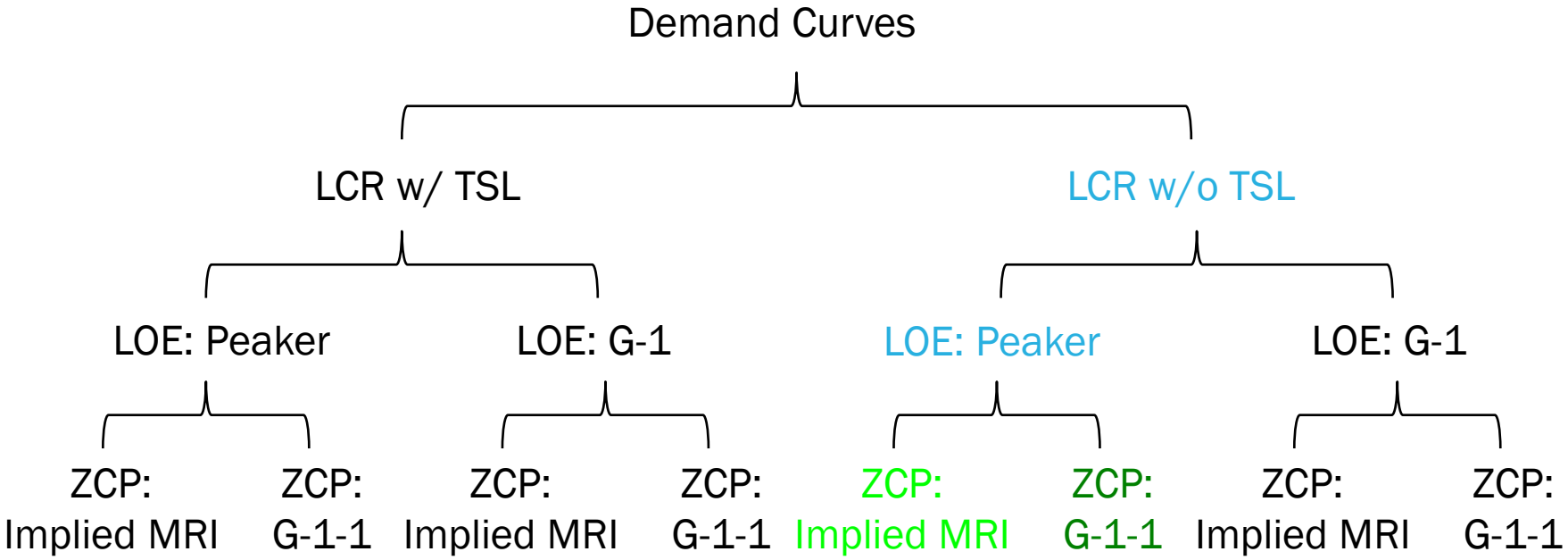
ICAP Demand Curve Illustration: Third Scenario



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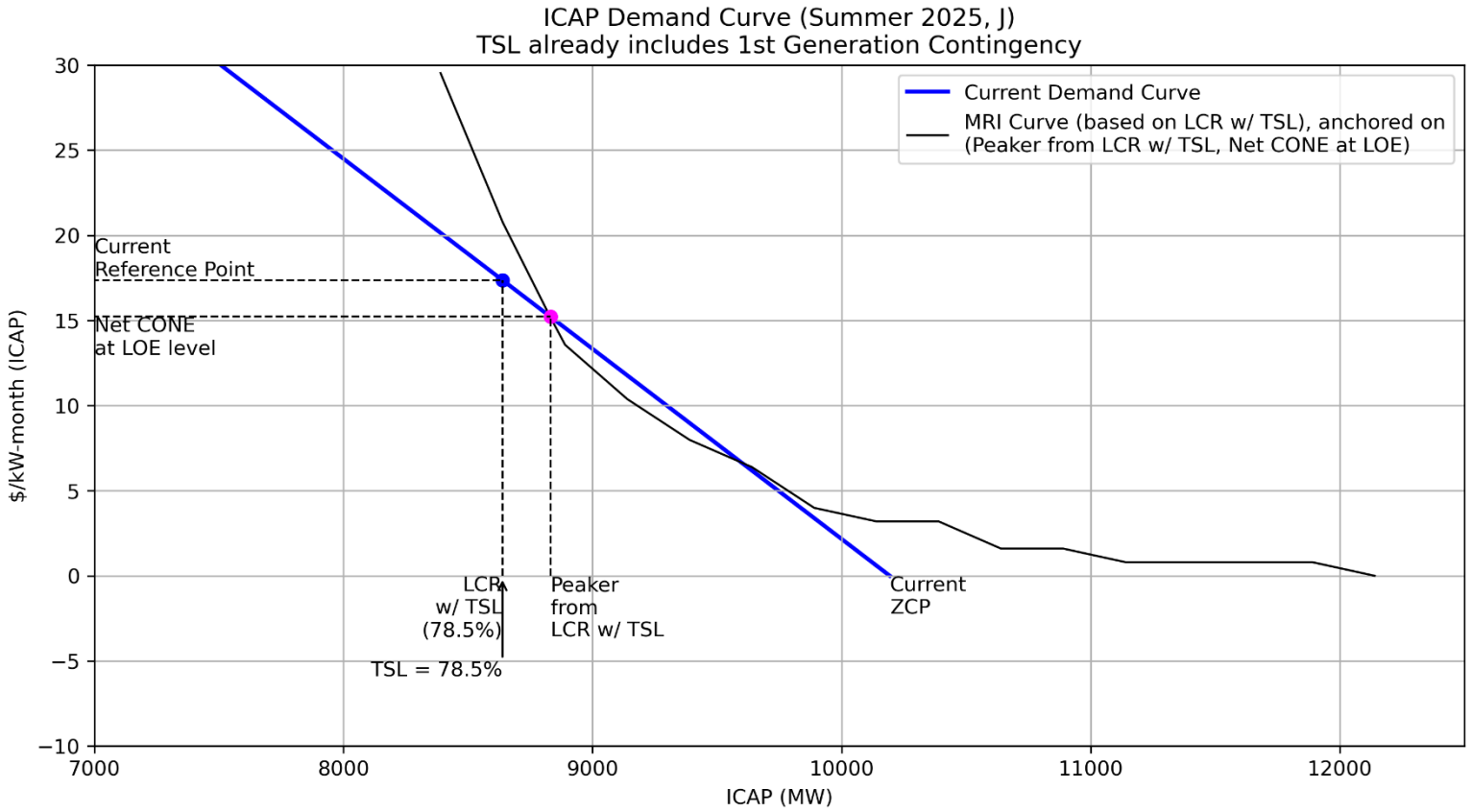

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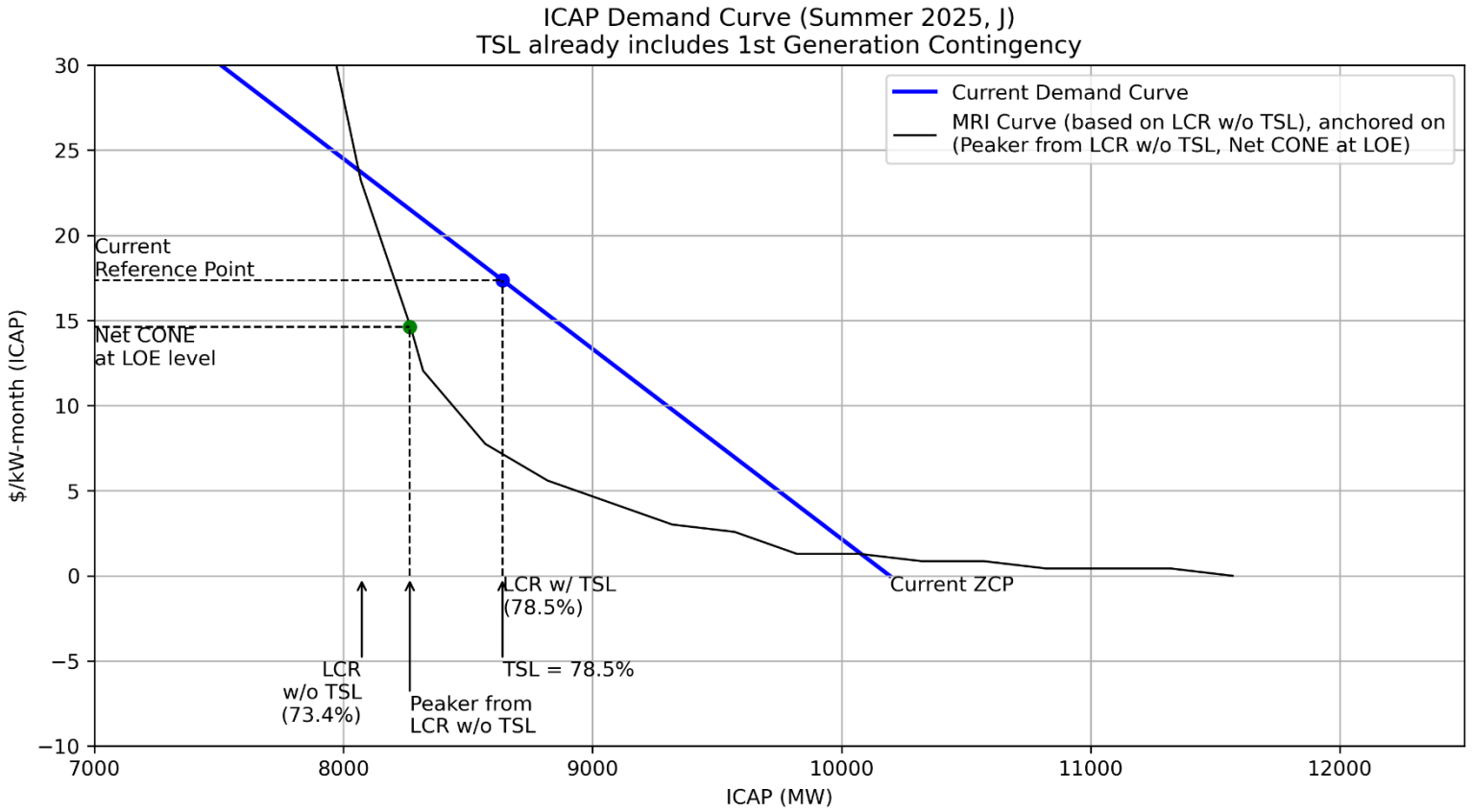

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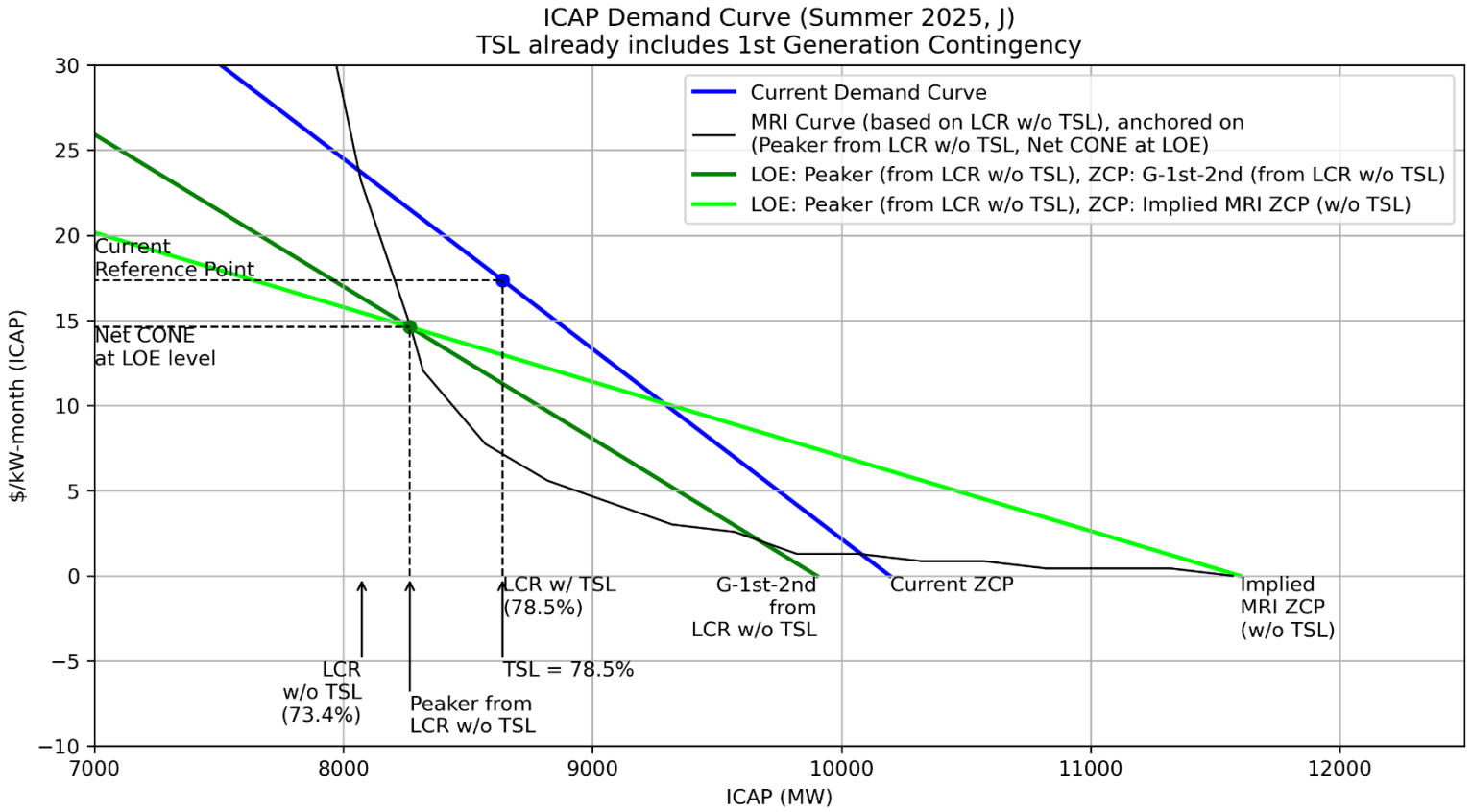

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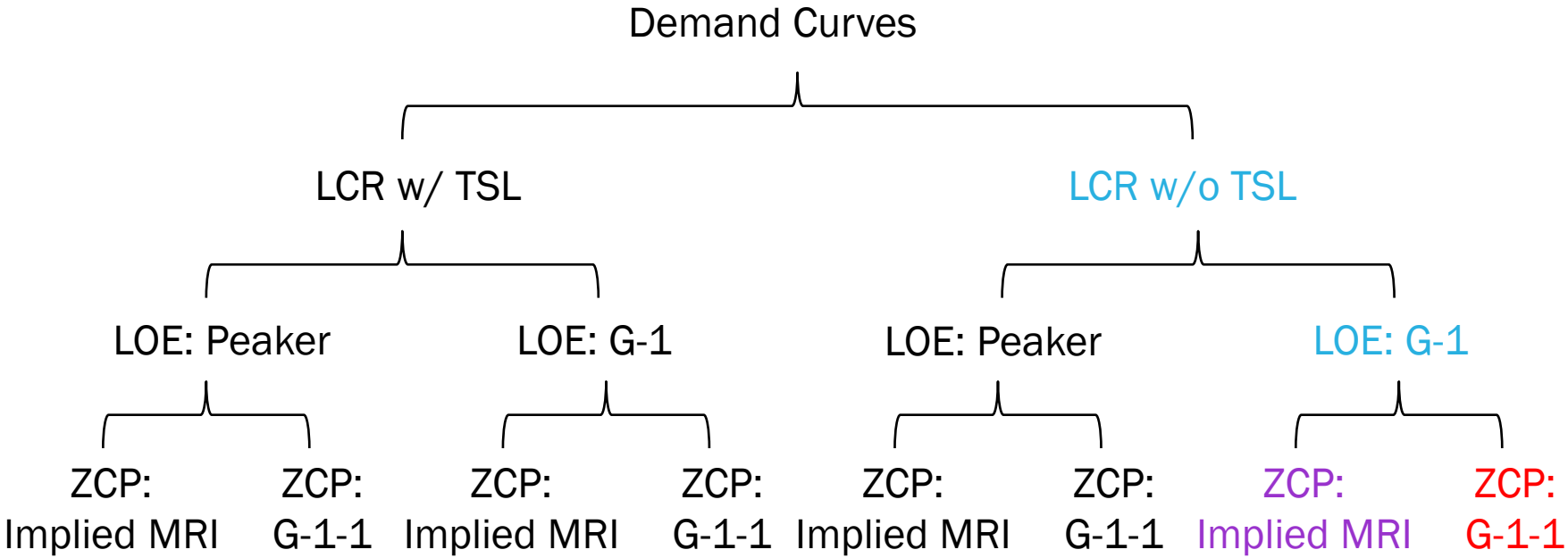
ICAP Demand Curve Illustration: Fourth Scenario



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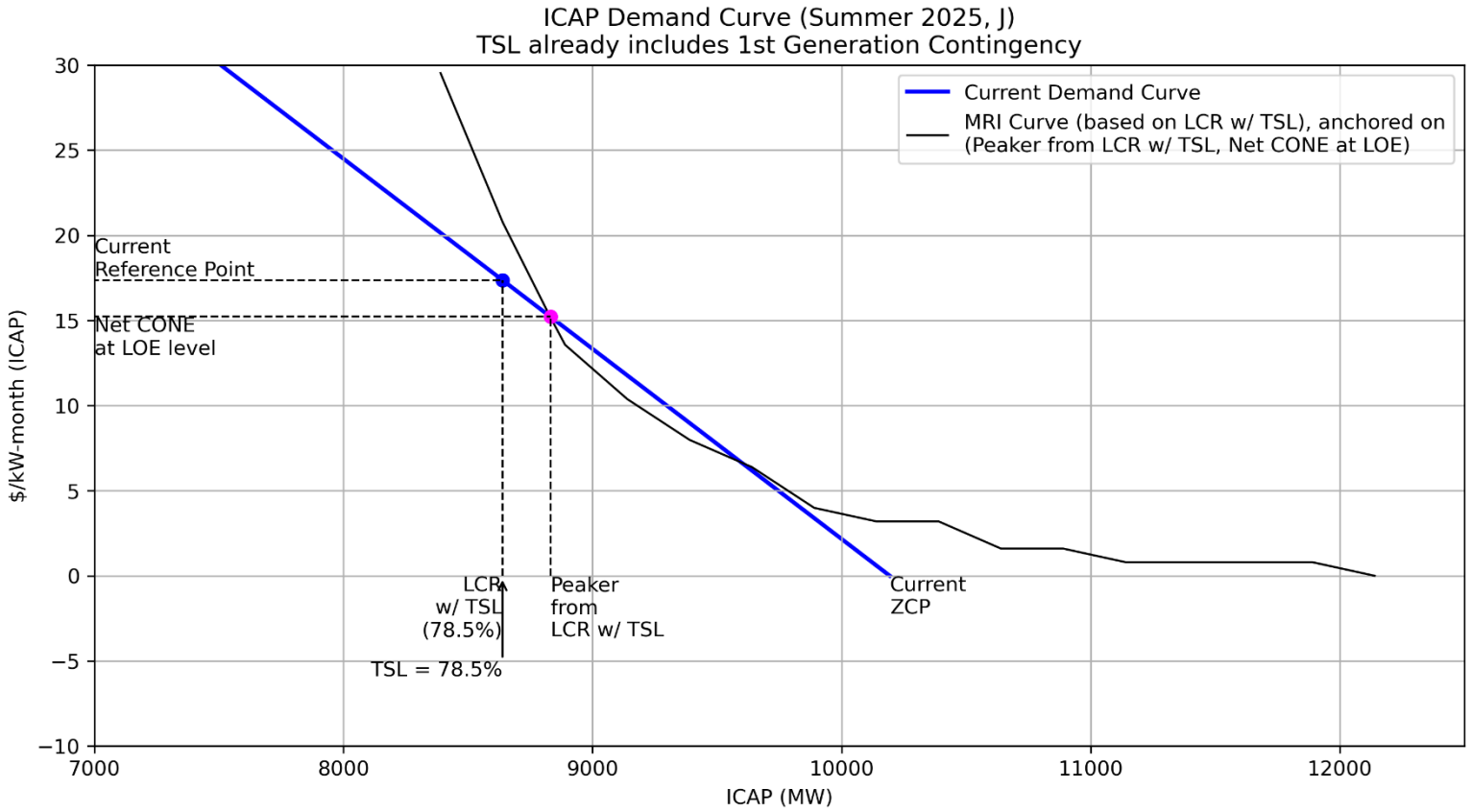

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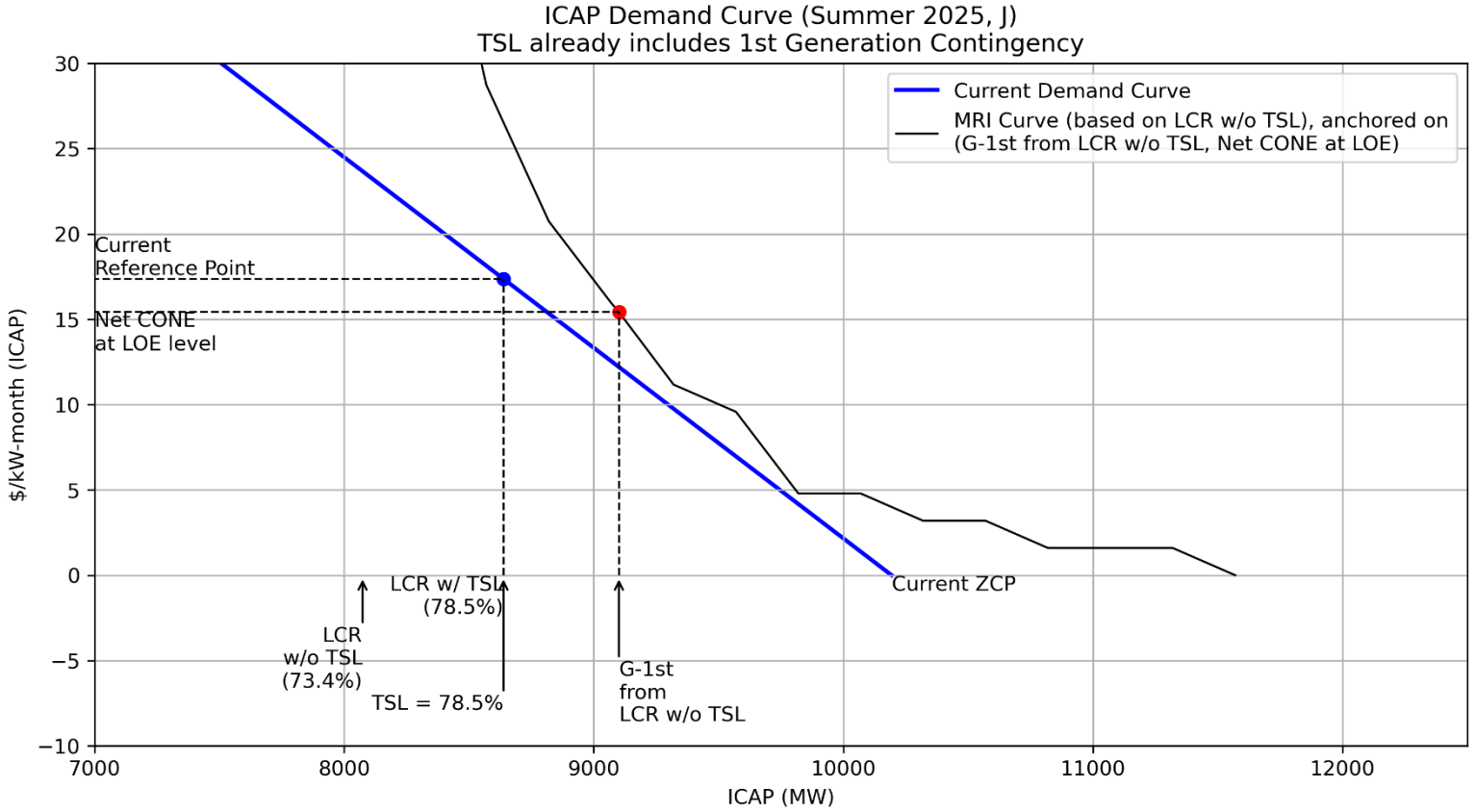

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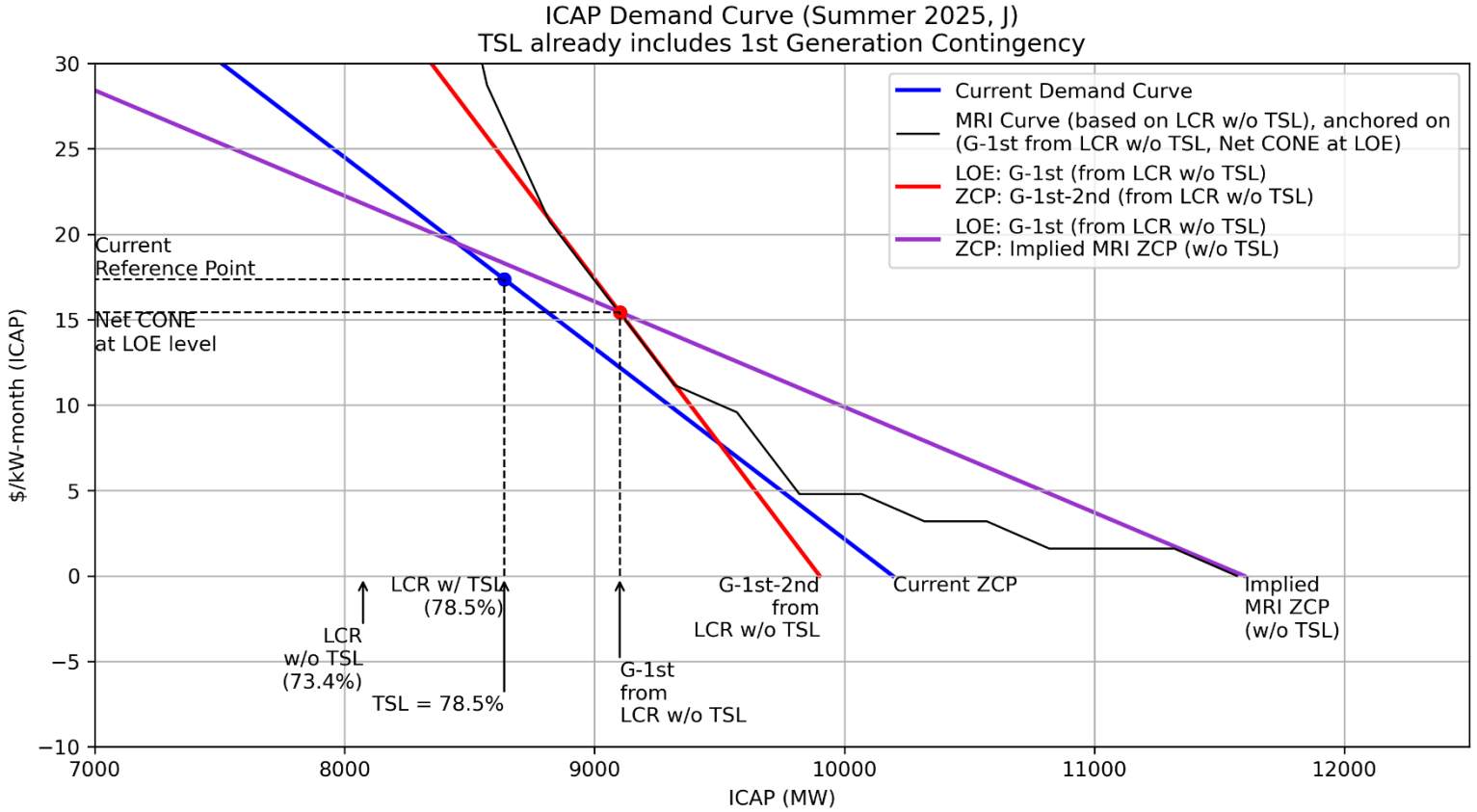

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Alternative Prescribed LOE and ZCPs: Takeaways

- **The ZCP implied by the MRI curve is typically greater than both the current ZCP and the ZCP set at LCR + G-1-1. This results in a demand curve with a gentler slope.**
  - Impact: slower decline in capacity value as supply increases.
- **When the demand curve is based on a Prescribed LOE = LCR + G-1 and ZCP = LCR + G-1-1, the slope is steepest because the distance between the LOE and ZCP points is compressed.**
  - Impact: more rapid drop in prices as capacity exceeds the minimum Installed Capacity requirement.

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Kinked ICAP Demand Curve

- **A kinked demand curve introduces multiple slope segments, allowing the curve to convey more nuanced market signals depending on where the market clears.**
- **An illustrative example of a kinked ICAP Demand Curve is shown below:**
  - Prescribed LOE is set as the capacity of peaking plant above the minimum Installed Capacity requirement (in this case LCR).
  - ZCP is based on the corresponding MRI curve.
  - The kink point is identified as the point on the MRI curve where the x-coordinate (MWs) equals the next largest generation capacity (G-1) above the LCR.

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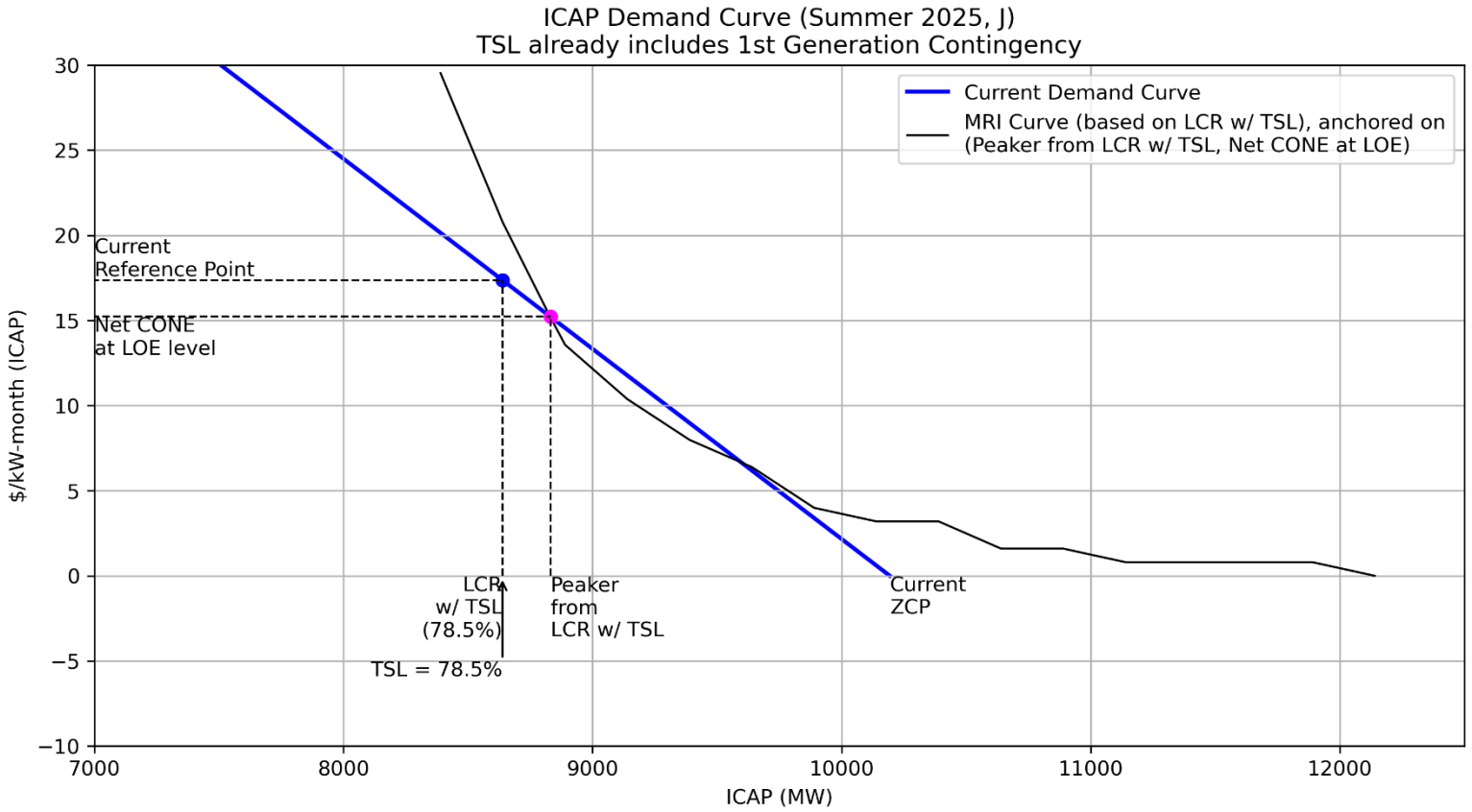

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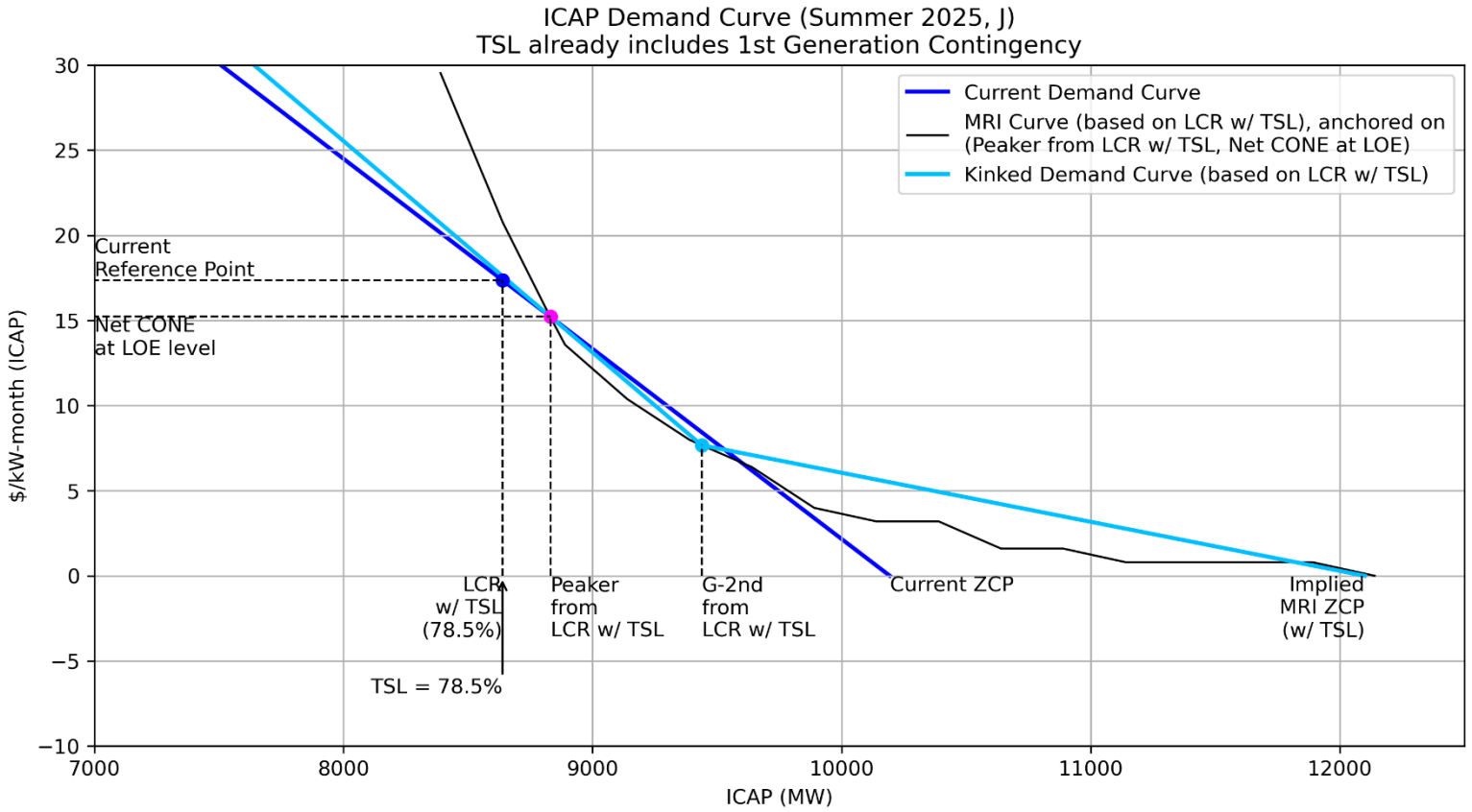

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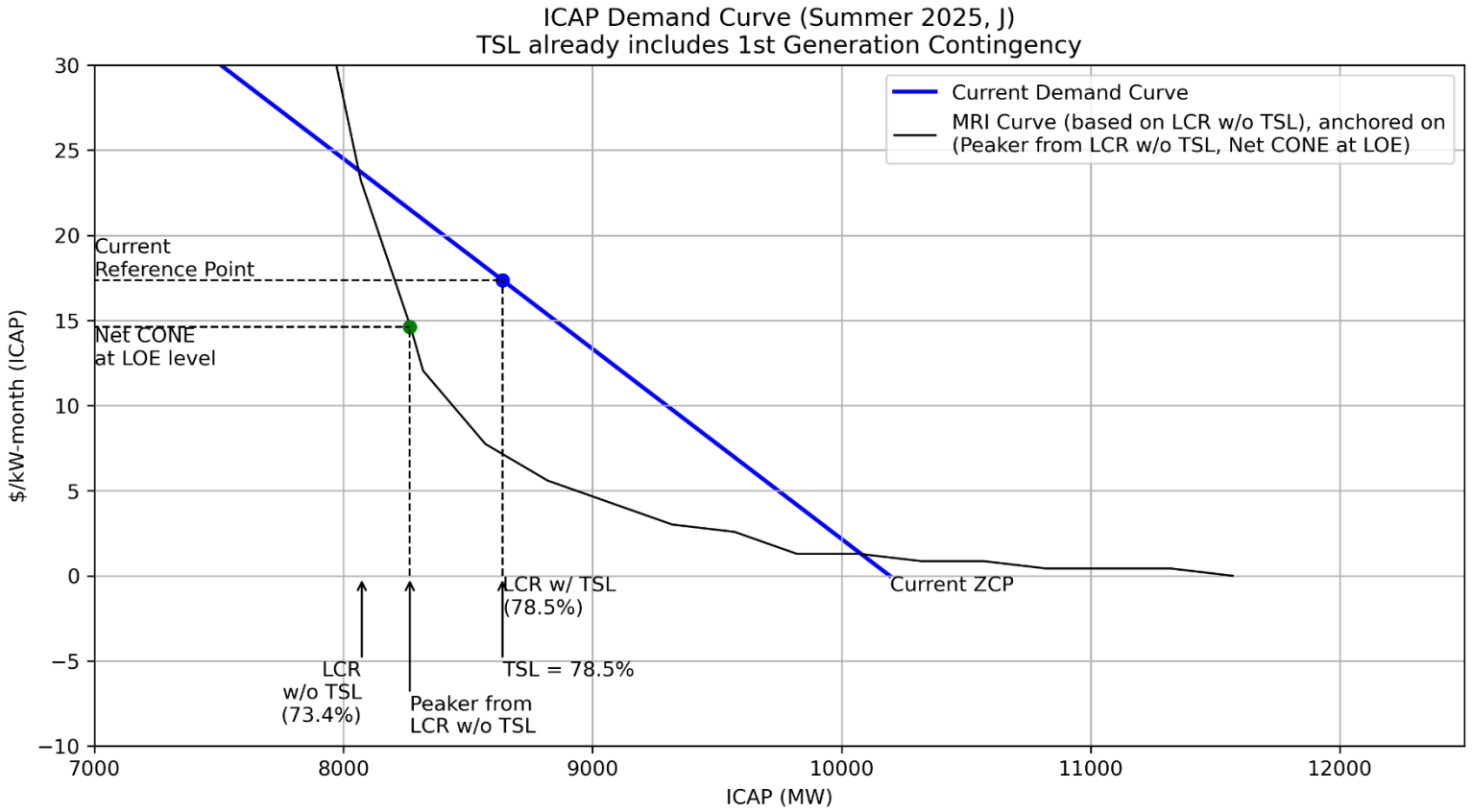

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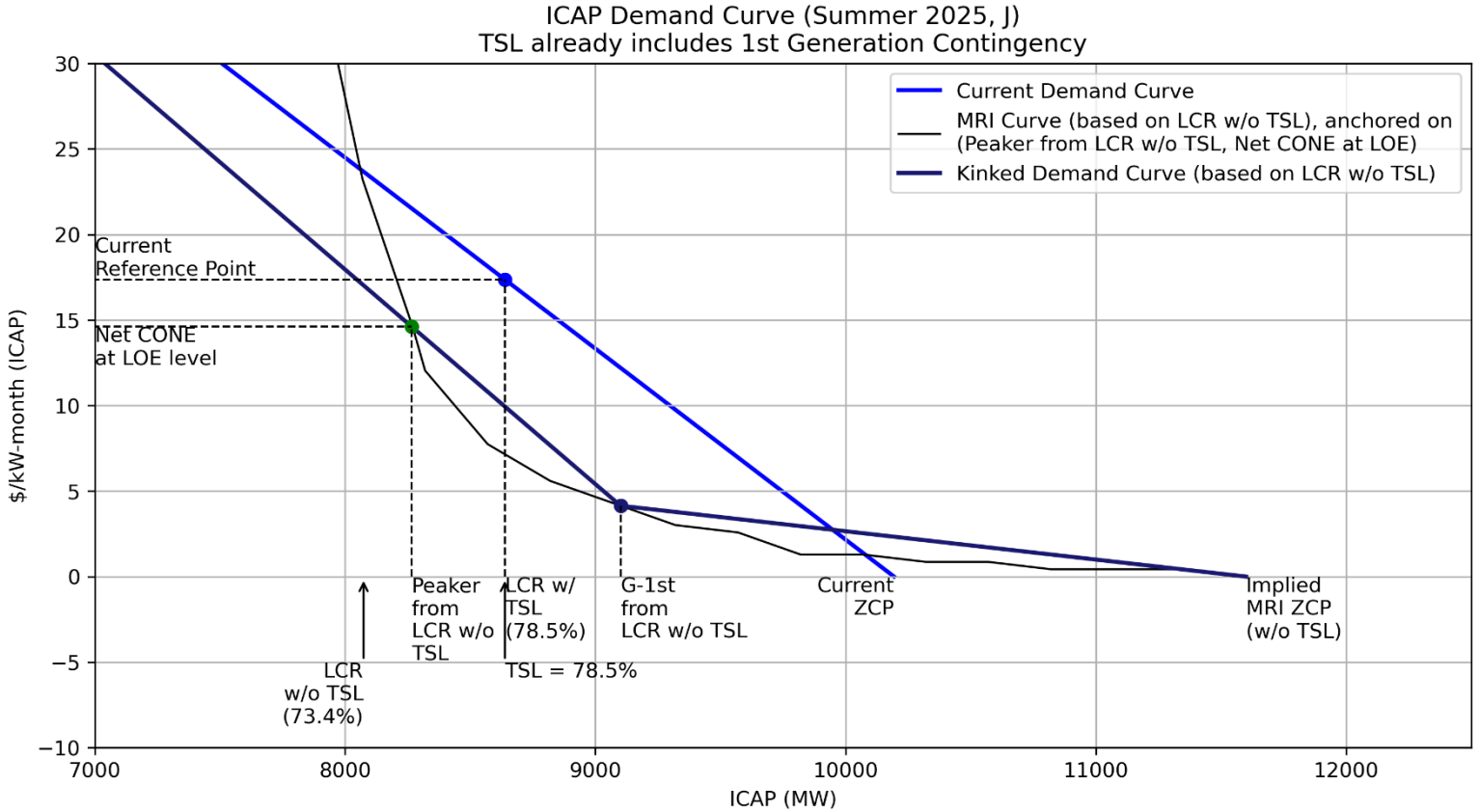

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Kinked ICAP Demand Curve: Takeaways

- **Adding additional kink point on the demand curve may better align the ICAP Demand Curve with the corresponding MRI curve.**
- **To the left of the kink point, the slope is steeper.**
  - Impact: prices rise more sharply if supply decreases toward the minimum Installed Capacity requirement level.
- **To the right of the kink point, the slope becomes more gradual.**
  - Impact: a slower decline in capacity value as supply exceeds the LCR + G-1 level.

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Feedback & Next Steps

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Feedback & Next Steps

- This presentation illustrates the impact of the alternative Prescribed LOE and ZCPs on ICAP Demand Curve shape and slope, using NYC Locality data and 2025 MRI curves. The NYISO is evaluating the impact on ICAP Demand Curve shapes and slopes for other Localities and with MRI curves from additional years.
- The NYISO seeks stakeholder feedback on other potential ICAP Demand Curve configurations (shape and slope) to considered for this analysis.

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Questions?

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Appendix: ICAP Demand Curve Options for Zone J with 2025 Data

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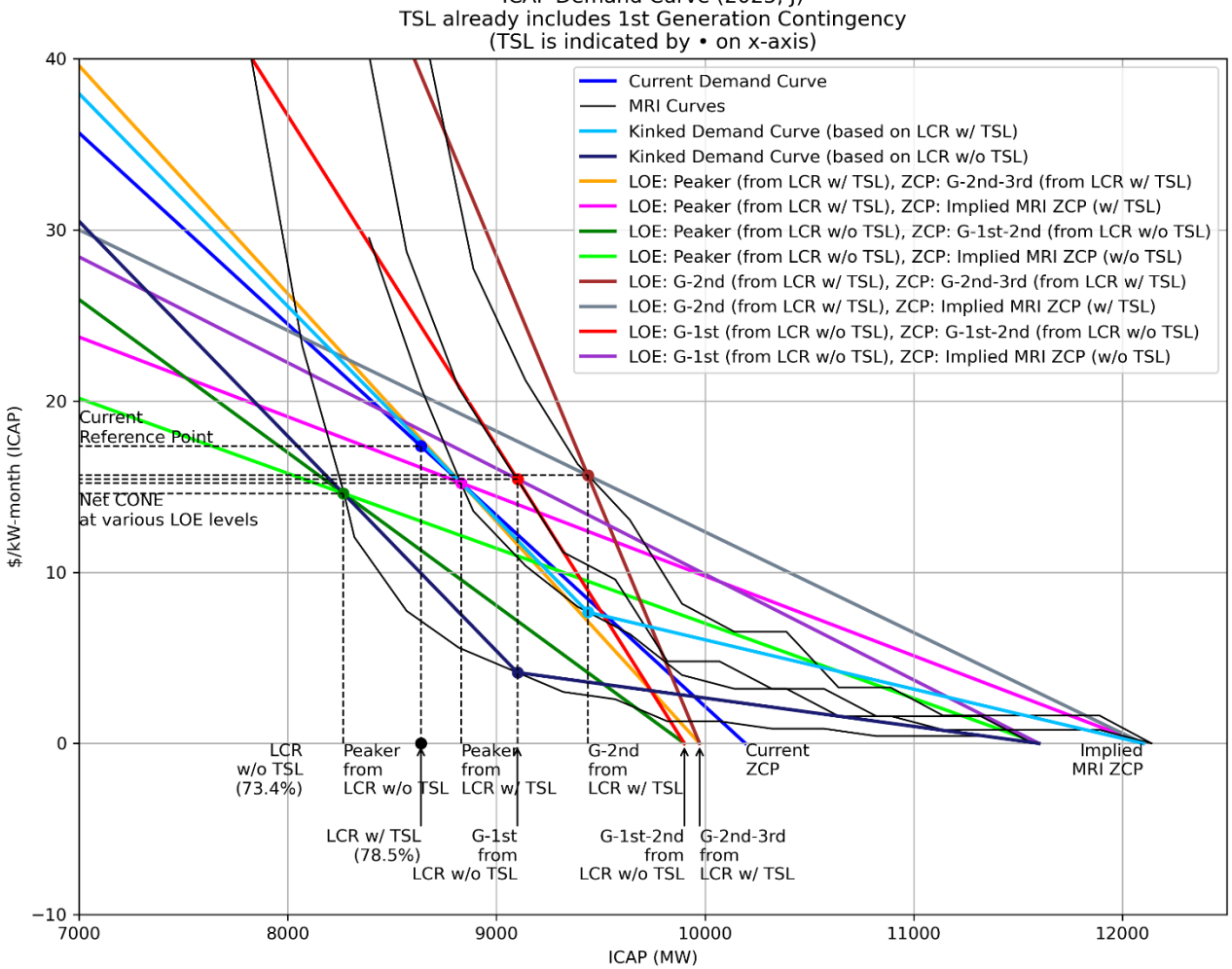

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Appendix: Previous Presentations

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Previous ICAPWG Presentations

Date	Description
2026-01-12	Demand Curve Reset Process and Methodology Improvements
2025-11-17	Project Kickoff

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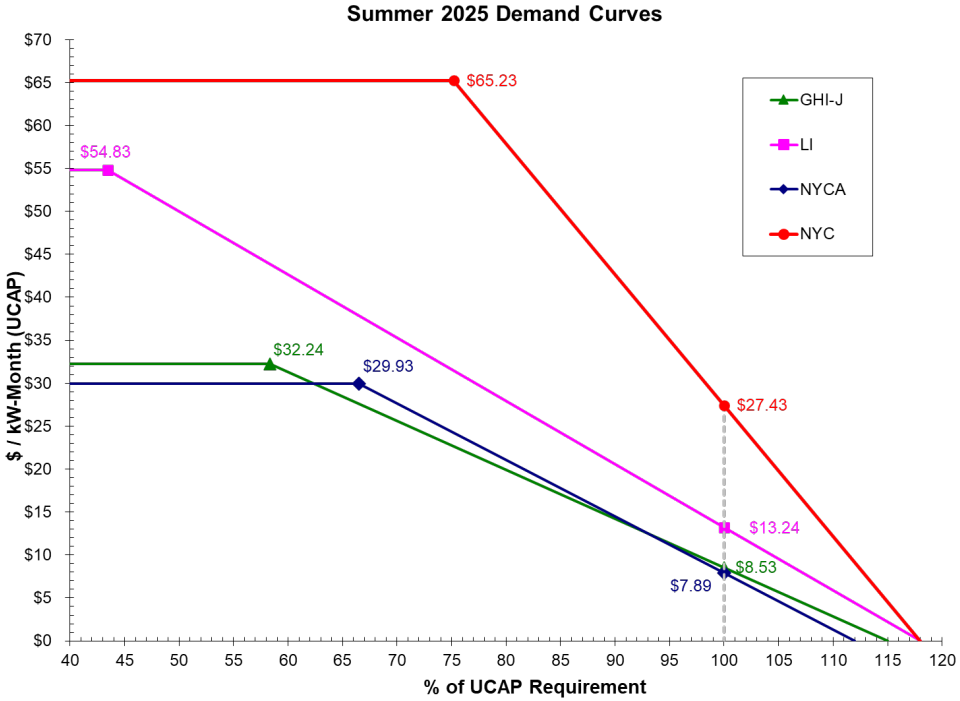
Appendix: Demand Curve Shapes 5/22/2025 ICAPWG

Overview

- Each ICAP Demand Curve is comprised of a price cap, sloped section, and price floor.
  - This structure has remained unchanged since the implementation of the sloped demand curves in 2003.
- Alternative shapes and slopes may more accurately value resources according to their contribution to reliability. They may also address stakeholder concerns that the current ICAP Demand Curve structure may result in wealth transfers to incumbent resources while inadequately incentivizing new resource entry.



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Overview (cont.)

- **Alternatives to explore could include leveraging a marginal reliability improvement (MRI) curve, such as used in ISO-NE and MISO and proposed for use in PJM, or a kinked curve, such as used in PJM currently.**
  - While these alternatives may more accurately value resources according to their contribution to reliability, they may also pose price predictability risks and increased investment risk due to steeper slopes.
    - These risks may vary by season and will need to be further evaluated when considering these alternatives

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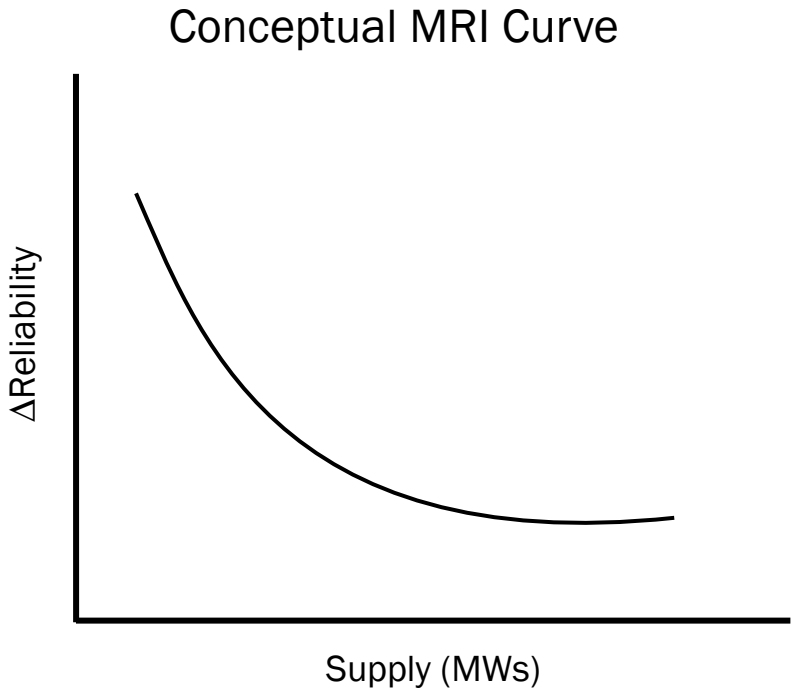
MRI Demand Curve - Overview

- **MRI Curve (used to derive an MRI Demand Curve)**
  - As supply is added to a system, the marginal reliability benefit provided by the next increment of supply decreases, producing a downward sloping convex MRI curve
    - Thus, as supply is added to the NYCA system, it has decreasing reliability value. This is reflected as a lower capacity price as supply increases using an MRI demand curve



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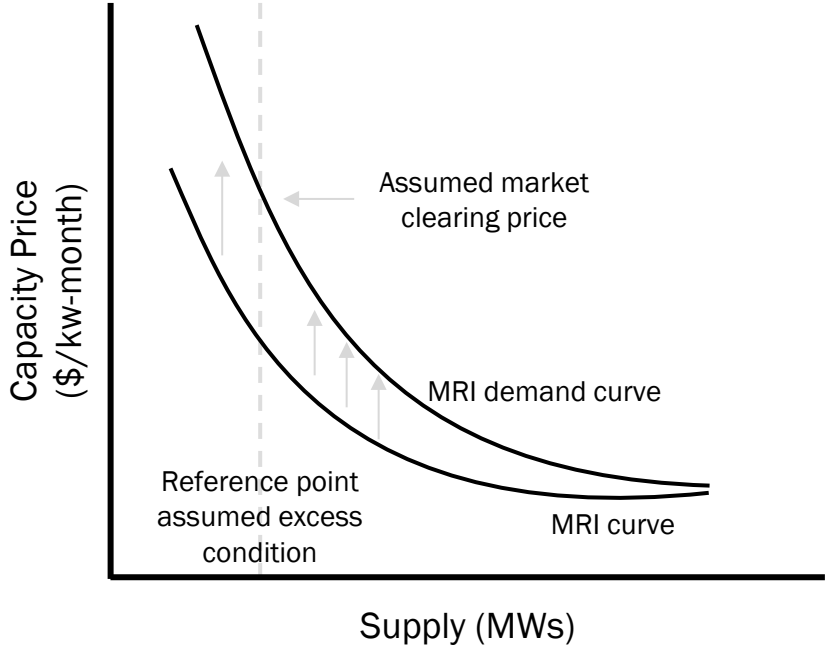
MRI Demand Curve – Overview (Cont.)

- **MRI Demand Curve**
  - An MRI demand curve can be produced by multiplying each MRI point on an MRI curve by a scaling factor
    - The scaling factor can be calculated by dividing the capacity price at the reference point assumed level of excess condition, as defined in MST 5.14.1.2.2, for the applicable season by the MRI at that supply condition
      - This ensures the peaking plant underlying the ICAP Demand Curve continues to be revenue sufficient when moving to an MRI demand curve

Conceptual MRI Demand Curve



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NYCA and Locality MRI Demand Curves

- **To help evaluate the potential use of MRI demand curves, the NYISO has developed example MRI curves for NYCA and the Localities utilizing the 2025-2026 Locational Minimum Installed Capacity Requirement (LCR) study model in GE MARS**
  - MRI curves were developed by adding increments of capacity to the at-criteria model and measuring the resulting Loss of Load Expectation (LOLE) and Expected Unserved Energy (EUE)
    - Other methodologies could be considered for creating MRI curves
- **The MRI curves were translated into seasonal MRI demand curves using seasonal scaling factors**
  - The scaling factor for each curve was calculated by dividing the market clearing price at the reference point assumed level of excess condition, as defined in MST 5.14.1.2.2, by the implied MRI at the reference point assumed excess condition for each season
    - The implied MRI was calculated by linearly interpolating between the MRIs on either side of the reference point assumed excess condition

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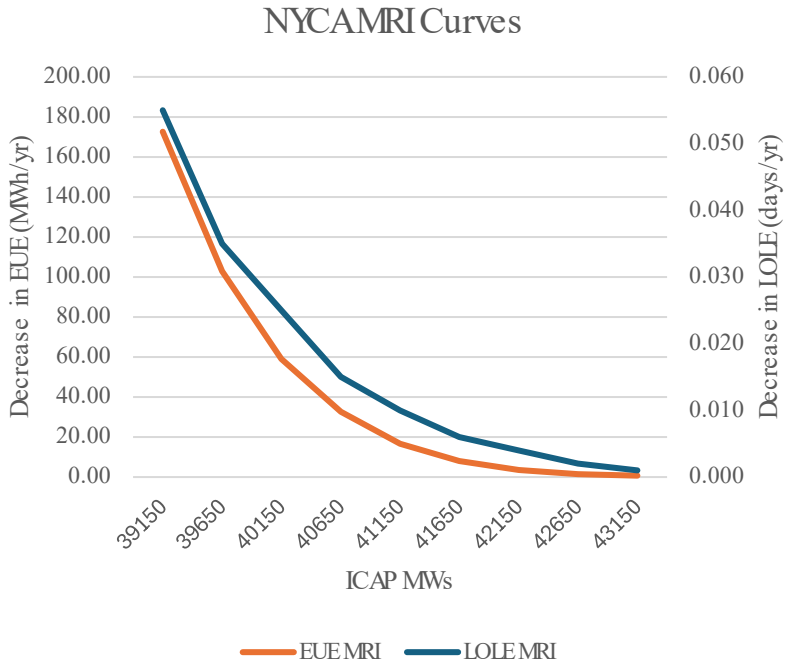
Example NYCA MRI Curve

ICAP (MW)	Capacity Adjustment (MW)	LOLE (days/yr)	- Δ LOLE (days/yr) per 500 MW [LOLE MRI]	EUE (MWh/yr)	- Δ EUE (MWh/yr) per 500 MW [EUE MRI]
38,148	-1000	0.231		675.9	
38,648	-500	0.155	0.076	398.7	277.20
39,148	0	0.100	0.055	226.1	172.61
39,648	500	0.065	0.035	123.2	102.89
40,148	1,000	0.04	0.025	64.1	59.10
40,648	1,500	0.025	0.015	31.4	32.70
41,148	2,000	0.015	0.010	14.7	16.70
41,648	2,500	0.009	0.006	6.7	8.00
42,148	3,000	0.005	0.004	3.2	3.50
42,648	3,500	0.003	0.002	1.7	1.50
43,148	4,000	0.002	0.001	1	0.70



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Example NYCA MRI Demand Curve Scaling Factors - LOLE

- **2025 Summer Demand Curve**

Reference Point Assumed Excess Condition (%)[1]	(a)	100.52%
ICAP Requirement (MW ICAP)	(b)	39,148
Reference Point Assumed Excess Condition (MW ICAP)	(c) = (a)*(b)	39,351
Assumed Capacity Price ($/kW-month ICAP) [2]	(d)	$5.48
Implied LOLE MRI per 500 MW ICAP (days/year) [3]	(e)	0.047
LOLE Scaling Factor	(f) = (d)/(e)	116.9

- **2025-2026 Winter Demand Curve**

Reference Point Assumed Excess Condition[4]	(a)	103.82%
ICAP Requirement (MW ICAP)	(b)	39,148
Reference Point Assumed Excess Condition (MW ICAP)	(c) = (a)*(b)	40,648
Assumed Capacity Price ($/kW-month ICAP) [2]	(d)	$2.95
Implied LOLE MRI per 500 MW ICAP (days/year) [3]	(e)	0.015
LOLE Scaling Factor	(f) = (d)/(e)	196.7

[1] Equal to "Level of Excess" for the applicable capacity zone from the 2025-2026 ICAP Demand Curve Parameters
[2] See Assumed Capacity Prices at Tariff Prescribed Level of Excess Conditions" for the applicable capacity zone from the 2025-2026 ICAP Demand Curve Parameters
[3] Calculated by linear interpolation using NYCA LOLE MRI curve
[4] Equal to "Level of Excess" plus "Ratio of Winter to Summer DMNCs" for the applicable capacity zone from the 2025-2026 ICAP Demand Curve Parameters

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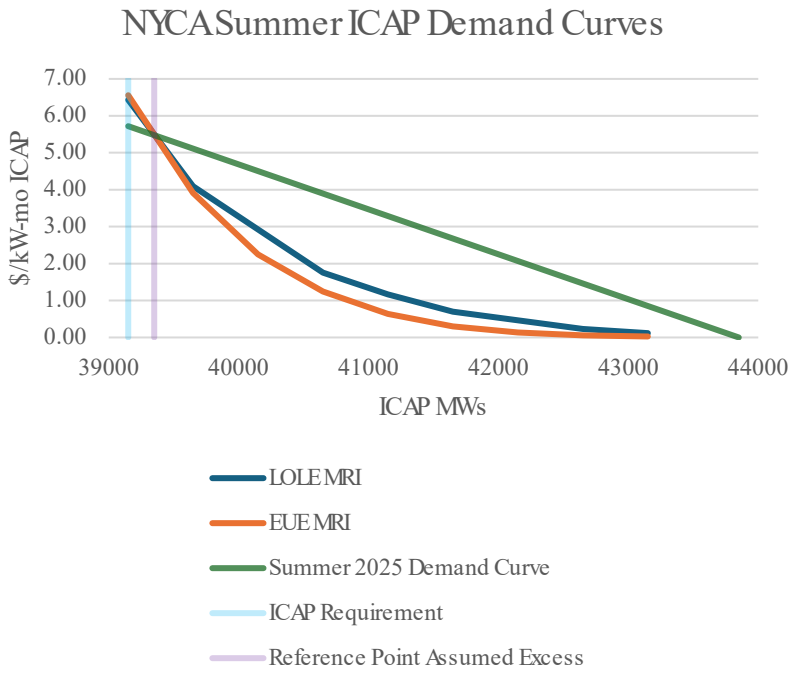
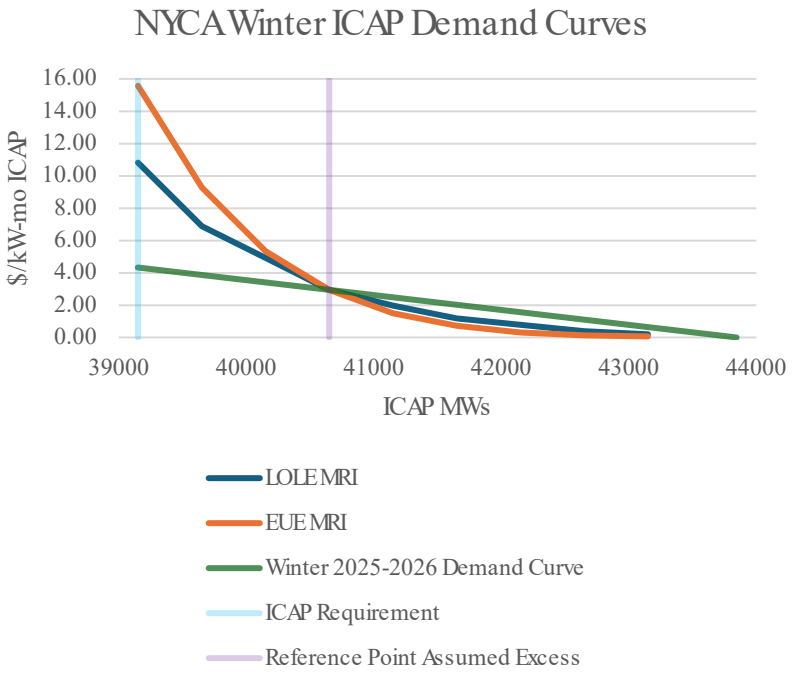
Example NYCA MRI ICAP Demand Curves





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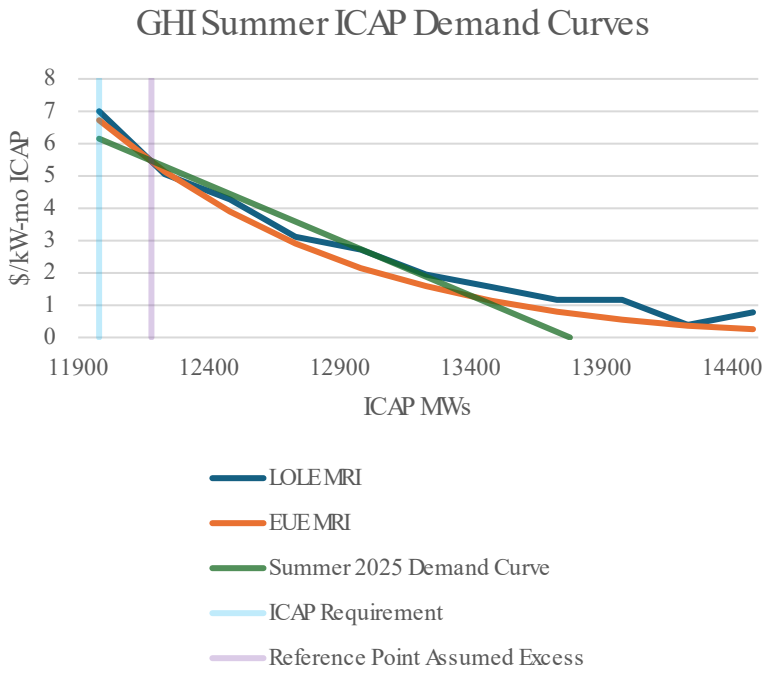
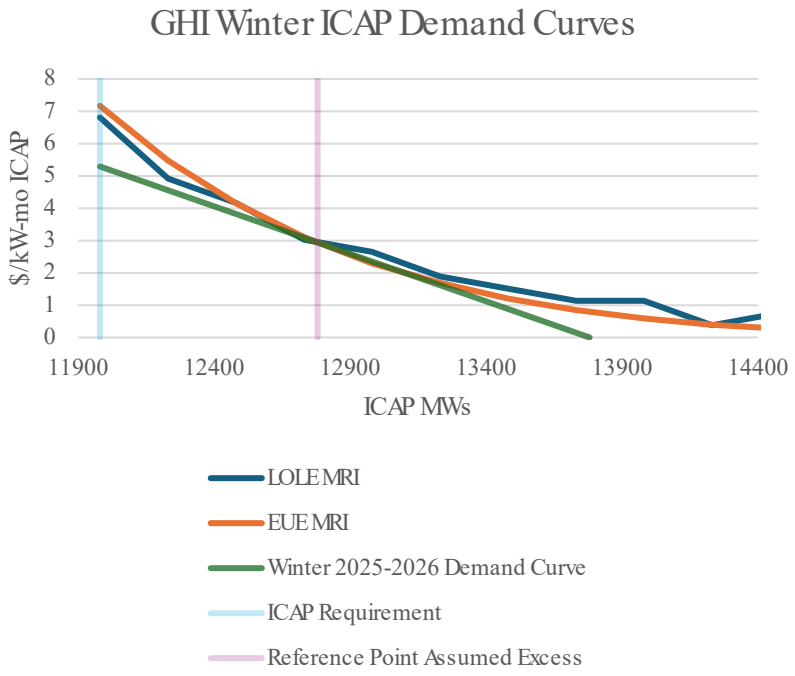
Example GHI MRI ICAP Demand Curves





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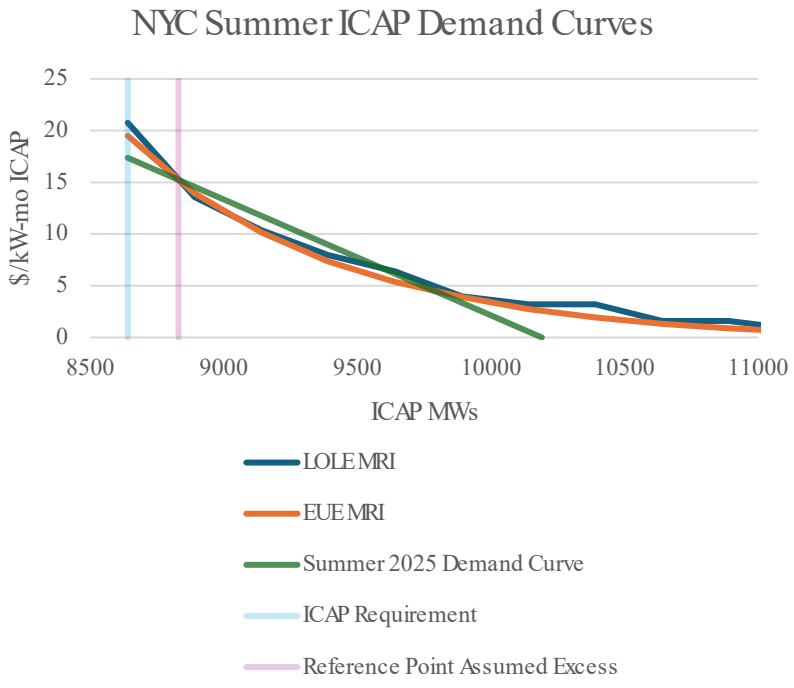
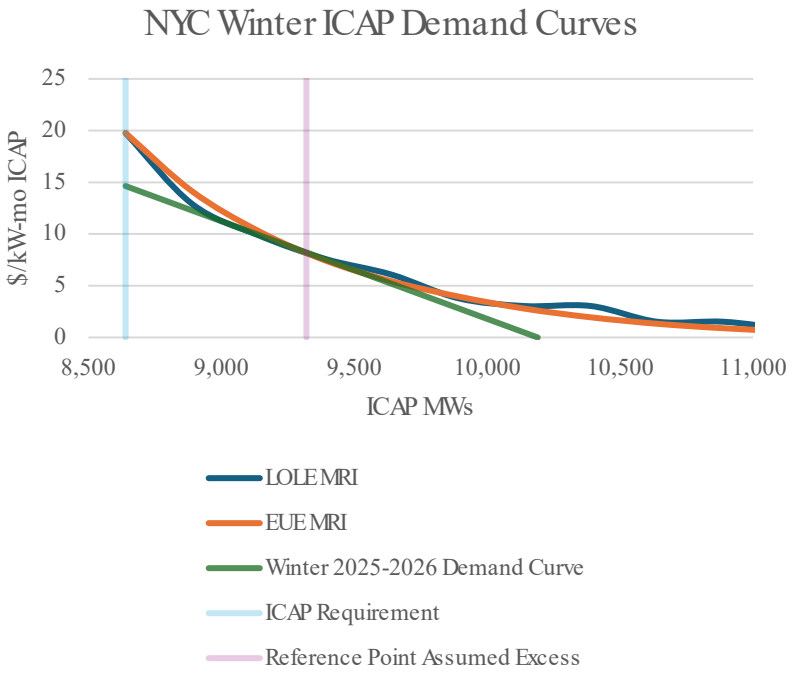
Example NYC MRI ICAP Demand Curves





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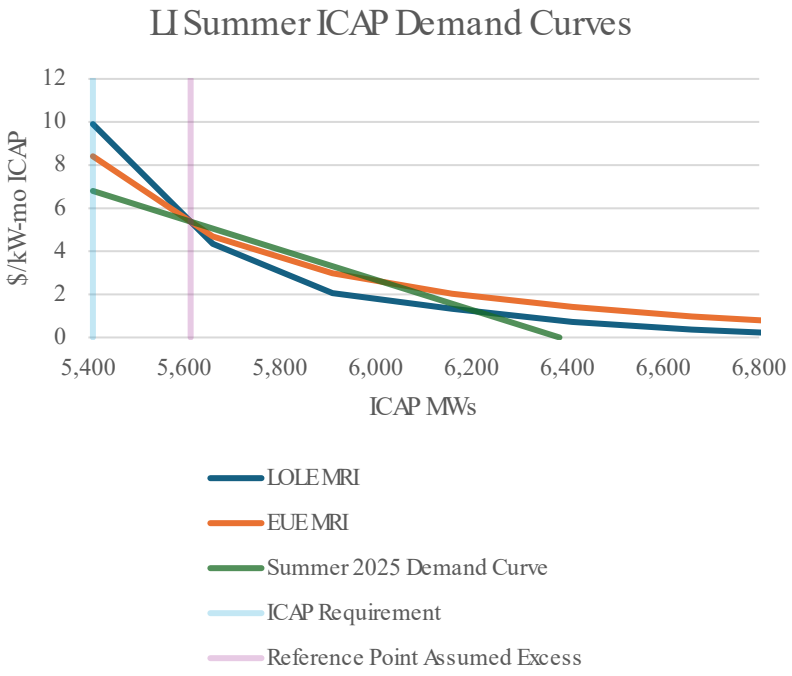
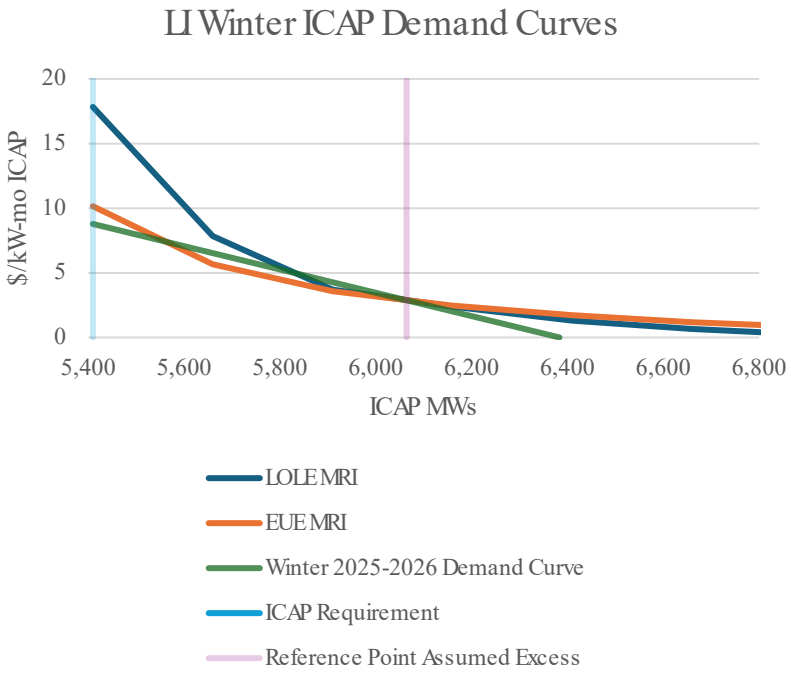
Example LI MRI ICAP Demand Curves





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MRI Demand Curve – Considerations and Further Evaluation

- **An MRI demand curve may more accurately value resources according to their reliability contribution by explicitly tying capacity prices to the marginal reliability improvement provided by resources.**
  - This could help the ICAP Demand Curves provide more efficient and transparent price signals for resource entry and exit based on the system's resource adequacy needs
- **However, MRI demand curves typically measure reliability improvement solely through improvement in LOLE or EUE.**
  - There may be additional reliability elements that should be captured in the shape and slope of the ICAP Demand Curves in order for the curves to continue to provide efficient incentives for resources to participate in the ICAP market during all months of the year
- **Before adopting an MRI demand curve in the ICAP market, the NYISO would need to consider how to measures MRI, supply side mitigation impacts, price stability impacts, and interactions with other ICAP market design changes such as enhancements resulting from the Winter Reliability Capacity Enhancements project.**

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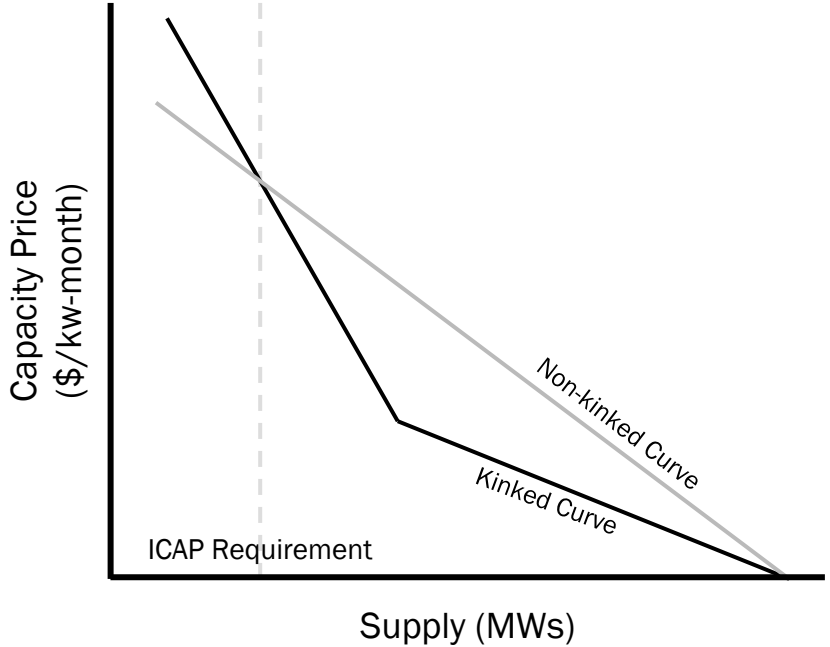
Kinked Demand Curves

- **A kinked demand curve is comprised of multiple downward sloping segments with different slopes**
  - Can be concave or convex
  - PJM has utilized a kinked demand curve in its capacity market since 2006
- **Convex kinked demand curves can be used to**
  - Approximate MRI demand curves
  - Provide price stability in the flatter portions of the curve
  - Mitigate over-procurement risks in the face of net CONE uncertainty when the slope is steeper near the reference point

Figure 4: Conceptual Convex Kinked Demand Curve



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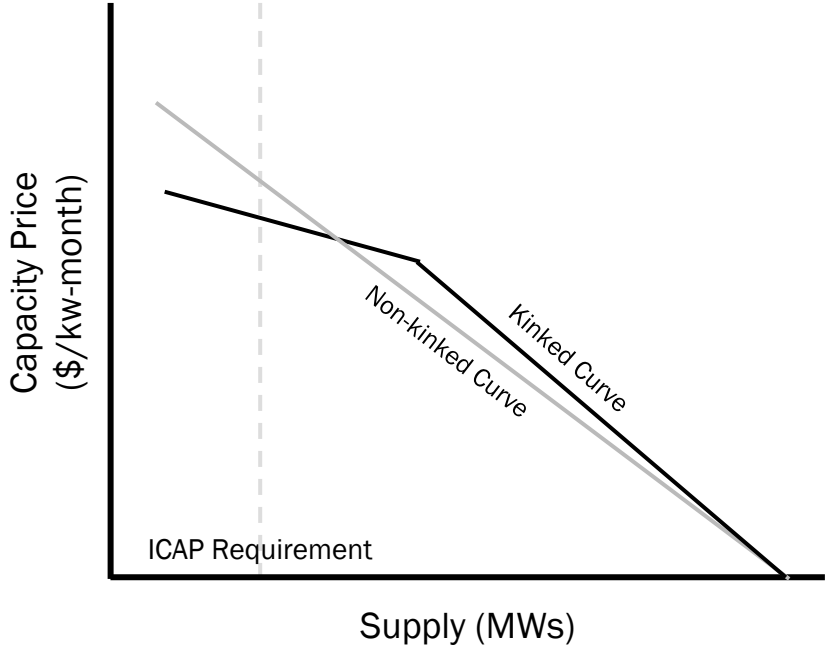
Kinked Demand Curves (cont.)

- **Concave kinked demand curves can be used to**
  - Reduce the reference point price by reducing the impact of the level of excess adjustment
  - Provide price stability in the flatter portions of the curve
- **NERA Economic Consulting (NERA) evaluated a convex kinked demand curve as part of the 2008-2011 and 2011-2014 DCRs**
  - NERA noted the potential price stability advantages of a kinked demand curve but did not recommend a kinked demand curve during those DCRs due to market power and regulatory risk concerns

Conceptual Concave Kinked Demand Curve



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Kinked Demand Curves – Considerations and Further Evaluation

- **Before adopting a kinked demand curve in the ICAP market, the NYISO would need to consider and evaluate:**
  - The appropriate point(s) at which the curve should be kinked
  - Price stability and market power concerns related to the steeper sections of the curves
  - Whether the zero-crossing point should be moved
  - Potential interactions with other ICAP market design changes such as enhancements resulting from the Winter Reliability Capacity Enhancements project

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Changing the ICAP Demand Curve Shapes and Slopes – Considerations

- Ultimately, direct adoption of an MRI demand curve or kinked curve may not be desirable when considering price predictability and transparency impacts.
- However, elements from an MRI curve or kinked curve could be utilized to better inform the shape and slope of the current linear demand curves in an effort to incent reliability at an efficient level for consumers.

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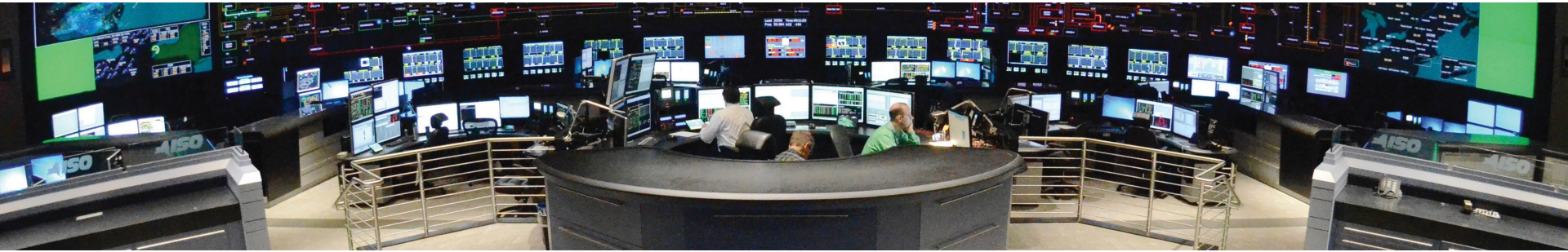
Our Mission and Vision

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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