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Mitigation Review Analysis

Discussion Slides

October 22, 2021

Draft: October 19, 2021

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Analysis Methodology Updates

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Updates to Analysis

- Revisions to Marginal Capacity Values
  - Marginal Capacity Values based on latest 6/22/20 "New York's Evolution to a Zero Emissions Power System" study[1]
  - Marginal Capacity Value of Energy Storage now based on % Peak Load Reduction
- Revisions to Peak Load and IRM/LCR Assumptions
  - Use of "CLCPA Load" Scenario in 2021 Gold Book and Climate Phase I study to match progression of peak load over time in Grid in Transition study
  - Minor reductions in IRM/LCR in 2026 and 2032 to reflect changes in transmission topology
  - IRM/LCRs set to reflect capacity value of full portfolio
- Revisions to Demand Curve
  - Refinement of peaking technology assumptions to better locality cost premiums

Source: [1] https://www.nyiso.com/documents/20142/13245925/Brattle%20New%20York%20Electric%20Grid%20Evolution%20Study%20-%20June%202020.pdf/

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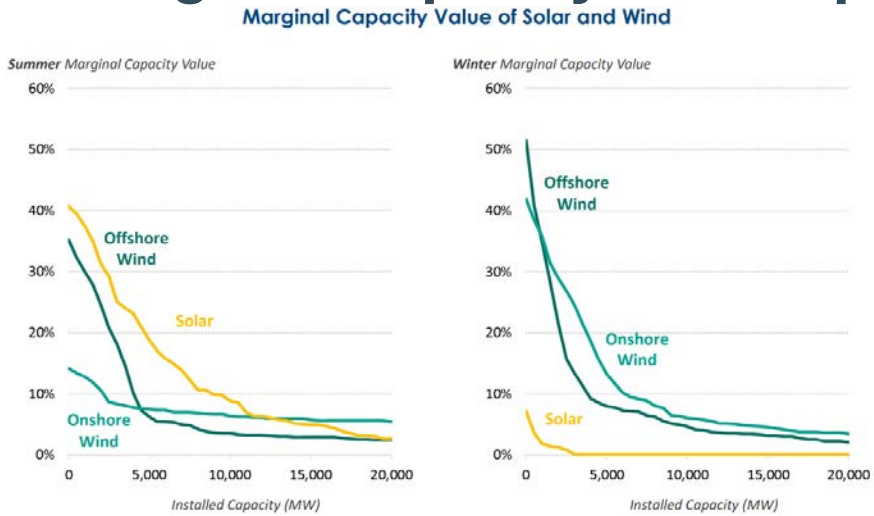
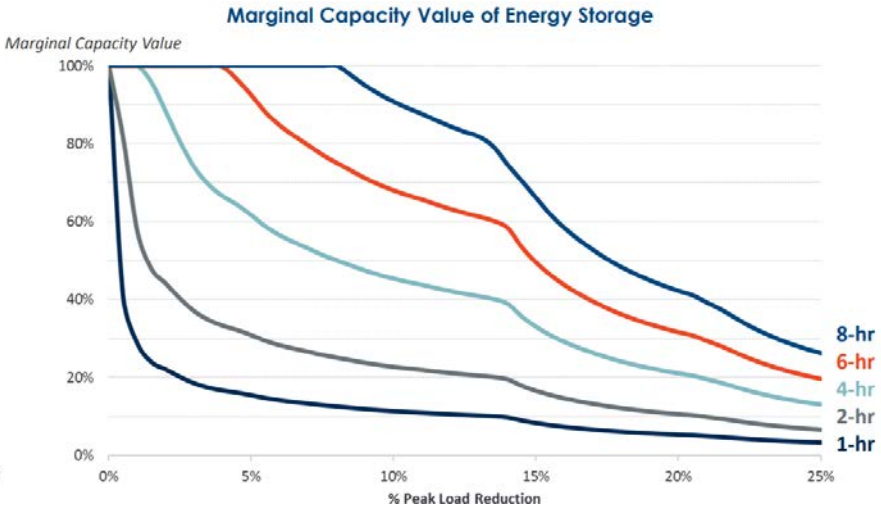
Marginal Capacity Assumption Values





UCAP Translation Factors for CLCPA Units	Current ICAP Manual		Marginal Capacity Values			
	2022 Summer	2022 Winter	2026 Summer	2026 Winter	2032 Summer	2032 Winter
Onshore Wind	16.0%	34.0%	10.5%	28.9%	6.6%	6.1%
Offshore Wind	N/A	N/A	29.0%	32.2%	4.9%	6.5%
Utility-Scale Solar	46.0%	2.0%	18.6%	0.0%	4.3%	0.0%
2h Battery Storage	45.0%	45.0%	27.2%	27.2%	20.6%	20.6%
4h Battery Storage	90.0%	90.0%	100.0%	100.0%	100.0%	100.0%

Note: Battery Storage units have an additional assumed 3% EFORd in calculation of UCAP.

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Revised Supply Curve Inputs: UCAP/ICAP Translation

- UCAP/ICAP Translation Factors used in demand curve are recalculated in each season/year to be consistent with supply curve inputs
  - 2022 values reflect resource assumptions in Grid in Transition Study, including entry of 2-hour storage into Zone K, so are not directly comparable to historical values

UCAP/ICAP Translation Factors	Summer			Winter		
	2022	2026	2032	2022	2026	2032
NYCA	12.4%	25.0%	53.6%	11.3%	25.3%	53.2%
G-J Locality	8.0%	16.7%	38.4%	7.8%	15.9%	36.9%
NYC (J)	7.8%	20.6%	44.4%	7.7%	19.5%	42.4%
LI (K)	14.9%	24.5%	46.0%	15.0%	23.8%	44.6%

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Revised Demand Curve Inputs: Reserve Margins

- UCAP Reserve Margins (UCAP Requirement / Peak Load) by locality calculated from historical average 2016-2021 values

	NYCA	G-J Locality	NYC (J)	LI (K)
UCAP Reserve Margin	107.9%	85.7%	77.8%	96.9%

- IRMs and LCRs by year derived from URMs and UCAP/ICAP Translation Factors from supply curve reflecting portfolio capacity value
- 2026 and 2032 IRMs and LCRs modified to reflect changes in transmission topology[1]

IRM/LCR by Year	NYCA	G-J Locality	NYC (J)	LI (K)
2022 IRM/LCR	123.1%	93.2%	84.4%	113.8%
2026 IRM/LCR	139.4%	101.2%	93.2%	124.1%
2032 IRM/LCR	210.7%	130.9%	126.7%	163.7%

Note: IRM/LCRs decrease by 0.4% in NYCA, decrease by 2.1% in NYC, and increase by 0.1% in G-J from 2024/25 to 2025/26 in the assumptions used for NYISO's BSM study assumptions.
Source: [1] https://www.nyiso.com/documents/20142/23240761/IMM_ICAPWG_072621.Final.pdf/

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Revised Demand Curve Inputs: UCAP Requirements

- UCAP Requirements calculated using marginal capacity accreditation values:

UCAP (MW) Requirements	Summer			Winter		
	2022	2026	2032	2022	2026	2032
NYCA	34,429	33,161	34,662	34,835	33,002	34,923
G-J Locality	12,816	12,433	13,120	12,835	12,552	13,444
NYC (J)	8,397	7,858	8,216	8,405	7,965	8,516
LI (K)	5,237	5,082	5,562	5,229	5,132	5,707

- As UCAP average derating factors (UCAP/ICAP translation factor) increase over time, UCAP requirements decrease simultaneously

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Preliminary Results

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Preliminary Modeled Results

Clearing Prices ($/kW-mo)	Summer			Winter		
	2022	2026	2032	2022	2026	2032
NYCA	$4.26	$3.21	$4.99	$3.19	$2.42	$4.96
G-J Locality	$6.91	$9.02	$9.58	$3.87	$6.05	$7.36
NYC (J)	$6.91	$9.07	$9.58	$3.87	$6.05	$7.36
LI (K)	$6.66	$13.38	$12.20	$3.66	$11.17	$11.45

Clearing UCAP Quantities (MW)	Summer			Winter		
	2022	2026	2032	2022	2026	2032
NYCA	36,535	35,401	35,448	37,484	35,658	35,735
G-J Locality	13,791	12,918	13,178	14,229	13,502	13,957
NYC (J)	9,454	8,578	8,764	9,649	8,930	9,283
LI (K)	5,809	4,937	5,176	5,968	5,161	5,398

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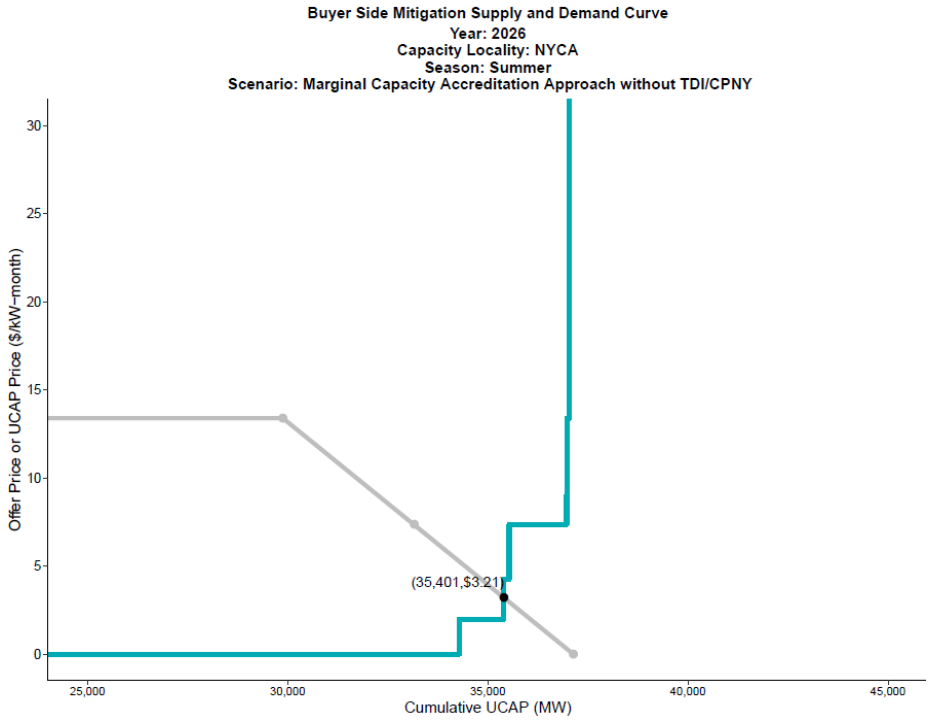
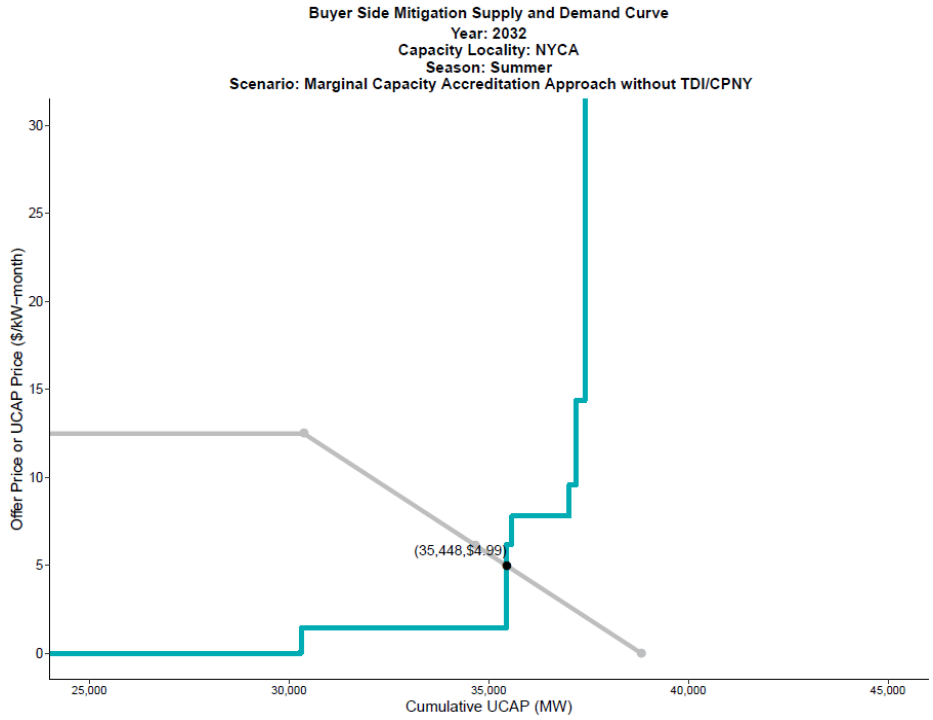
Results in NYCA, 2026-2032

Summer 2026 NYCA



Summer 2032 NYCA



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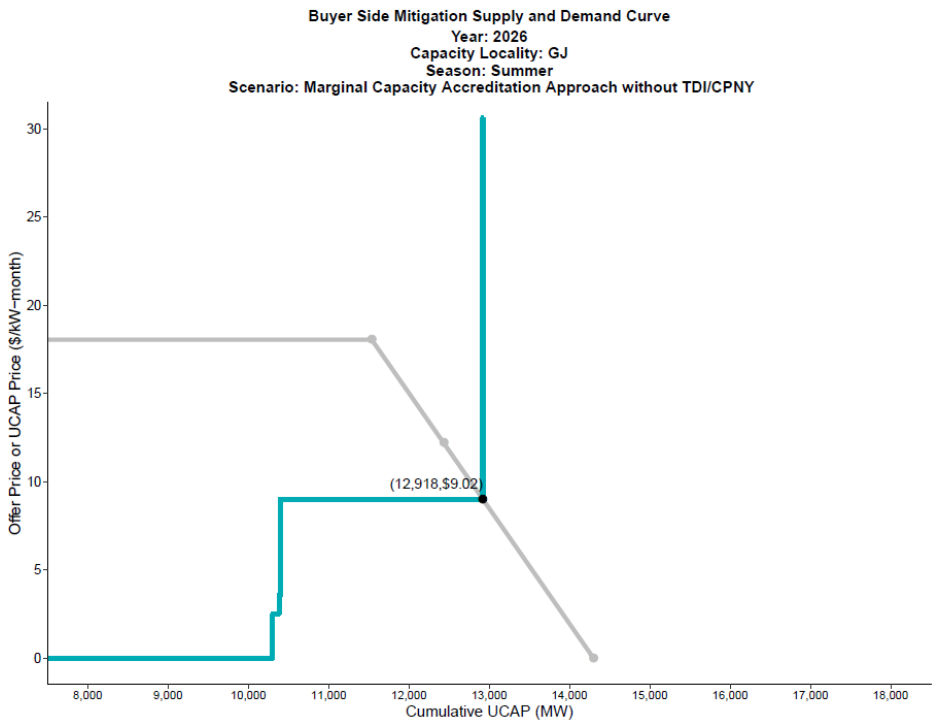
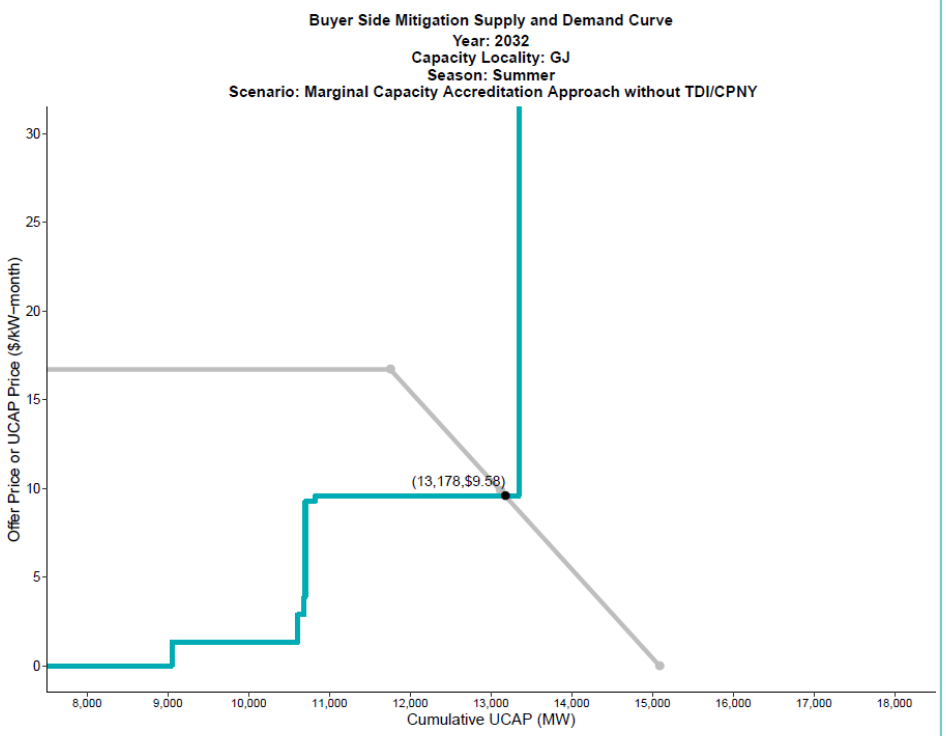
Results in G-J Locality, 2026-2032

Summer 2026 G-J Locality



Summer 2032 G-J Locality



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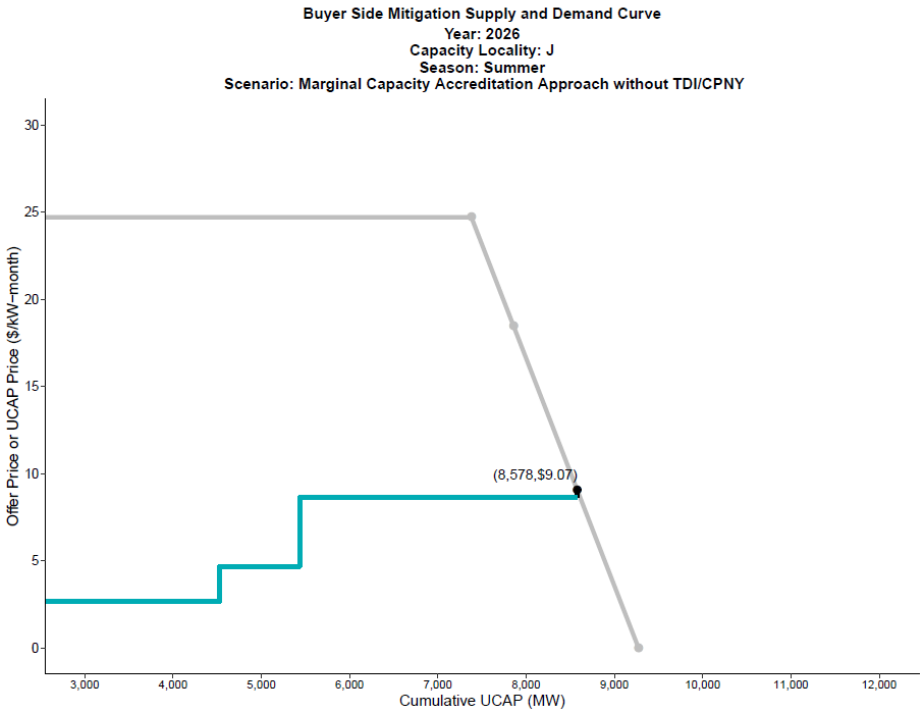
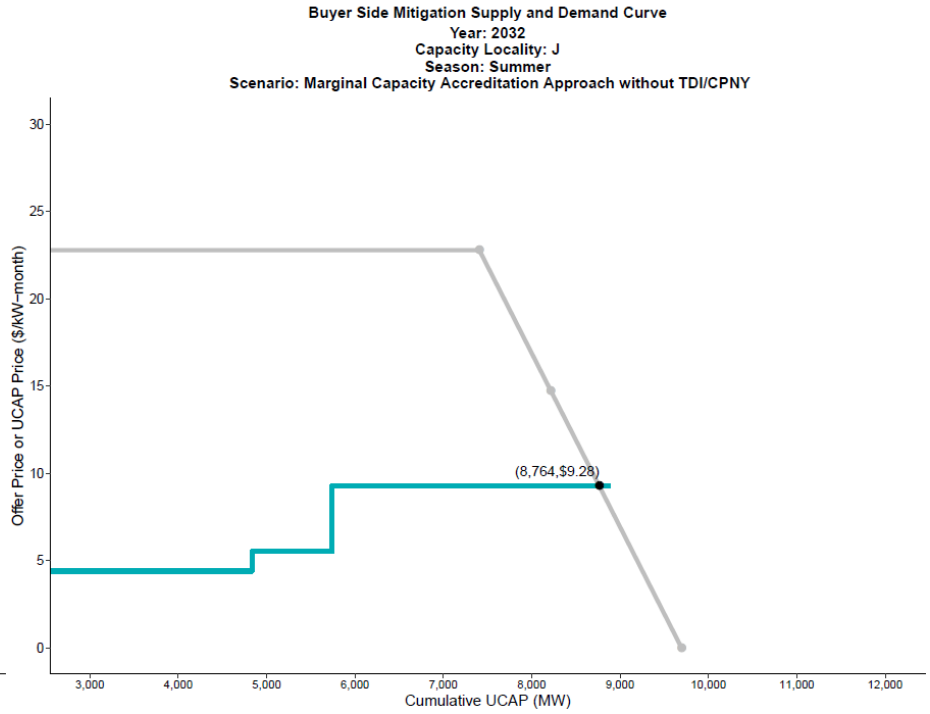
Results in NYC, 2026-2032

Summer 2026 NYC



Summer 2032 NYC



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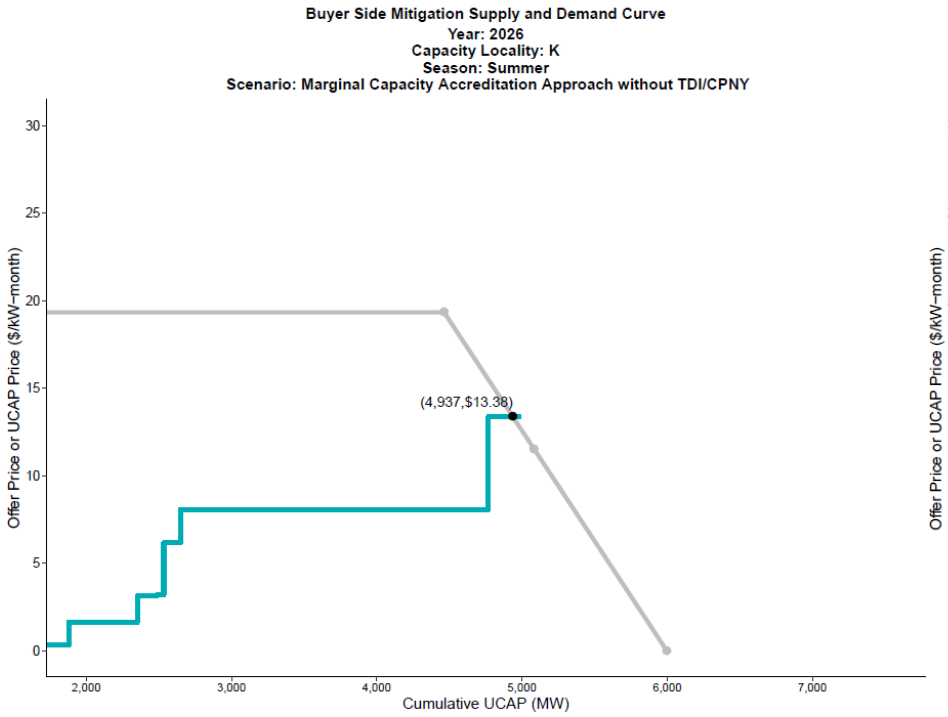
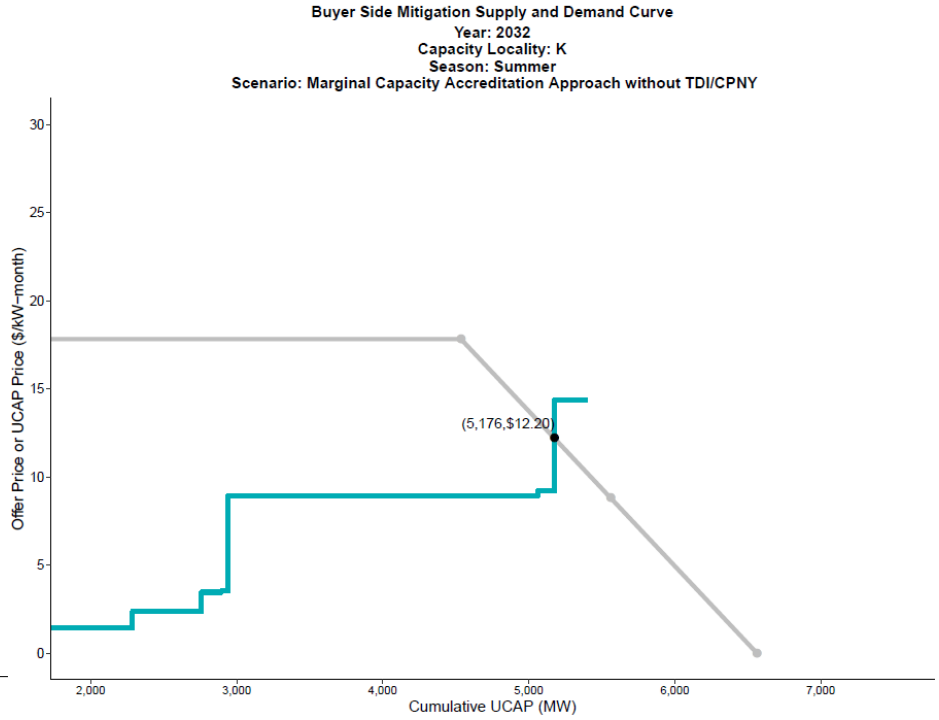
Results in Long Island, 2026-2032

Summer 2026 Long Island



Summer 2032 Long Island



Observations

- In 2022 and 2026, prices clear based on competitive offers of existing resources in all zones
- Clearing quantities include new CLCPA resources and existing resources, and are sufficient to meet reliability requirements in all zones and all years
- Changes in UCAP/ICAP Translation Factor due to entry of CLCPA resources affect both supply and demand curves, leading to similar prices over time

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Sensitivities

Transmission Sensitivities

- Sensitivities evaluated to review whether potential new transmission infrastructure would alter observations with respect to competitive, reliable outcomes
- Two potential projects reviewed
  - TDI (1,250 MW ICAP) transmission line assumed to come in-service in 2025
  - CPNY (1,300 MW ICAP) transmission line assumed to come in-service in 2027
- Modeled based on whether in or out of NY
  - TDI modeled as additional 1,188 MW UCAP delivered into Zone J
  - CPNY modeled as 1,235 MW reduction in UCAP requirement for both Zone J and G-J Locality and 0.4% reduction in NYCA IRM
  - Both lines have assumed 5% derating factor

Source: S&P Global Platts, NYSERDA, individual companies

Transmission Sensitivity Model Results

Clearing Prices ($/kW-mo)	2026 with TDI		2032 with TDI and CPNY	
	Summer	Winter	Summer	Winter
NYCA	$3.21	$2.42	$6.42	$6.28
G-J Locality	$9.02	$6.05	$9.32	$7.36
NYC (J)	$9.02	$6.05	$9.32	$7.36
LI (K)	$13.38	$11.17	$12.20	$11.45

Clearing UCAP Quantities (MW)	2026 with TDI		2032 with TDI and CPNY	
	Summer	Winter	Summer	Winter
NYCA	35,401	35,658	34,412	34,771
G-J Locality	12,918	13,502	12,010	12,694
NYC (J)	8,611	8,930	7,470	7,956
LI (K)	4,937	5,161	5,176	5,398

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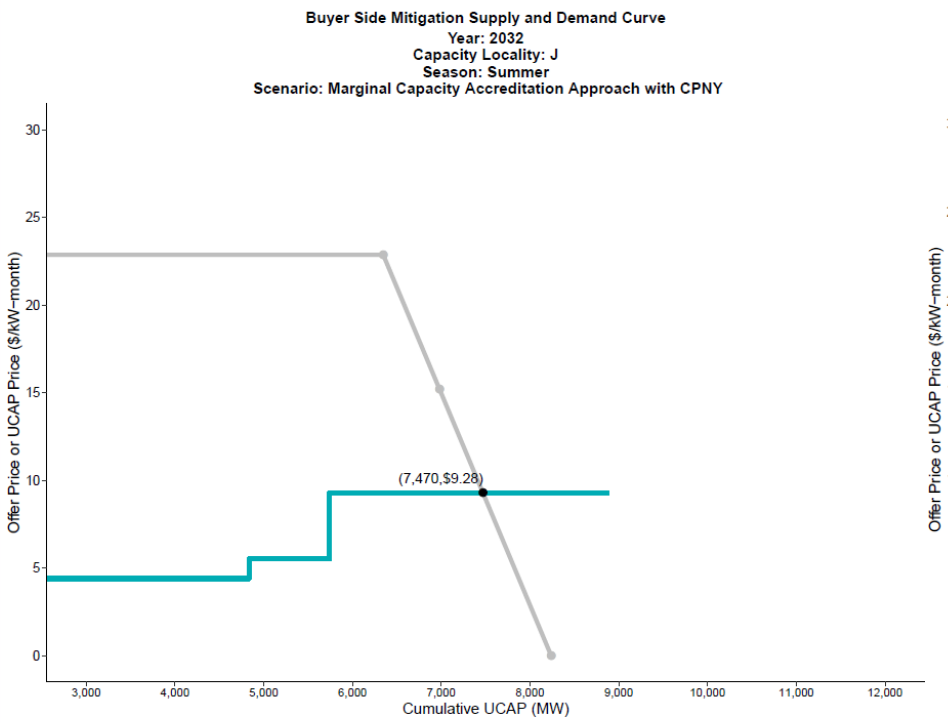
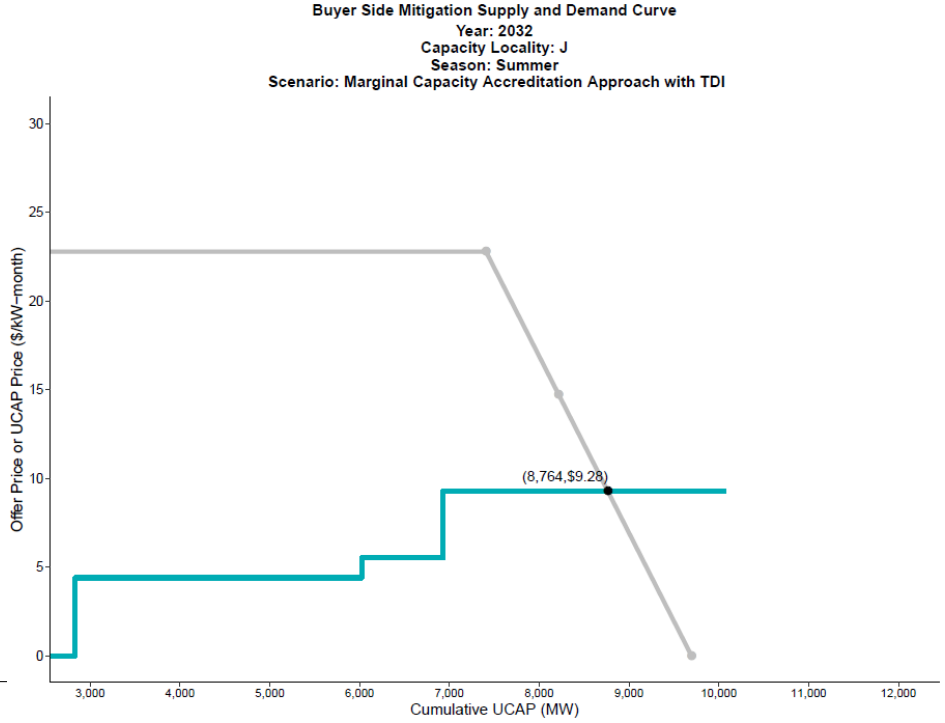
Sensitivity Observations

- Clearing prices based on competitive offers of existing resources and clearing quantities are sufficient to meet reliability requirements in all zones and all years

Summer 2032, Zone J with CPNY Only



Summer 2032, Zone J with TDI only



Battery as Peaking Technology Sensitivity

- 4 hour Battery energy storage system (BESS) assumed as peaking technology in demand curve in 2026 and 2032
- Installed cost assumptions from Grid in Transition Study:
  - $1,400/kW installed cost in 2019 with -4% per year cost decline, adjusted for locality cost
- Other resource assumptions for battery (same as in 2021-2025 Demand Curve Reset[1]):
  - 200 MW capacity, 3% EFORd
  - 15 year plant amortization period
  - Net EAS revenues based on 85% efficiency

Source: [1] https://www.nyiso.com/documents/20142/14526320/Analysis-Group-2019-2020-DCR-Final-Report.pdf/0dc75930-e651-2120-80de-234d98cd548b

Battery Peaking Unit Sensitivity Model Results

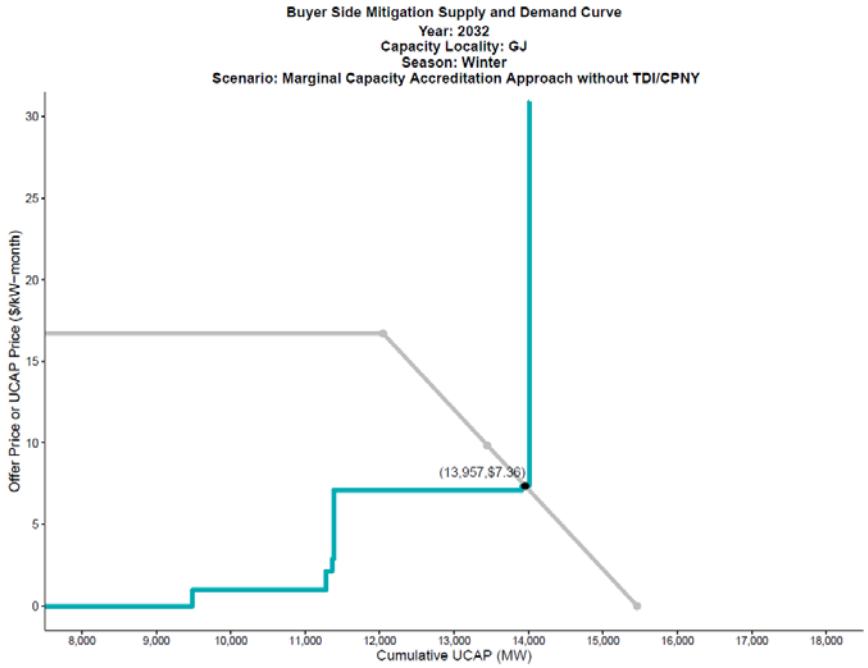
Clearing Prices ($/kW-mo)	2026 with Battery Peaking Tech.		2032 with Battery Peaking Tech.	
	Summer	Winter	Summer	Winter
NYCA	$4.50	$3.20	$6.31	$6.08
G-J Locality	$9.39	$6.05	$9.58	$7.24
NYC (J)	$9.39	$6.05	$9.58	$7.36
LI (K)	$13.38	$11.17	$9.59	$9.01

Clearing UCAP Quantities (MW)	2026 with Battery Peaking Tech.		2032 with Battery Peaking Tech.	
	Summer	Winter	Summer	Winter
NYCA	35,510	35,807	35,200	35,597
G-J Locality	12,920	13,540	12,798	13,687
NYC (J)	8,556	8,890	8,492	9,059
LI (K)	4,912	5,140	5,176	5,398

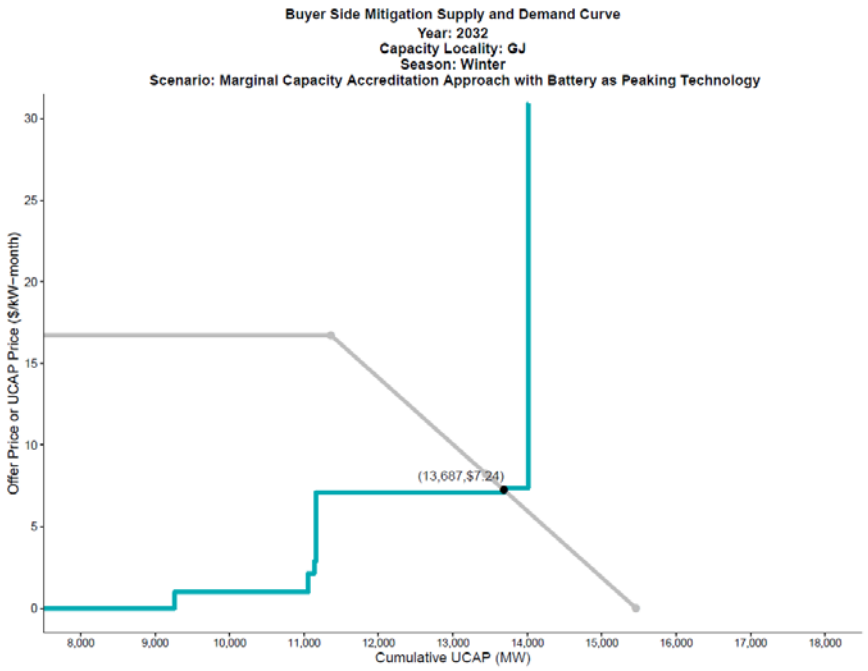
Sensitivity Observations

- Selection of the 4-hour BESS as peaking technology leads to an increase in demand curve reference prices and clearing prices in some years/zones but a decrease in others downstate in winter
- Clearing prices based on competitive offers of existing resources and clearing quantities are sufficient to meet reliability requirements in all zones and all years

Winter 2032, G-J Locality with Gas CT Peaking Technology



Winter 2032, G-J Locality with Battery Peaking Technology



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Demand Curve Risk Premium Sensitivity

- Alternate demand curves assuming additional risk premium added to peaking unit WACC
- Used hypothetical risk premiums based on analysis by Potomac Economics[1]
  - Results showed an increase in cost of equity, decrease in cost of debt, and re-leveraging to decrease the D/E ratio
- Applied to NYISO WACC parameters from DCR study, increasing WACC used to set reference and max prices in 2026 and 2032

	ISO-NE			NYISO Risk Premium Sensitivity		
	Filed Value from Net CONE study	MOPR adjustment	Adjusted Value	Filed Value from DCR study	Analogous adjustment	Adjusted Value
Cost of Debt	6.00%	-0.94%	5.06%	6.70%	-0.94%	**5.76%**
Cost of Equity	13.00%	1.58%	14.58%	13.00%	1.58%	**14.58%**
D/E Ratio	55%	-12.5%	42.5%	55%	-12.5%	**42.5%**

Source: [1] https://isone.org/static-assets/documents/2021/09/2021_09_13_14_mc_a02b_iso_presentation.pptx

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Demand Curve Risk Premium Sensitivity Model Results

Clearing Prices ($/kW-mo)	2026 with TDI and Risk Premium		2032 with TDI/CPNY and Risk Premium	
	Summer	Winter	Summer	Winter
NYCA	$3.24	$2.48	$7.21	$6.28
G-J Locality	$9.02	$6.05	$9.58	$7.36
NYC (J)	$9.02	$6.05	$9.58	$7.36
LI (K)	$15.33	$12.95	$14.38	$12.68

Clearing UCAP Quantities (MW)	2026 with TDI and Risk Premium		2032 with TDI/CPNY and Risk Premium	
	Summer	Winter	Summer	Winter
NYCA	35,664	35,836	34,667	35,458
G-J Locality	13,126	13,642	12,223	12,899
NYC (J)	8,704	8,995	7,578	8,045
LI (K)	4,992	5,198	5,218	5,517

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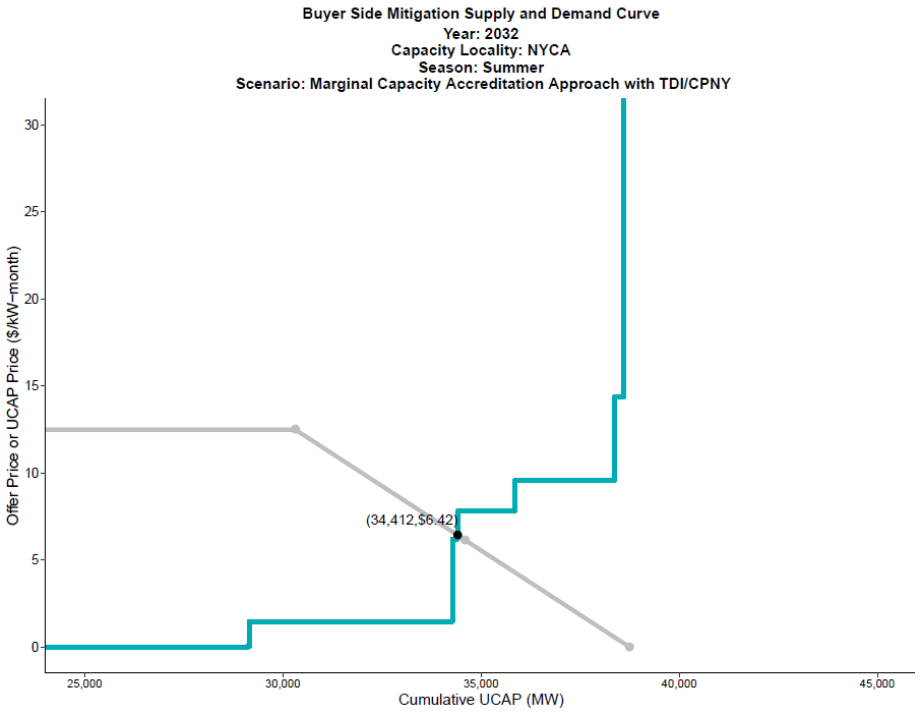
Sensitivity Observations

- WACC premium leads to increase in prices across most localities in 2026/2032 due to higher reference and max prices
- Clearing prices based on competitive offers of existing resources and clearing quantities are sufficient to meet reliability requirements in all zones and all years

Summer 2032, NYCA with TDI and CPNY



Summer 2032, NYCA with TDI/CPNY and Risk Premium