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NYISO 2025-2029 ICAP Demand Curve Reset (DCR)

Summary of Interim Final Report

ICAP Working Group

Results and recommendations contained herein are interim and subject to change. The results herein use data for the period September 1, 2020 through August 31, 2023. The results will be updated in September 2024 to reflect data for the period September 1, 2021 through August 31, 2024.

August 1, 2024

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Agenda

- Summary of Findings in Interim Final Report
- Updates to Previously Discussed Assumptions
- Updated Preliminary Reference Point Prices
- Annual Updating of ICAP Demand Curve Parameters
- Ongoing Work

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Summary of Findings in Interim Final Report

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Summary of Interim Final Report

- In general, recommendations in the interim final report are consistent with recommendations in the draft report (as discussed at the June 13, 2024 ICAPWG meeting)
- Consistent with the discussions at the July 23, 2024 ICAPWG meeting, updates were made to several values/assumptions in the draft report in response to stakeholder feedback.
- Analysis Group (AG) has also finalized its recommended financial parameters for each peaking plant technology option. AG recommends:
  - 13-year amortization period for simple cycle gas turbine (SCGT) technology options to account for the 2040 zero-emissions energy requirement established by the Climate Leadership and Community Protection Act (CLCPA).
  - 20-year amortization period for lithium-ion battery energy storage system (BESS) technologies to better align with typical operating lifetimes for new BESS technologies.
  - To appropriately reflect technology-specific risks, AG recommends differing cost of equity (COE), cost of debt (COD), and after-tax weighted average cost of capital (ATWACC) values for BESS and SCGT technologies:
    - SCGT: COD=6.7%, COE = 14.0%, ATWACC= 8.76% (Load Zone J), and ATWACC= 9.02% (all other locations)
    - BESS: COD=7.2%, COE = 14.5%, ATWACC= 9.17% (Load Zone J), and ATWACC=9.45% (all other locations)
  - These preliminary recommendations are subject to change due to updated data, as AG will continue to review data on the cost of debt and cost of equity through August 2024 to ensure final recommended financial parameters reflect current market conditions.
- Ultimately, there is no change in 1898 & Co. and AG's recommended peaking plant technology option for all locations: the 2-hour BESS option minimizes UCAP costs among all candidate technologies.

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Updates to Previously Discussed Assumptions

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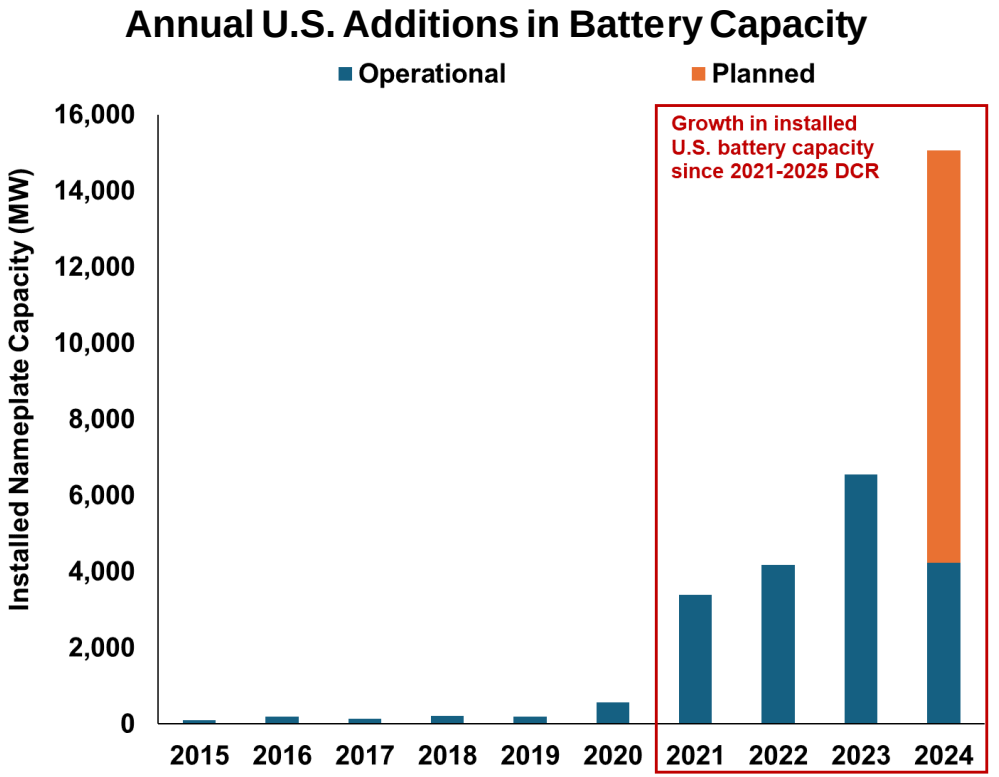
BESS Financial Parameters: Amortization Period

AG recommends a 20-year amortization period for BESS technologies

- AG recommends that the amortization period for BESS technologies align with typical expected operating lifetimes.
  - Consistent with 1898 & Co.'s industry experience, 20-year warranties and performance guarantees for battery performance are now common in the industry.
  - On-going battery augmentation assumed in BESS fixed and variable operation and maintenance (O&M) costs for this study would maintain plant energy output capability over the assumed economic life of twenty years.
  - BESS equipment would be expected to require replacement with new equipment after the 20-year warranty period, so a 20-year amortization period ensures recovery of investment before more substantial upgrades beyond typical augmentation may be required.
- Since the 2021-2025 DCR, the U.S. electricity sector has gained substantial experience with the development of BESS:
  - Nearly 20 GW of BESS is in service, with the vast majority placed in service since the last reset.
  - Significant quantities of additional capacity are currently under development.



Source: U.S. Energy Information Administration, Preliminary Monthly Electric Generator Inventory, based on Form EIA-860M

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BESS Financial Parameters: ATWACC

AG recommends a higher ATWACC for BESS technologies than SCGT technologies

- BESS technologies face a higher degree of financial risk than SCGT technologies.
- While experience with BESS has grown, it remains a relatively new technology which creates certain risks.
- BESS technologies face elevated market risk relative to SCGT technologies due to future Capacity Accreditation Factor (CAF) uncertainty:
  - Future CAFs are unknown and will vary each year depending on the mix of resources in the system, load profiles and other factors.
  - As the demand curves used in conducting the NYISO's monthly spot auctions are expressed on a UCAP rather than ICAP basis, CAF changes for the peaking plant technology used to establish each curve would lead to shifts in the demand curve and clearing price that would tend to offset the effect of any future declines in the CAFs for such peaking plant technology during the four-year period of this reset.
  - CAF variability may affect revenue certainty for years beyond the four-year period of this reset.
- **As such, AG recommends a higher ATWACC of 9.17% for Load Zone J and 9.45% for all other locations for BESS technologies.**

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Updated Financial Parameters

Finance Category	NYCA	G-J	NYC	LI	NYCA	G-J	NYC	LI
	SCGT				BESS			
Inflation Factor (%)	2.12%	2.12%	2.12%	2.12%	2.12%	2.12%	2.12%	2.12%
Debt Fraction (%)	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%	55.00%
Debt Rate (%)								
Nominal	6.70%	6.70%	6.70%	6.70%	7.20%	7.20%	7.20%	7.20%
Real	4.48%	4.48%	4.48%	4.48%	4.97%	4.97%	4.97%	4.97%
Equity Rate (%)								
Nominal	14.00%	14.00%	14.00%	14.00%	14.50%	14.50%	14.50%	14.50%
Real	11.63%	11.63%	11.63%	11.63%	12.12%	12.12%	12.12%	12.12%
Composite Tax Rate (%)	26.14%	26.14%	33.13%	26.14%	26.14%	26.14%	33.13%	26.14%
Federal Tax Rate	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%
State Tax Rate	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%	6.50%
City Tax Rate	0.00%	0.00%	8.85%	0.00%	0.00%	0.00%	8.85%	0.00%
WACC Nominal (%)	9.99%	9.99%	9.99%	9.99%	10.49%	10.49%	10.49%	10.49%
ATWACC Nominal (%)	9.02%	9.02%	8.76%	9.02%	9.45%	9.45%	9.17%	9.45%
ATWACC Real (%)	6.76%	6.76%	6.51%	6.76%	7.18%	7.18%	6.91%	7.18%
Amoritization Period (Years)	13 Years	13 Years	13 Years	13 Years	20 Years	20 Years	20 Years	20 Years
Tax Depreciation Schedule	15-Year MACRS	15-Year MACRS	15-Year MACRS	15-Year MACRS	5-Year MACRS	5-Year MACRS	5-Year MACRS	5-Year MACRS
Fixed Property Tax Rate (%)	0.60%	0.60%	4.77% with 15-Year Abatement	0.60%	0.6% with 15-Year Abatement	0.6% with 15-Year Abatement	4.77% with 15-Year Abatement	0.6% with 15-Year Abatement
Insurance Rate (%)	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%
Levelized Fixed Charge (%)	14.65%	14.65%	14.66%	14.65%	11.15%	11.15%	11.95%	11.15%

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Updated Voltage Support Service (VSS) Revenue Adder for the SCGT 7HA.02

- VSS revenue adders for the 2025-2026 Capability Year ICAP Demand Curves of $3.97 for the SCGT 7HA.03 and $4.10 for BESS using a new formula methodology as discussed at the July 23, 2024 ICAPWG meeting
- 1898 & Co. provided reactive capability for the SCGT 7HA.02: -125 MVARS to +225 MVARS
- Estimated voltage support payment for the 2025-2026 Capability Year:

SCGT 7HA.02 Frame Combustion Turbine: $3.51/kW-yr

- Nominal Capacity: 330 MW
- Reactive Capability: -125 MVARS to +225 MVARS
- Annual VSS Compensation: (225+125) * $3,307.31 = $1,157,559
- $1,157,559/(330*1000)=$3.51

- The VSS revenue adder will be updated annually over the 2025-2029 DCR period to reflect the VSS compensation rate in effect at the time of each annual update.

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Updated Preliminary Reference Point Prices

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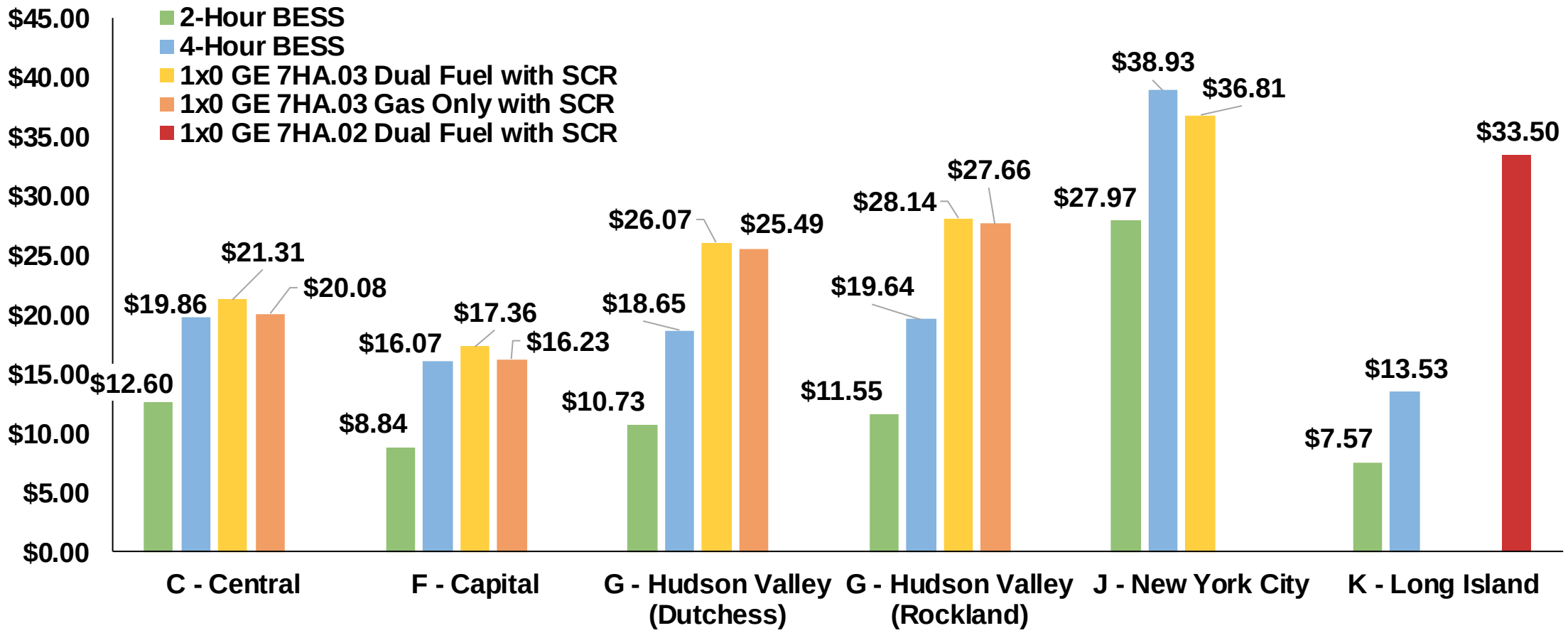
Preliminary 2025-2026 Capability Year Reference Point Prices by Candidate Technologies ($/kW-month UCAP)[1]



[1] The preliminary reference points are calculated using the currently effective methodology for determining the UCAP Demand Curve reference point prices. However, beginning with the 2025-2026 Capability Year, seasonal UCAP Demand Curve reference point prices will be calculated using enhancements approved earlier this year.

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Evaluation of Peaking Plant Technology Options

Comparison of Preliminary Reference Point Prices by Technology ($2024/kW-month UCAP)

Technology	Fuel Type/ Emission Control	Current Year (2025-2026)					
		C - Central	F - Capital	G - Hudson Valley (Rockland)	G - Hudson Valley (Dutchess)	J - New York City	K - Long Island
Summer Reference Point Prices (UCAP Basis)							
1x0 GE 7HA.03	Dual Fuel, with SCR	$24.14	$19.74	$28.36	$26.27	$37.01	$70.04
	Gas Only, with SCR	$22.75	$18.45	$27.88	$25.69	-	-
1x0 GE 7HA.02	Dual Fuel, no SCR	$26.89	$24.91	-	$28.35	-	-
	Gas Only, no SCR	$25.24	$23.15	-	$27.81	-	-
	Dual Fuel, with SCR	-	-	-	-	-	$30.63
2-hour BESS	Battery Storage	$14.02	$9.84	$11.76	$10.93	$28.64	$7.35
4-hour BESS	Battery Storage	$22.10	$17.89	$20.00	$18.99	$39.86	$13.14
6-hour BESS	Battery Storage	$24.24	$21.05	$24.11	$23.06	$44.01	$21.55
8-hour BESS	Battery Storage	$30.60	$27.76	$31.21	$29.96	$53.80	$30.10
Winter Reference Point Prices (UCAP Basis)							
1x0 GE 7HA.03	Dual Fuel, with SCR	$17.73	$14.37	$29.34	$27.18	$38.95	$138.83
	Gas Only, with SCR	$16.70	$13.43	$28.84	$26.58	-	-
1x0 GE 7HA.02	Dual Fuel, no SCR[1]	$19.26	$16.99	-	$27.74	-	-
	Gas Only, no SCR	$18.07	$15.79	-	$27.21	-	-
	Dual Fuel, with SCR	-	-	-	-	-	$49.06
2-hour BESS	Battery Storage	$10.60	$7.44	$11.18	$10.39	$26.81	$8.01
4-hour BESS	Battery Storage	$16.70	$13.52	$19.01	$18.05	$37.32	$14.31
6-hour BESS	Battery Storage	$18.32	$15.91	$22.92	$21.92	$41.19	$23.48
8-hour BESS	Battery Storage	$23.12	$20.98	$29.67	$28.48	$50.37	$32.79

Note: [1] The peaking plant technology choice in all locations is a 2-hour, lithium-ion BESS, which is highlighted in green. [2] The net EAS revenues are estimated using data for the three-year period September 1, 2020 to August 31, 2023 and the seasonal capacity availability values are based on data for the same period. **The values will be updated in September 2024 to reflect data for the period September 1, 2021 through August 31, 2024.** [4] The net EAS revenues for BESS options reflect the net EAS model using RTD interval prices. [4] Assumes a $3.97/kW-year VSS revenue adder for the 1x0 GE 7HA.03, $3.51/kW-year VSS revenue adder for the 1x0 GE 7HA.02, and $4.10/kW-year VSS revenue adder for lithium-ion BESS.

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Preliminary Recommended ICAP Demand Curve Parameters

Preliminary ICAP Demand Curve Parameters ($2024)
2-Hour BESS (RTD interval pricing net EAS model)

		Current Year (2025-2026)					
Parameter	**Source**	**C - Central**	**F - Capital**	**G - Hudson Valley (Rockland)**	**G - Hudson Valley (Dutchess)**	**J - New York City**	**K - Long Island**
Gross Cost of New Entry ($/kW-Year)	[1]	$124.77	$125.66	$129.15	$125.40	$206.06	$128.22
Net EAS Revenues ($/kW-Year)	[2]	$57.52	$78.46	$75.87	$75.90	$79.10	$100.48
Annual Reference Value ($/kW-Year)	[3]=[1]-[2]	$67.25	$47.20	$53.28	$49.50	$126.96	$27.73
ICAP DMNC (MW)	[4]	200	200	200	200	200	200
Annual Reference Value	[5]=[3]*[4]	$13,450	$9,440	$10,656	$9,901	$25,393	$5,547
Level of Excess (%)	[6]	100.52%	100.52%	101.62%	101.62%	102.23%	103.77%
Ratio of Summer to Winter DMNCs	[7]	1.033	1.033	1.058	1.058	1.067	1.072
Summer DMNC (MW)	[8]	200	200	200	200	200	200
Winter DMNC (MW)	[9]	200	200	200	200	200	200
Assumed Capacity Prices at Tariff Prescribed Level of Excess Conditions							
Summer ($/kW-Month)	[10]	$7.29	$5.11	$5.77	$5.36	$13.75	$3.00
Winter ($/kW-Month)	[11]	$3.92	$2.75	$3.11	$2.89	$7.41	$1.62
Monthly Revenue (Summer)	[12]=[10]*[8]	$1,457	$1,023	$1,154	$1,073	$2,751	$601
Monthly Revenue (Winter)	[13]=[11]*[9]	$785	$551	$622	$578	$1,481	$324
Seasonal Revenue (Summer)	[14]=6*[12]	$8,742	$6,136	$6,926	$6,435	$16,505	$3,605
Seasonal Revenue (Winter)	[15]=6*[13]	$4,707	$3,304	$3,729	$3,465	$8,887	$1,941
Total Annual Reference Value	[16]=[14]+[15]	$13,450	$9,440	$10,656	$9,901	$25,393	$5,547
ICAP Demand Curve Parameters							
Summer ICAP Monthly Reference Point Price ($/kW-Month)		$7.62	$5.35	$6.47	$6.01	$15.70	$3.80
Winter ICAP Monthly Reference Point Price ($/kW-Month)		$5.75	$4.04	$6.15	$5.72	$14.69	$4.14
Summer ICAP Maximum Clearing Price ($/kW-Month)		$21.19	$21.35	$23.53	$22.85	$38.21	$26.35
Winter ICAP Maximum Clearing Price ($/kW-Month)		$16.01	$16.13	$22.37	$21.72	$35.77	$28.71
Demand Curve Length		12.0%	12.0%	15.0%	15.0%	18.0%	18.0%

Notes: [1] The peaking plant technology choice in all locations is a 2-hour, lithium-ion BESS. [2] The net EAS revenues are estimated using data for the three-year period September 1, 2020 to August 31, 2023 and the seasonal capacity availability values are based on data for the same period. **The values will be updated in September 2024 to reflect data for the period September 1, 2021 through August 31, 2024**. [3] The net EAS revenues for BESS options reflect the net EAS model using RTD interval prices. [4] Assumes a $4.10/kW-year VSS revenue adder for lithium-ion BESS.

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Annual Updating of ICAP Demand Curve Parameters

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Annual Updating of Gross Cost of New Entry (CONE)

- Consistent with the tariff and previous DCRs, gross CONE is escalated annually by a state-wide, technology-specific escalation factor representing the cost-weighted average of inflation indices for four major plant components: wages, turbines/storage batteries, materials and components, and other costs
- Consistent with the 2021-2025 DCR, a separate cost index for battery capital costs will be used for the BESS "turbine generator costs" component.
- Cost weightings have previously been calculated using engineering, procurement, and construction (EPC) costs only (i.e., not inclusive of owner's costs) to reflect the relative portion of such costs associated with each of the four components of the composite escalation factor. The indices and cost weightings are fixed over the 2025-2029 DCR period.

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Proposed Composite Escalation Rate Indices and Component Weights, by Technology (Annual Growth Rates for 2025-2026 Capability Year)

Cost Component	Index	Interval	Calculation of Index Value	Annual Growth Rate	Component Weight, by Technology								
					7HA.03, 25 ppm, Dual Fuel and SCR	7HA.03, 25 ppm, Gas Only and SCR	7HA.02 25ppm, Dual Fuel and SCR	7HA.02 15ppm, Dual Fuel and No SCR	7HA.02 15ppm, Gas Only and No SCR	2-Hour BESS	4-Hour BESS	6-Hour BESS	8-Hour BESS
Construction Labor Cost	BLS Quarterly Census of Employment and Wages, New York - Statewide, NAICS 2371 Utility System Construction, Private, All Establishment Sizes, Average Annual Pay	Annually	Most recent annual value	2.35%	21%	17%	28%	20%	18%	15%	13%	13%	13%
Materials Cost	BLS Producer Price Index for Commodities, Not Seasonally Adjusted, Intermediate Demand by Commodity Type (ID6), Materials and Components for Construction (12)	Monthly	Average of finalized February, March, April values	1.29%	14%	13%	15%	17%	16%	11%	9%	8%	7%
Gas and Steam Turbine Cost	BLS Producer Price Index for Commodities, Not Seasonally Adjusted, Machinery and Equipment (11), Turbines and Turbine Generator Sets (97)	Monthly	Average of finalized February, March, April values	4.72%	31%	35%	22%	25%	26%	-	-	-	-
Storage Battery Costs	BLS Producer Price Index for Commodities, Not Seasonally Adjusted, Machinery and Equipment (11), Storage Batteries (7901)	Monthly	Average of finalized February, March, April values	0.44%	-	-	-			62%	65%	66%	67%
GDP Deflator	Bureau of Economic Analysis: Gross Domestic Product Implicit Price Deflator, Index 2009 = 100, Seasonally Adjusted	Quarterly	Most recent Q2 value	2.59%	34%	35%	35%	38%	40%	12%	13%	13%	13%
Total					100%	100%	100%	100%	100%	100%	100%	100%	100%

Annual Updating of BESS Net EAS Model

Energy Prices, Reserve Prices, VSS Adder, and Rate Schedule Charges Will Be Updated Annually, While All Other Aspects of the Net EAS Model Are Held Fixed for the Quadrennial Reset Period

Factor Used in Annual Updates for Each ICAP Demand Curve	Type of Value
Net EAS Revenue Model, including Commitment and Dispatch Logic	Fixed for Quadrennial Reset Period
Hurdle Rates for BESS net EAS Revenue Model	Fixed for Quadrennial Reset Period
Peaking plant Physical Operating Characteristics, including start time requirements, start-up cost minimum down time and runtime requirements, operating hours restrictions and/or limitations (if any), heat rate	Fixed for Quadrennial Reset Period
Level of Excess Adjustment Factors	Fixed for Quadrennial Reset Period
Peaking plant Variable Operating and Maintenance Cost	Fixed for Quadrennial Reset Period
Annual Value of Voltage Support Service	Formula Methodology with VSS Compensation Rate to be Updated with NYISO Published Values
Energy Prices (day-ahead and real-time)	NYISO Published Values
Operating Reserves Prices (day-ahead and real-time)	NYISO Published Values
NYISO Rate Schedule 1 Charges	NYISO Published Values

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Ongoing Work

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Topics for August 22, 2024 ICAPWG Meeting

1. Continued discussion of inflation indices and weighting factors for annual updating of gross CONE

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