

Fifth Review of the Net CONE Draft Results

NET CONE DRAFT RESULTS

PRESENTED BY

Michael Hagerty
Samuel Newell
Travis Carless

PRESENTED TO

PJM Market Implementation
Committee

MARCH 25, 2022



Agenda

Gas CT and CC Gross CONE

Battery Storage Gross CONE

E&AS Revenue Offset

Net CONE and Recommended Reference Technology

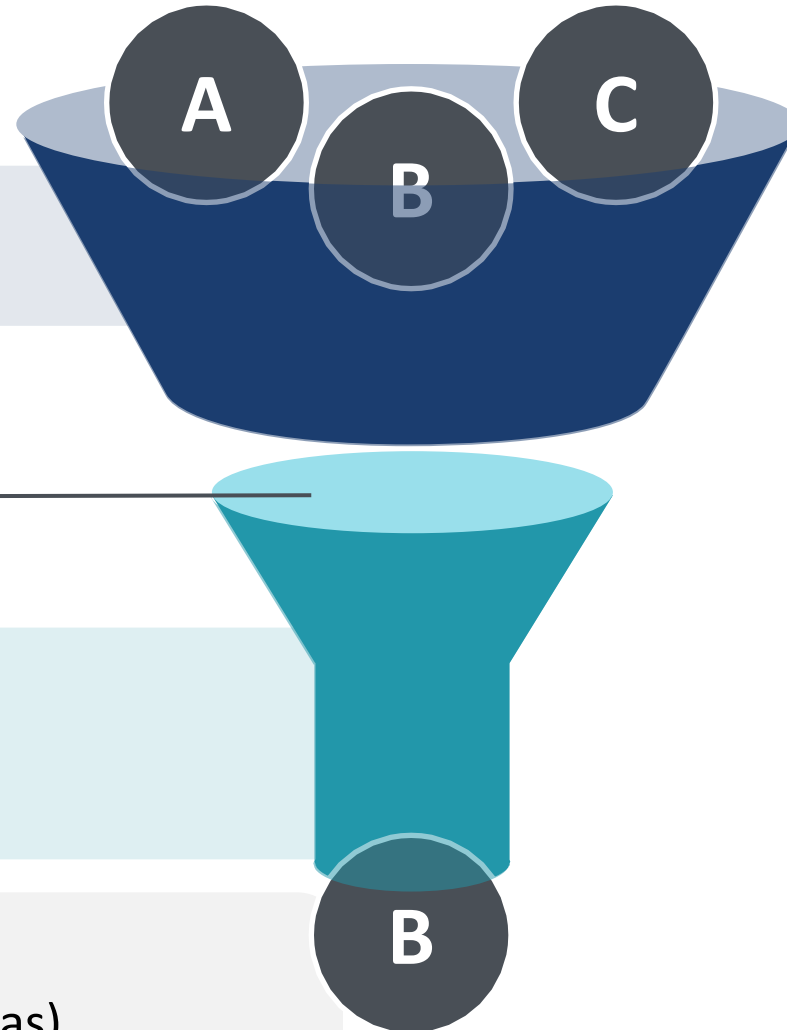
Review of Screening Analysis

Screening Analysis: Apply criteria to all candidate technologies

SHORT LIST PROPOSED TECHNOLOGIES
(CC, CT, and 4-Hour Battery Storage)

Detailed Analysis: Conduct detailed analysis of Net CONE for proposed technologies; re-apply selection criteria

Recommend Reference Technology
(or technologies if appropriate for different areas)



Gas CT and CC Gross CONE

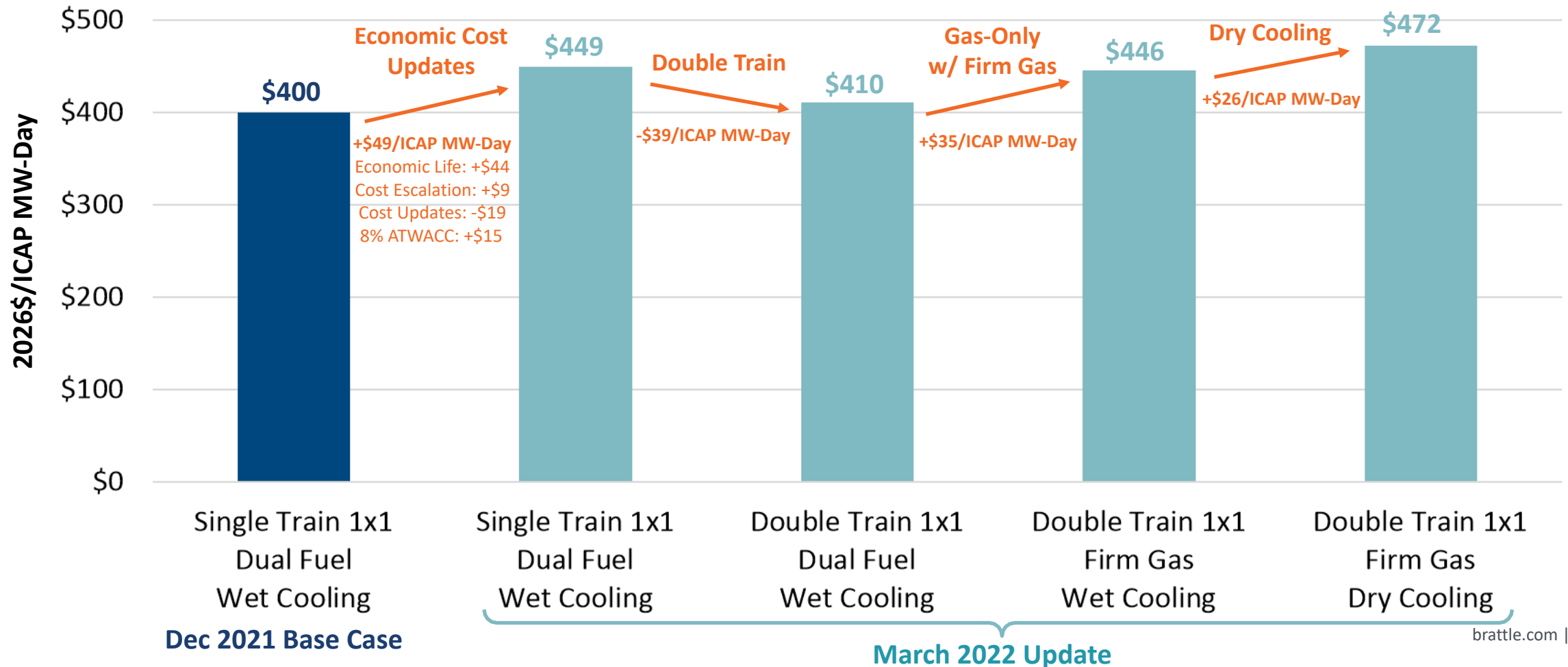
Updates Based on Stakeholder Feedback and Additional Considerations

Type	Assumption	Stakeholder Feedback and Additional Considerations	Preliminary Assumption (December 2021)	Updated Assumption (March 2022)	Impact on CONE
Economic Cost Assumptions	Economic Life	Changing market & environmental rules may make it challenging for a 30 year life	30 years (Base Case)	20 years	↑
	Cost Escalation	Review current market expectations for equipment and material costs	Costs remain constant in real terms (Base Case)	Labor costs increase by 1.6% real/year; equipment and materials constant in real terms	↑
	Other Cost Updates	Additional internal review of cost assumption	n.a.	8% ATWACC, reduced O&M staffing, and reduced gas pipeline costs	↓
Specification Assumptions	CC & CT Fuel Supply	Increasing challenges permitting new CCs and CTs with fuel oil	Dual fuel for CC & CT (except SWMAAC CC)	Gas-only for CC & CT in all zones	↑
	CC Size & Configuration	All recent 1x1 CCs built in PJM include multiple (2 or 3) trains	Single train 1x1 CC	Two parallel 1x1 CC trains	↓
	CC Cooling System	Increasing challenges permitting cooling towers due to regulatory requirements	Wet cooling towers	Air-cooled condensers (ACC)	↑

Updated Gross CC CONE Assumptions and Estimates

Updated CC CONE increased by \$72/ICAP MW-day (+18%) compared to preliminary CONE values

Rest of RTO 2026/27 Gas CC CONE Estimates



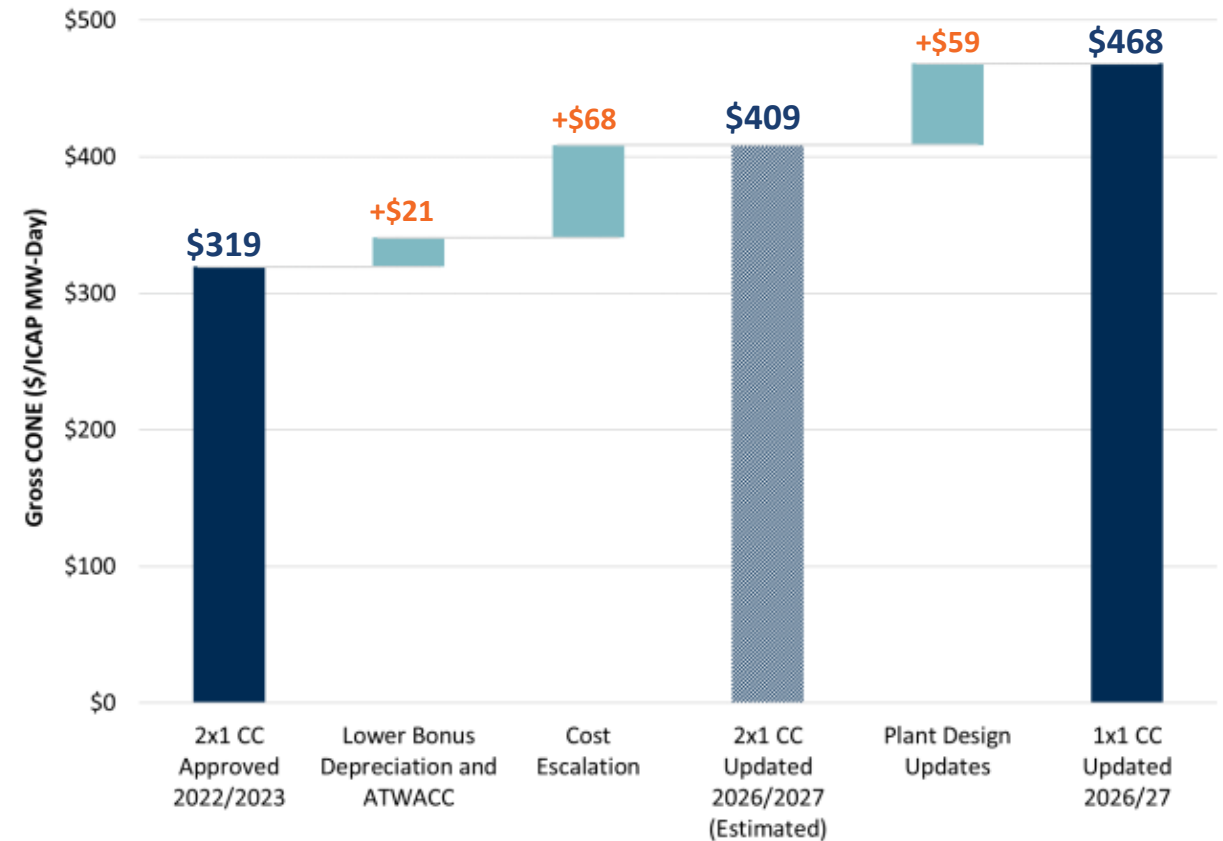
Comparison to 2022/23 CC Gross CONE Estimate

The updated 2026/27 CC CONE is higher than the 2022/23 CC CONE for the following reasons:

- ✎ **Updated Financial Assumptions:** Bonus depreciation decreased from 100% to 20% (increases CONE); cost of capital decreased from 8.2% to 8.0% (decreases CONE)
- ✎ **Cost Escalation:** CC costs increased faster than assumed in 2018 CONE study (material costs increased by 36% and labor costs increased by 10%); labor costs projected to continue to rise through 2026 on a real basis
- ✎ **Plant Design Configuration:**
 - 2x1 to double train 1x1 (increases CONE)
 - Wet cooling to dry cooling (increases CONE)
 - Dual fuel to gas-only (increases CONE)

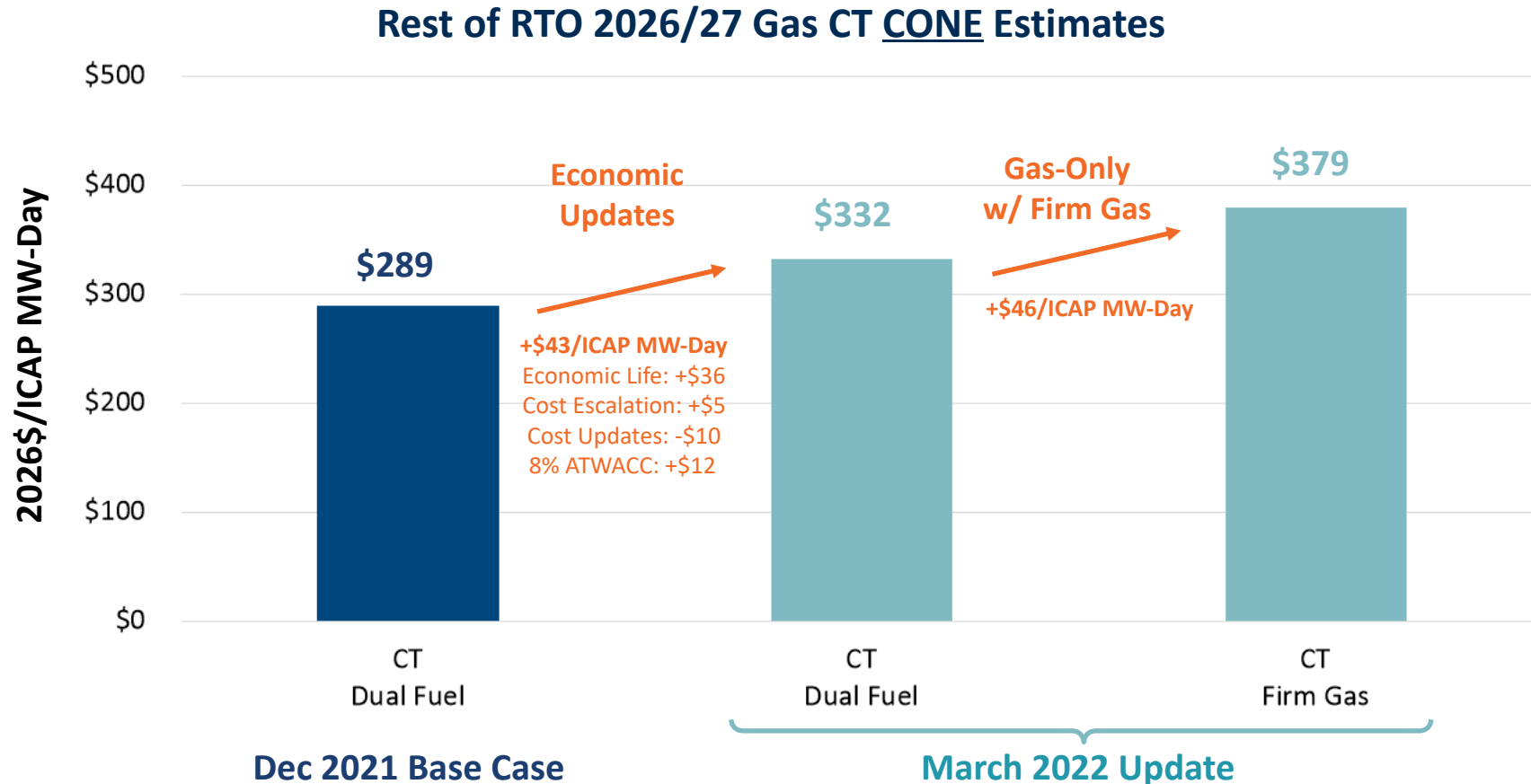
Comparison to 2022/23 CC Gross CONE

(Average Across All CONE Areas)



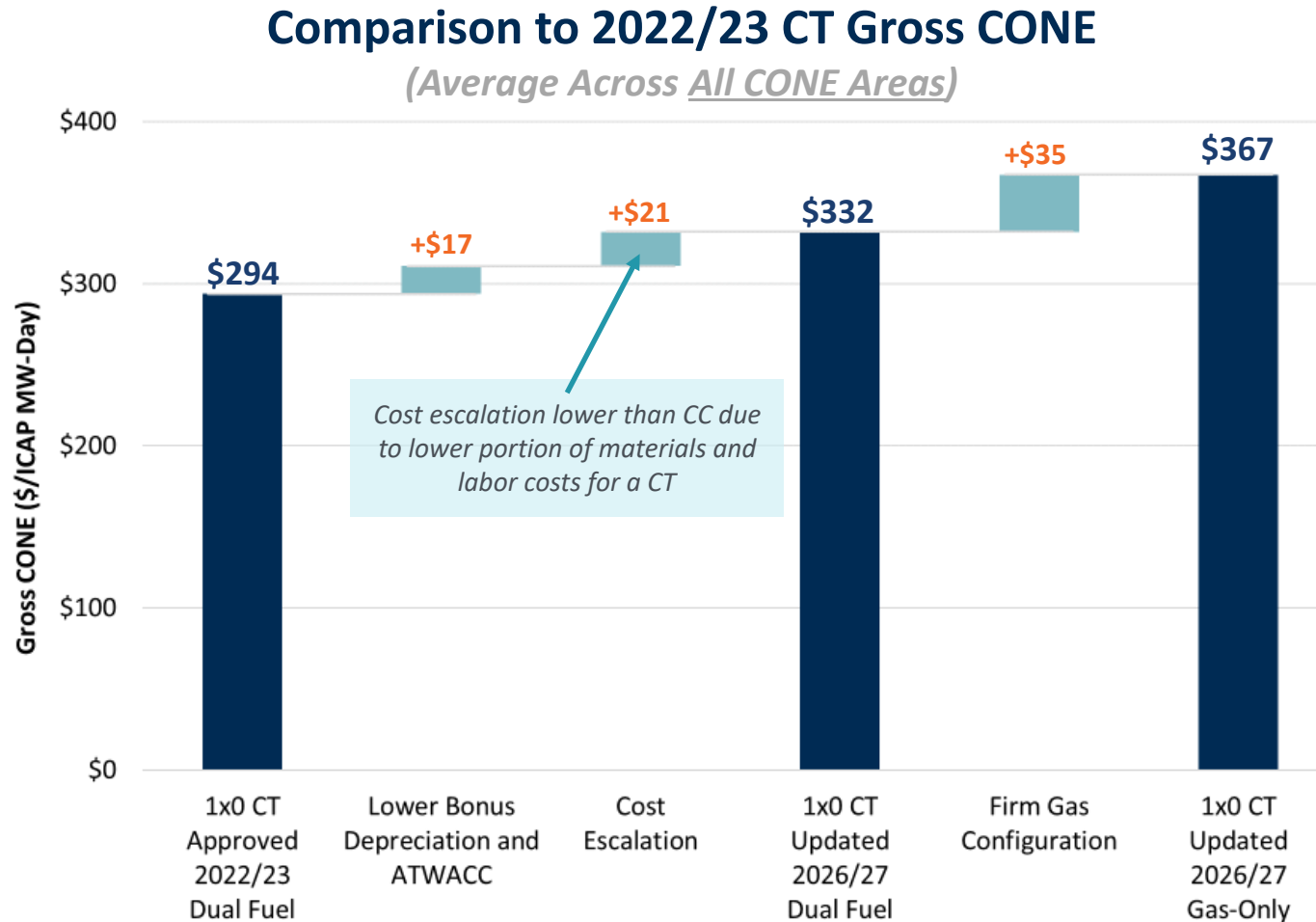
Updated Gross CT CONE Assumptions and Estimates

Updated CT CONE increased by \$90/ICAP MW-day (+31%) compared to preliminary CONE values



Comparison to 2022/23 CT Gross CONE Estimate

Updated 2026/27 CT CONE is higher than the 2022/23 CC CONE due to updated financial assumptions (lower bonus depreciation offset by lower ATWACC), cost escalation since 2018, and switch to a gas-only unit with firm gas service



Updated Gas CT and Gas 1x1 CC CONE Values

		Simple Cycle				1 x 1 Combined Cycle		
		EMAAC	SWMAAC	Rest of RTO	WMAAC	EMAAC	SWMAAC	Rest of RTO
Gross Costs								
Overnight	<i>\$m</i>	\$313	\$295	\$300	\$305	\$1,311	\$1,197	\$1,219
Installed (inc. IDC)	<i>\$m</i>	\$328	\$310	\$314	\$320	\$1,419	\$1,295	\$1,319
First Year FOM	<i>\$m/yr</i>	\$9	\$14	\$13	\$10	\$33	\$51	\$44
Net Summer ICAP	<i>MW</i>	361	363	353	350	1,171	1,174	1,144
Unitized Costs								
Overnight	<i>\$/kW</i>	\$868	\$814	\$849	\$871	\$1,120	\$1,020	\$1,065
Installed (inc. IDC)	<i>\$/kW</i>	\$909	\$853	\$889	\$913	\$1,212	\$1,104	\$1,153
Levelized FOM	<i>\$/kW-yr</i>	\$28	\$40	\$40	\$34	\$32	\$45	\$41
After-Tax WACC	%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
Effective Charge Rate	%	11.6%	11.6%	11.6%	11.6%	12.3%	12.2%	12.3%
Levelized CONE	<i>\$/MW-yr</i>	\$128,800	\$134,000	\$138,300	\$134,900	\$169,600	\$169,600	\$172,300
Levelized CONE	<i>\$/MW-day</i>	\$353	\$367	\$379	\$370	\$465	\$465	\$472

4-Hour Battery Storage Gross CONE

4-Hour Battery Storage (BESS) Detailed Specifications

We performed a top-down cost analysis for BESS based on the following assumptions

BESS Detailed Specifications

Characteristic	Battery Storage
Chemistry	Lithium-ion
Installation Configuration	Containerized
Rated Output Power (at POI)	200 MW-ac
Duration	4 Hours
Installed Energy Capacity	1,030 MWh-dc
Annual Capacity Degradation	4% in Year 1, then 2% per year
Augmentations	Year 5 and Year 10
Use Case	Daily Cycling
Round Trip Efficiency	85%
Economic Life	15 Years
Salvage Value	\$0



Battery Sizing Assumptions

Component	Value
Rated AC Output Power (at POI)	200 MW-ac
AC Losses	4.6%
Inverter Losses	1.6%
Gross DC Power Output	212 MW-dc
Minimum State of Charge	5.0%
Duration	4 hours
Gross Energy Capacity	895 MWh-dc
Overbuild due to Degradation	13%, or 135 MWh-dc
Installed Energy Capacity	1,030 MWh-dc

BESS Capacity and Degradation

Many factors contribute to BESS degradation, including:

- ⌘ Time, ambient temperature, state-of-charge, operational profiles, depth of discharge, and manufacturing defects

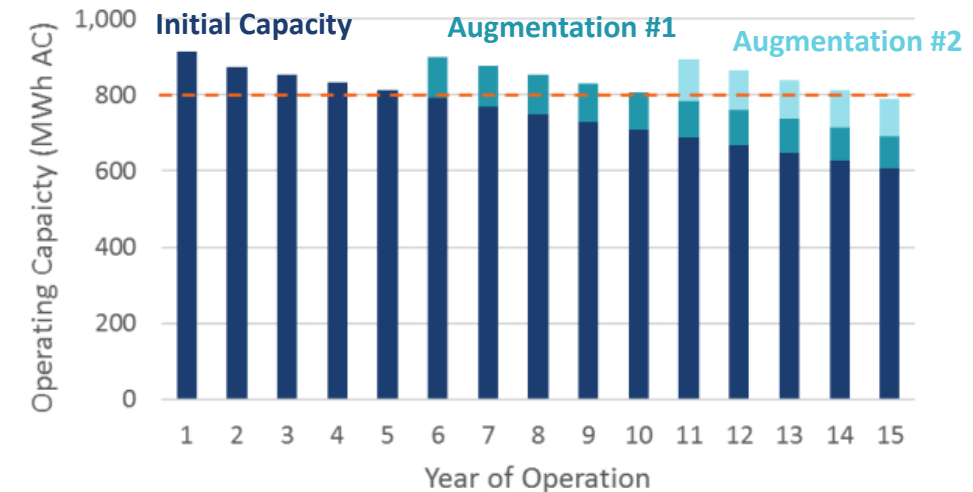
Developers use a range of approaches to handling degradation and capacity augmentation based on several considerations

- ⌘ Expected rate of degradation
- ⌘ Cost certainty of overbuilding versus expected future cost declines
- ⌘ Larger CAPEX for overbuilds and infrequent augmentations versus add costs of mobilization for annual augmentation

We assume an initial 13% overbuild and two augmentations in Year 5 and Year 10 to maintain energy storage capacity at or above 800 MWh-ac for 15 years of operation

- ⌘ Reduces costs of frequent augmentation while taking advantage of future cost declines

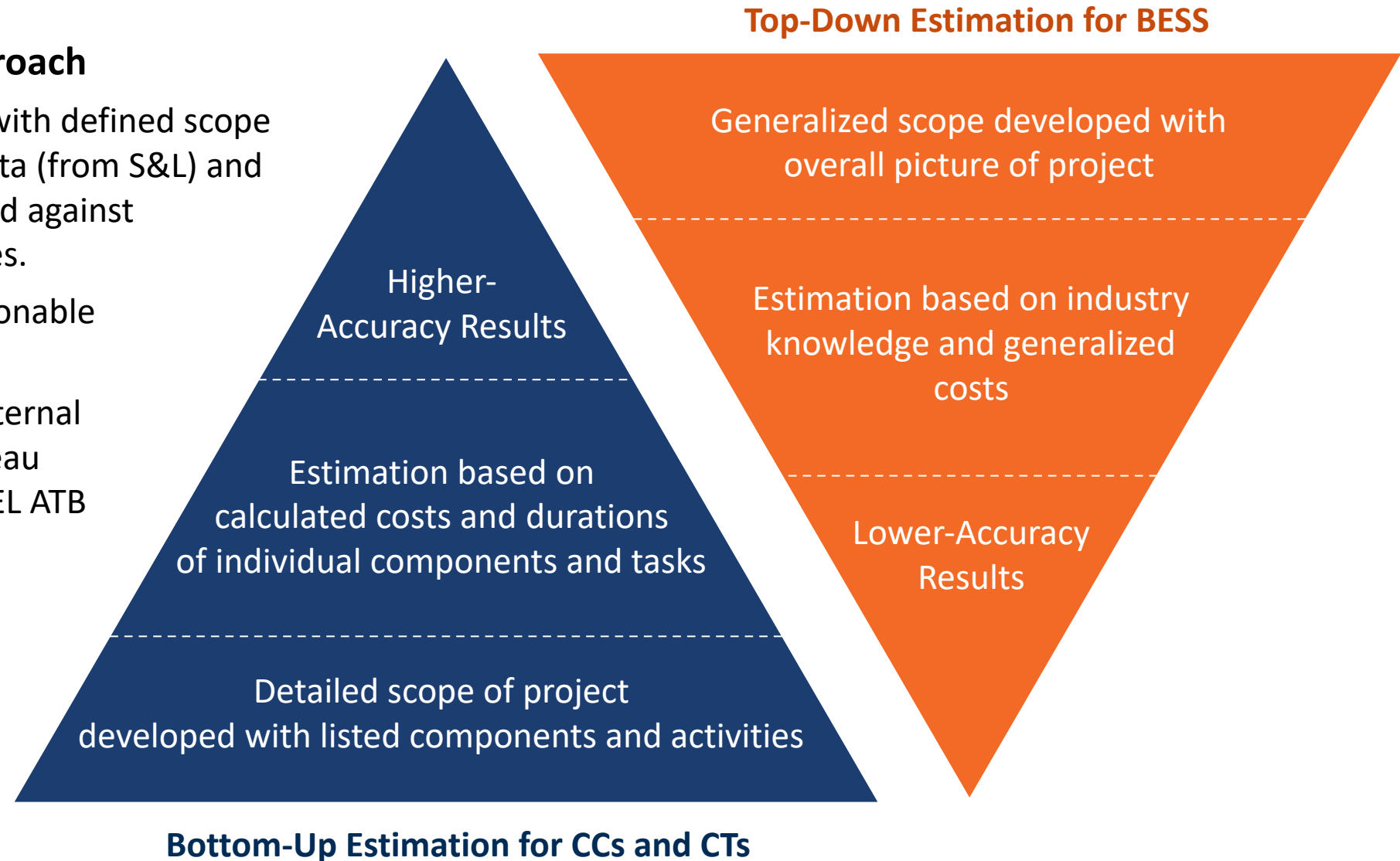
BESS Storage Capacity at POI (MWh)



BESS Cost Estimation

Top-down estimation approach

- Estimate costs associated with defined scope based on recent project data (from S&L) and regional labor rates, verified against published reference sources.
- Intended to present a reasonable order-of-magnitude cost
- Key sources include S&L internal project database, U.S. Bureau of Labor Statistics, and NREL ATB



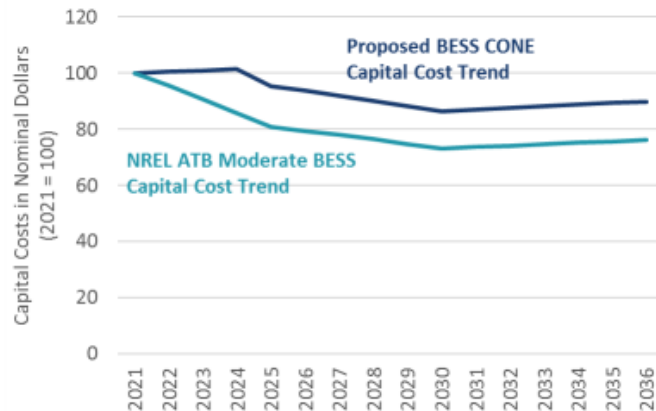
4-Hour BESS Capital Costs

2022 Capital Costs: \$1,581/kW to \$1,658/kW

- Without 13% initial overbuild for degradation, 2022 capital costs would be about \$1,400/kW
- Lower than 2020 NYISO estimate of \$1,550/kW, which assumed no initial overbuild

Cost Escalation Approach:

- 2021 to 2024: -1.5%/year (real) based on contract data, trends, and expectations expressed by OEM suppliers
- Post-2024: 2021 ATB Moderate cost decline rate



2026 Capital Costs: \$1,502/kW to \$1,575/kW

2026 Projected BESS Capital Costs (nominal \$)

Capital Costs (in \$millions)	CONE Area			
	1 EMAAC 200 MW	2 SWMAAC 200 MW	3 Rest of RTO 200 MW	4 WMAAC 200 MW
EPC Costs				
BESS Equipment				
Batteries and Enclosures	\$186.0	\$186.0	\$186.0	\$186.0
PCS and BOP Equipment	\$27.8	\$27.8	\$27.8	\$27.8
Project Management	\$11.3	\$9.0	\$9.6	\$10.3
Construction & Materials	\$56.5	\$45.1	\$47.7	\$51.5
Sales Tax	\$0.0	\$0.0	\$0.0	\$0.0
EPC Contractor Fee	Included	Included	Included	Included
EPC Contingency	Included	Included	Included	Included
Total EPC Costs	\$281.6	\$267.9	\$271.0	\$275.7
Non-EPC Costs				
Project Development	\$14.1	\$13.4	\$13.6	\$13.8
Mobilization and Start-Up	\$2.8	\$2.7	\$2.7	\$2.8
Owner's Contingency	\$10.7	\$10.7	\$10.7	\$10.7
Electrical Interconnection	\$4.1	\$4.1	\$4.1	\$4.1
Land	\$0.4	\$0.3	\$0.2	\$0.4
Working Capital	\$0.0	\$0.0	\$0.0	\$0.0
Financing Fees	\$1.3	\$1.3	\$1.3	\$1.3
Total Non-EPC Costs	\$33.5	\$32.5	\$32.5	\$33.0
Total Capital Costs	\$315.1	\$300.4	\$303.6	\$308.7
Overnight Capital Costs (\$million)	\$315	\$300	\$304	\$309
Overnight Capital Costs (\$/kW)	\$1,575	\$1,502	\$1,518	\$1,544
Battery Energy Capital Costs (\$/kWh)	\$394	\$376	\$379	\$386
Installed Capital Costs (\$/kW)	\$1,655	\$1,578	\$1,594	\$1,621

4-Hour BESS O&M Costs

We estimated annual fixed O&M costs assuming daily cycling of the BESS to 95% Depth of Discharge

- Primarily the costs of O&M contract and insurance
- Assumed property tax rates are the same as gas plants

Augmentation occurs in Year 5 and Year 10

- 124 MWh-dc of batteries added in each year
- Based on current cost estimate of \$229/kWh-dc and cost escalation assumptions on previous slide
- Model augmentation costs as expenses

Projected BESS O&M Costs (nominal \$)

O&M Costs	CONE Area			
	1 EMAAC 200 MW	2 SWMAAC 200 MW	3 Rest of RTO 200 MW	4 WMAAC 200 MW
Fixed O&M (2026\$ million)				
O&M Contract Fixed Payments	\$2.7	\$2.7	\$2.7	\$2.7
BOP and Substation O&M	\$0.1	\$0.1	\$0.1	\$0.1
Station Load / Aux Load	\$0.4	\$0.3	\$0.3	\$0.3
Miscellaneous Owner Costs	\$0.3	\$0.2	\$0.3	\$0.3
Operating Insurance	\$1.3	\$1.2	\$1.2	\$1.2
Land Lease or Property Taxes	\$0.0	\$3.9	\$0.0	\$0.0
Total Fixed O&M (2026\$ million)	\$4.8	\$8.4	\$4.6	\$4.7
Total Fixed O&M (\$/kW-yr)	\$23.8	\$42.0	\$23.0	\$23.3
Augmentation				
Year 5 Costs (2031\$ million)	\$27.8	\$27.8	\$27.8	\$27.8
Year 10 Costs (2036\$ million)	\$28.8	\$28.8	\$28.8	\$28.8
Levelized Fixed O&M (\$/kW-yr)	\$44.1	\$58.6	\$43.2	\$43.6
Variable O&M (2026\$/MWh)	\$0.00	\$0.00	\$0.00	\$0.00

4-Hour BESS CONE Values

4-Hour BESS Detailed CONE Estimates

		4-Hour Battery Storage			
		EMAAC	SWMAAC	Rest of RTO	WMAAC
Gross Costs					
Overnight	\$m	\$315	\$300	\$304	\$309
Installed (inc. IDC)	\$m	\$332	\$317	\$320	\$325
First Year FOM	\$m/yr	\$5	\$8	\$5	\$5
Year 5 Augmentation	\$m	\$28	\$28	\$28	\$28
Year 10 Augmentation	\$m	\$29	\$29	\$29	\$29
Net Summer ICAP	MW	200	200	200	200
Unitized Costs					
Overnight	\$/kW	\$1,575	\$1,502	\$1,518	\$1,544
Installed (inc. IDC)	\$/kW	\$1,660	\$1,583	\$1,599	\$1,626
Levelized FOM	\$/kW-yr	\$44	\$59	\$43	\$44
After-Tax WACC	%	8.0%	8.0%	8.0%	8.0%
Effective Charge Rate	%	12.7%	12.7%	12.7%	12.7%
Updated CONE	\$/MW-yr	\$243,700	\$248,700	\$235,700	\$239,400
Updated CONE	\$/MW-day	\$668	\$681	\$646	\$656

Notes: Levelized FOM includes Year 5 and Year 10 augmentation costs. The 2023/24 BESS CONE was escalated to 2026 assuming a -2.4% per year nominal cost decline, consistent with capital cost projections from 2023 to 2026 shown on the next slide.

Comparison of Rest of RTO CONE Assumptions

CONE Value	2022/23 CONE	2026/27 CONE	CONE Impact
Financial Assumptions	100% bonus depreciation and 8.2% ATWACC	20% bonus depreciation and 8.0% ATWACC	+\$12/MW-day
Capital Costs	\$1,389/kW	\$1,599/kW	+\$74/MW-day
Fixed O&M Costs	\$34/kW-year	\$43/kW-year	+\$27/MW-day
CONE	\$532/MW-day	\$646/MW-day	+\$114/MW-day

Source: PJM Default MOPR Floor Prices for 2022 BRA.

E&AS Revenue Offset

Regulation Revenues in E&AS Revenue Offset

Based on stakeholder feedback, we reviewed the amount of Regulation revenues included in PJM's calculation of the E&AS revenue offset

Recommendation: Regulation revenues should not be included in the E&AS revenue offset

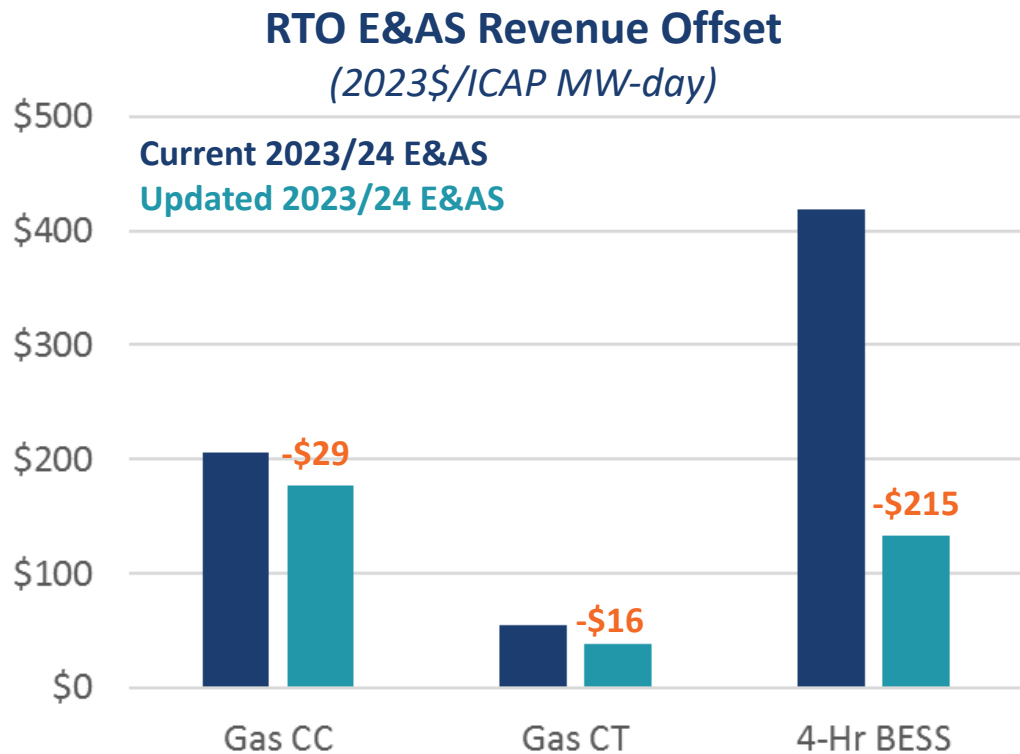
- ⌘ Regulation market is too small at only 500-800 MW, some of which is already absorbed by BESS plants providing the premium RegD product
- ⌘ By contrast, the capacity market may need to attract thousands of MW to meet load growth and replace retirements; such large amounts of new entrants could not earn significant revenues from the Regulation market
- ⌘ If the Regulation revenues per plant were high, the first few plants would use up that opportunity quickly; if the revenues were low, accounting for them (versus selling more energy) would not change the Net CONE estimate

Additional E&AS Recommendations

- ⌘ Reduce ramp rate to 15 MW/min per turbine reflecting ramp rates included in energy offers by similar plants
- ⌘ Update heat rate, startup costs, and variable O&M costs based on new reference technology
- ⌘ Remove variable gas transportation costs due to the inclusion of firm transportation service in fixed O&M costs

Impacts of Proposed Changes on E&AS Revenue Offset

The E&AS revenue offset for the 4-Hr BESS decreases by 68% due to the loss of regulation revenues, with smaller (but significant) decreases to Gas CC and CT E&AS



Impacts of Recommended Changes to RTO E&AS Revenue Offset

(2023\$/ICAP MW-day)

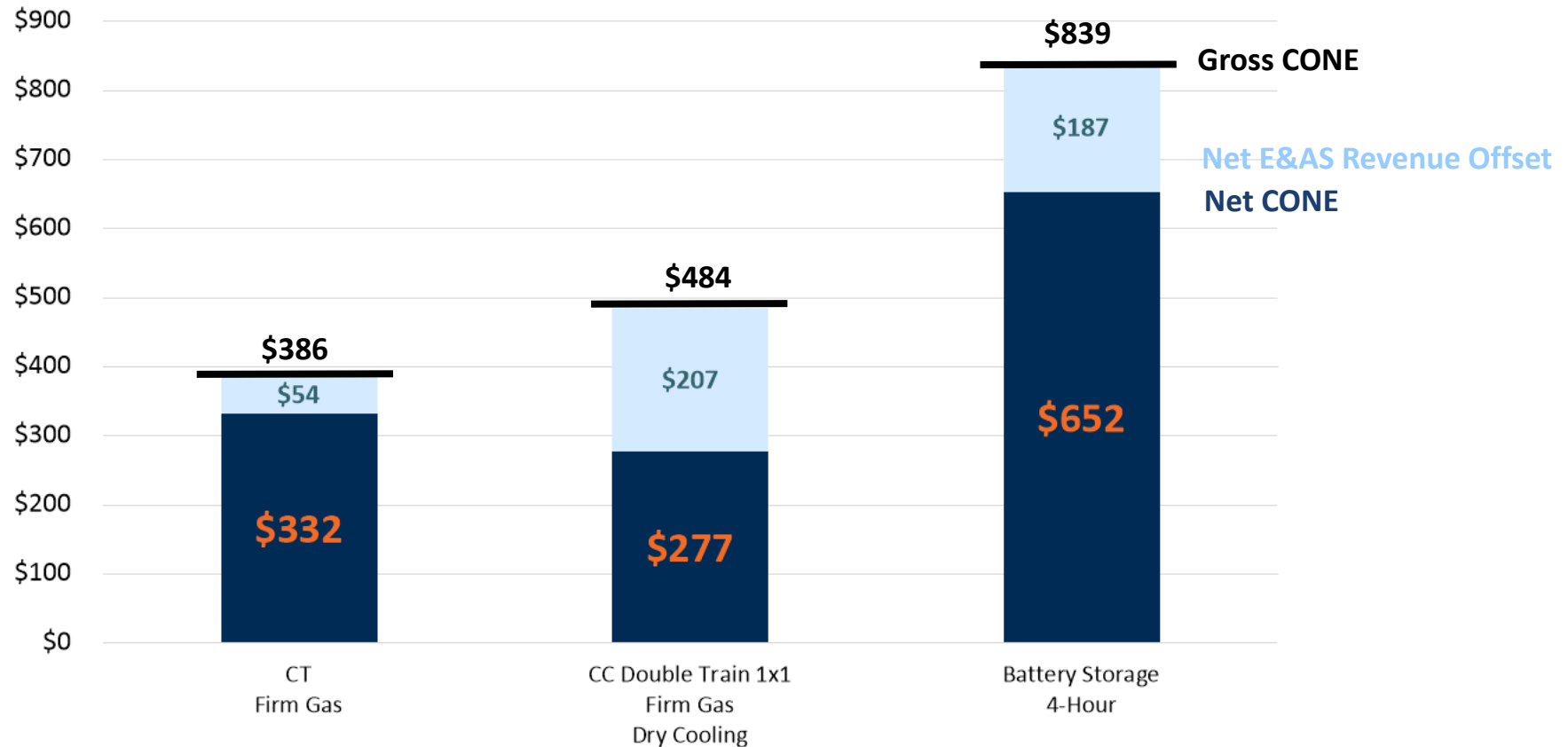
	Gas CC	Gas CT	4-Hr BESS
Current 2023/24 RTO E&AS	\$206	\$55	\$343
Reduced Ramp Rate	-\$46	-\$15	---
Updated Other Parameters	+\$23	\$0	---
Removed Transportation Costs	+\$17	+\$7	---
Removed Regulation	-\$23	-\$8	-\$215
Updated 2023/24 RTO E&AS	\$177	\$39	\$128

Note: All E&AS values based on the forward-looking E&AS method. CT E&AS includes 10% adder on fuel costs.

Net CONE and Recommended Reference Technology

Updated 2026/27 Net CONE Estimates

Average Across all Regions 2026/27 Net CONE Estimates
(2026\$/UCAP MW-day)



Sources and Notes: EAS Offset is from PJM and includes an estimated Net Reactive Service Revenue of \$9/ICAP MW-Day, and calculates 2026/27 values by escalating 2023/24 values forward three years by 2.5% per year. EFORd CC and CT estimates are from the August 2, 2021 Revision of the 2023-2024 BRA Default MOPR Floor Offer Prices for New Entry Capacity Resources with State Subsidy. ELCC for 4-hour battery storage is assumed to be 79%.

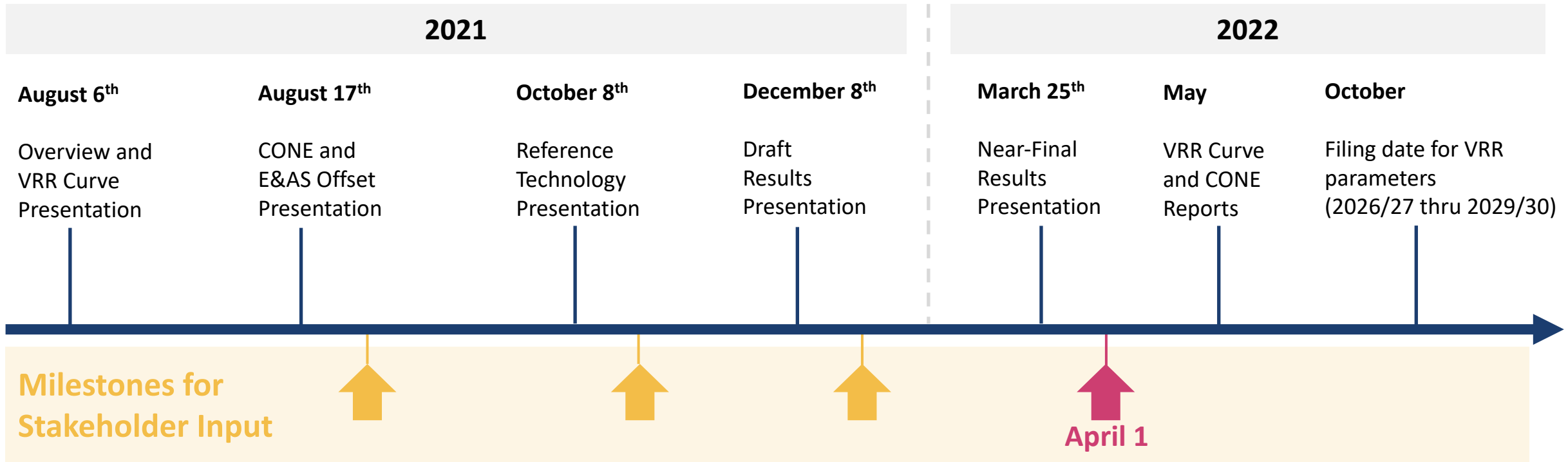
Recommended Reference Technology



Technology	Feasible to Build for Delivery Year	Economic Source of Capacity	Accuracy of Net CONE Estimates
Gas CC	Yes	Yes (significant recent entry; lowest 2026/27 Net CONE)	Highest
Gas CT	Yes (may be infeasible to build in NJ)	Unclear (few recently built; Net CONE 20% higher than CC)	High (higher forward E&AS uncertainty due to lack of forward pricing matching CT dispatch)
4-Hour Battery Storage	Yes	Unclear (no cleared capacity to date; highest 2026/27 Net CONE among candidates)	Low (uncertain future AS revenues; falling costs)

Stakeholder Input to Inform the Quadrennial Review

Provide input on results by **April 1** to
Melissa.Pilong@pjm.com or Gary.Helm@pjm.com



Contact Information



Sam Newell

PRINCIPAL | BOSTON

Sam.Newell@brattle.com

+1 (617) 234-5725



Travis Carless

ASSOCIATE | BOSTON

Travis.Carless@brattle.com

+1 (617) 234-5268



Michael Hagerty

SENIOR ASSOCIATE | WASHINGTON DC

Michael.Hagerty@brattle.com

+1 (202) 419-3323

Appendix Slides

Economic Life

We recommend maintaining the economic life of Gas CT and CCs at 20 years

- ∞ Scope of costs included in cost estimates typically reflect less than 30 years of operation
- ∞ Developers strongly discount the future value of fossil-fired generation beyond 20 years given the trend towards clean energy
- ∞ Two states (IL and NJ) have passed or are considering limits on the operation of gas plants
 - *Illinois*: Climate and Equitable Jobs Act (CEJA) requires phase out of privately-owned gas generation by 2045; CEJA does not limit the ability of new CCs to enter but may require alternative ownership structures with public entities to maintain operation over the entire 20 year economic life
 - *New Jersey*: DEP Proposed Rule (12.6.2021) will limit new gas generation to units that emit less than 860 lbs CO₂/MWh starting in 2025, which the proposed Gas CC can meet but the Gas CT cannot

Gas CT and CC Detailed Specifications

Characteristic	Combustion Turbine	Combined Cycle
Site Type	Greenfield	Greenfield
Turbine Model	GE 7HA.02	GE 7HA.02
Configuration	1x0	Double Train 1x1 Single Shaft
Power Augmentation	Evaporative Cooling, no inlet chillers	Evaporative Cooling, no inlet chillers
CC Cooling System	---	Air-Cooled
Fuel Supply	Firm Gas	Firm Gas
Environmental Controls	Dry Low NOx burners, SCR and CO Catalyst	Dry Low NOx burners, SCR and CO Catalyst
Net ISO Rating	350 – 363 MW	Without Duct Firing: 1,011 – 1,047 MW With Duct Firing: 1,133 – 1,174 MW
Net ISO Heat Rate (HHV)	9,304 – 9,320 Btu/kWh	Without Duct Firing: 6,359 – 6,383 Btu/kWh With Duct Firing: 6,593 – 6,619 Btu/kWh

CT & CC Fuel Supply Assumption

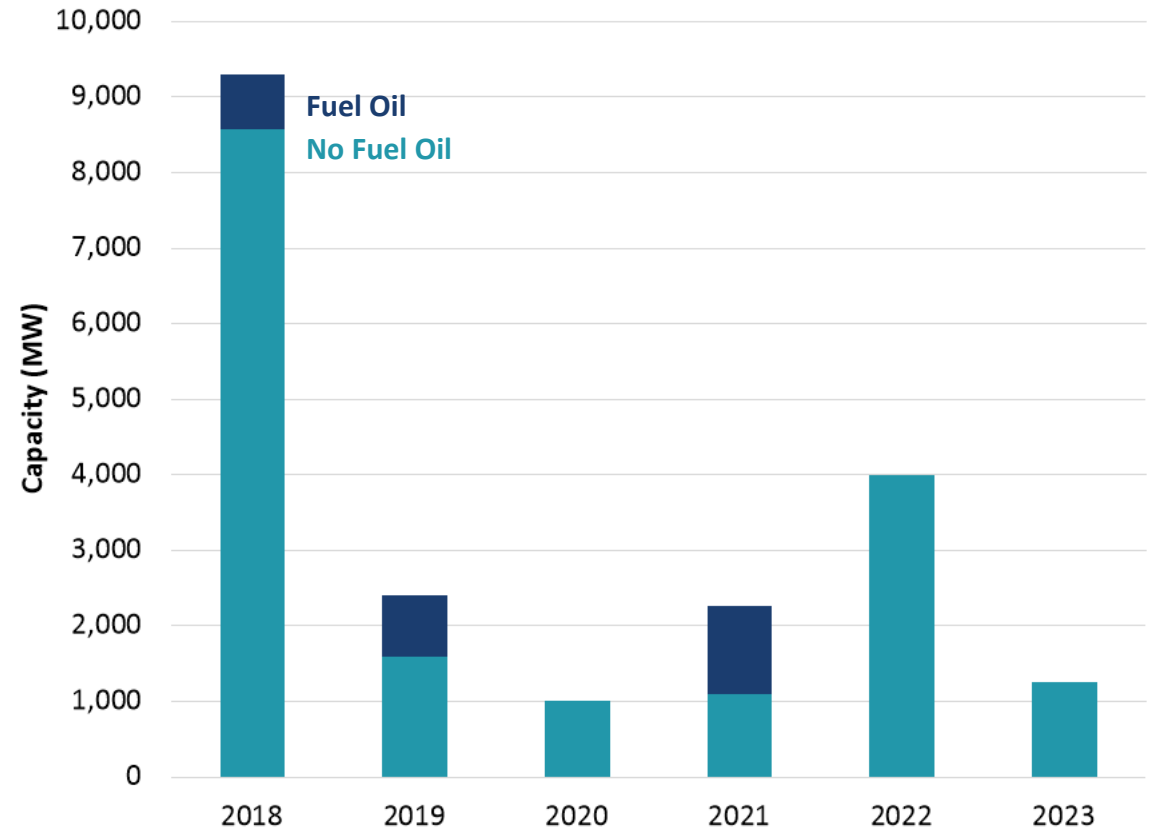
Developers have shifted away from installing dual fuel capabilities at new CCs in PJM

- Since 2018, only 13% of CC capacity built or under construction in PJM installed fuel oil as a secondary fuel
- Units that installed fuel oil are located in NJ, PA, and OH; other CCs in PA and OH have since installed gas-only units
- Developers are finding it increasingly difficult to permit fuel oil generation with tighter emission restrictions

We assume new CCs and CTs will not include dual fuel capability and opt for short-term firm contracts

- A few developers installing dual lateral pipelines to firm up fuel supply, but not as common as firm gas contracts
- Developed cost estimates for firm transportation based on posted tariff rates for interstate pipelines across PJM

Dual Fuel Capability of Gas CC Capacity Built or Under Construction in PJM since 2018

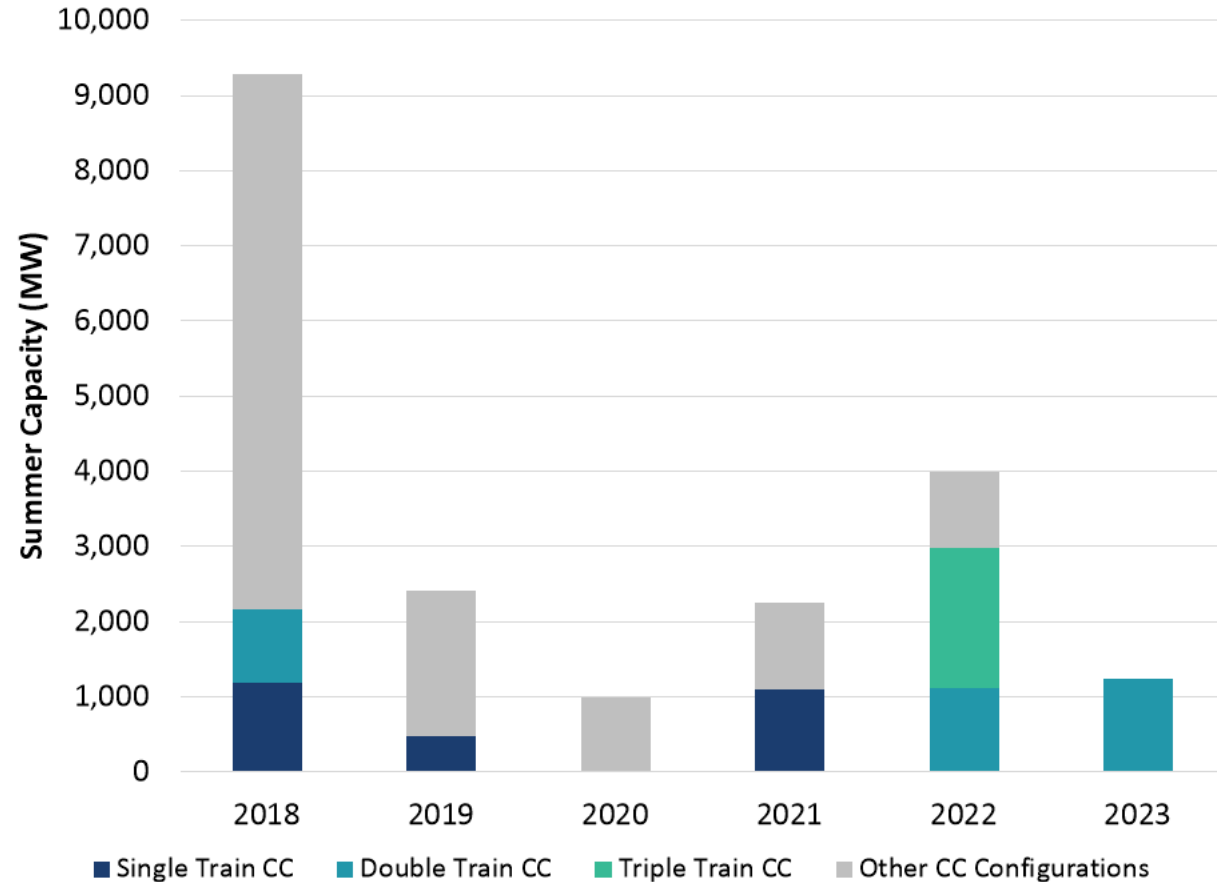


CC Configuration

New Gas CCs shifting away from 2x1 units to multi-train 1x1 units

- Since 2018, 2x1 and 1x1 CCs have each added about 8 GW of new merchant capacity in PJM
- Majority of units built in 2021 or are currently under construction are 1x1 units (5.3 GW vs 1.0 GW of 2x1)
- About 75% of new 1x1 CC capacity added since 2021 has installed multiple trains

Configuration of Gas CC Capacity Built or Under Construction in PJM since 2018



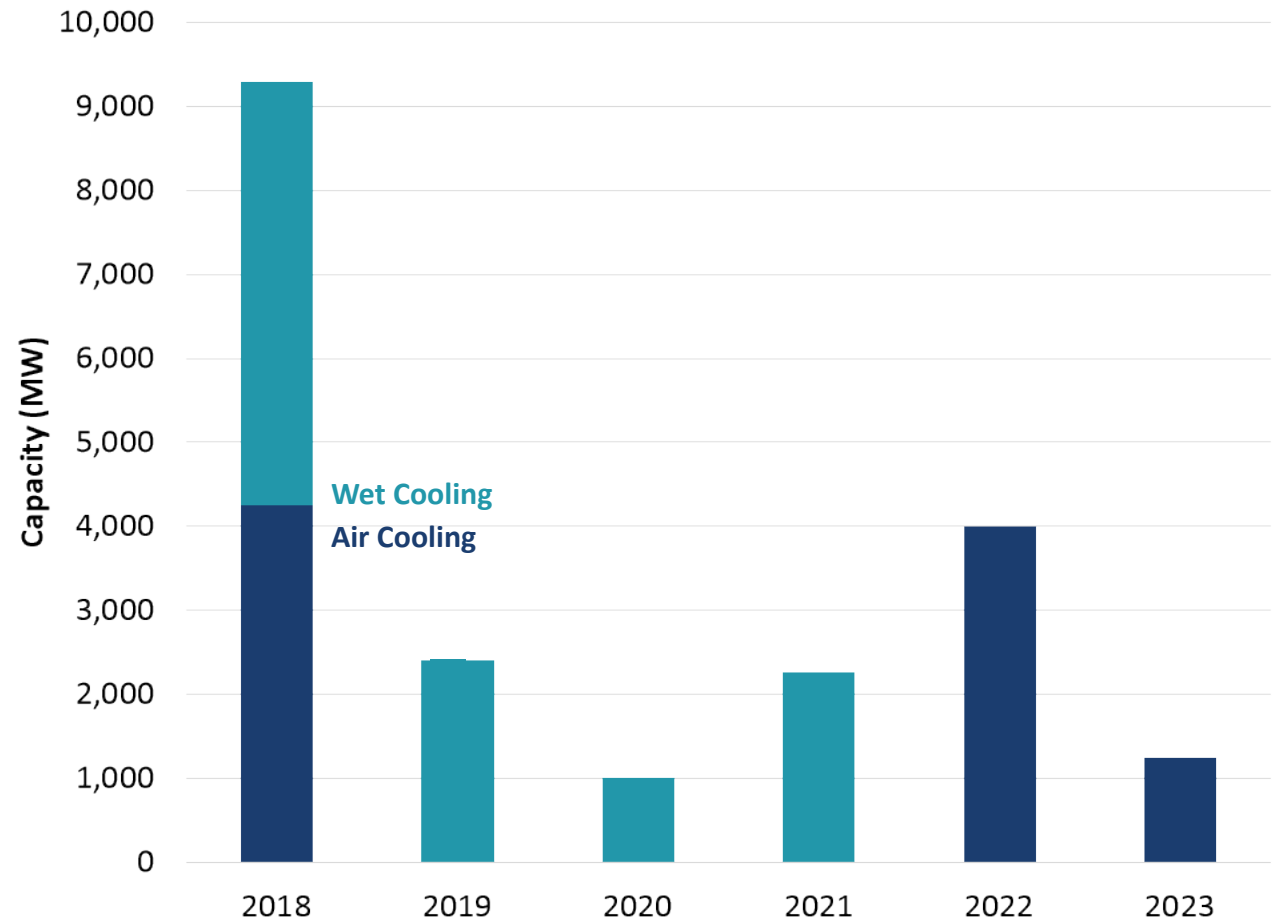
Sources and Notes: Ventyx Energy Velocity Suite, Accessed August 2021. Includes operational or units under construction (operating, under construction, site prep, converted, standby, testing, steam only, restarted)

CC Cooling System Assumption

Units under construction have shifted to air cooling given environmental regulations around water consumption

- Since 2018, **only 47%** of all CC capacity built or under construction in PJM used air cooling, however, the share of air cooling capacity increased to **70%** since 2021
- Since 2021, the CC capacity utilizing Wet Cooling are in OH and PA
- IL, OH, and MI have air-cooled CC capacity under construction schedule to go online in 2022 and 2023

Cooling System of Gas CC Capacity Built or Under Construction in PJM since 2018



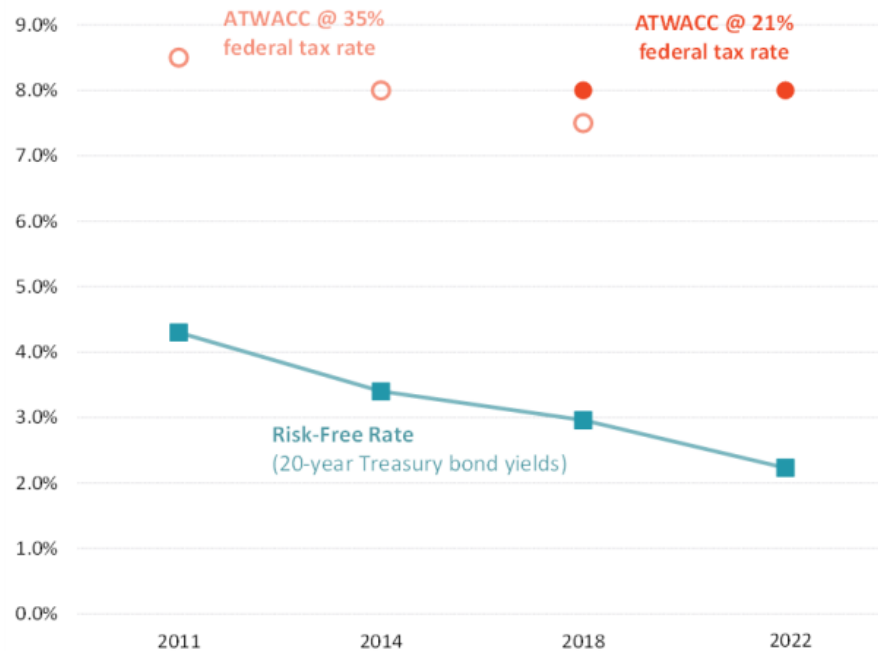
Sources and Notes: Ventyx Energy Velocity Suite, Accessed August 2021. For Hill Top Energy Center cooling data is from <https://www.nsenenergybusiness.com/projects/hill-top-energy-centre/>. Includes operational or units under construction (operating, under construction, site prep, converted, standby, testing, steam only, restarted).

Cost of Capital Recommendation

We recommend a 8.0% merchant generation ATWACC reflecting recent market trends

- Since Fall 2021, 20-year Treasury bond yields increased by 35 basis points to 2.23%, cost of debt increased by 50 bps to 4.7%, and assumed market risk premium increased 21 bps to 7.46%
- Results in a higher spread between risk-free rate and merchant ATWACC

Recommended PJM CONE ATWACC



ATWACC Components

Component	Value
Debt Rate	55%
Cost of Debt	4.7%
Return on Equity	13.6%
Effective Tax Rate	27.7%
ATWACC	8.0%

Updated Merchant Generation ATWACC

Estimated ATWACC for publicly-traded generation companies ranges from 5.7% to 7.8%

- ⌘ Sensitivities test ATWACC under alternative risk-free rate assumptions and sources of company betas
- ⌘ Rely more heavily on NRG and Vistra due to larger share of their business exposed to wholesale prices (including both merchant generation and competitive retail)

Fairness opinions identified in past studies ranged from 4.7% to 7.7%

ATWACCs of Publicly-Traded Generation Companies



ATWACC Details

ATWACCs of Publicly-Traded Generation Companies (Base Case)

Company	S&P Credit Rating [1]	Market Capitalization [2]	Long Term Debt [3]	Beta [4]	CAPM Cost of Equity [5]	Equity Ratio [6]	Cost of Debt [7]	ATWACC [8]
AES Corp	BBB-	\$15,213	\$18,664	1.16	10.9%	38%	3.9%	5.9%
NRG Energy Inc	BB+	\$9,994	\$8,984	1.17	10.9%	53%	4.5%	7.3%
Vistra Corp	BB	\$8,251	\$10,748	1.02	9.8%	43%	4.9%	6.3%

Sources & Notes:

[1]: S&P Research Insight.

[2] and [3]: Bloomberg as of 9/30/2021, millions USD.

[4]: Computed 3-year weekly betas based on stock price returns and index returns. These calculations omits all weekly stock price returns where they deviated from weekly index returns by more than 8%.

[5]: RFR (2.23%) + [4] × MERP (7.46%).

[6]: Equity as a percentage of total firm value.

[7]: Cost of Debt based on S&P Credit Rating for NPI and Company Cost of Debt for other companies.

[8]: $[5] \times [6] + [7] \times (1 - [6]) \times (1 - \text{tax rate})$.

Gas CC Capital Costs

	CONE Area			
	1	2	3	4
	EMAAC	SWMAAC	Rest of RTO	WMAAC
Capital Costs (in \$millions)	1171 MW	1174 MW	1144 MW	1133 MW
Owner Furnished Equipment				
Gas Turbines	\$149.9	\$149.9	\$149.9	\$149.9
HRSR / SCR	\$77.9	\$77.9	\$77.9	\$77.9
Steam Turbines	\$81.8	\$81.8	\$81.8	\$81.8
Sales Tax	\$0.0	\$0.0	\$0.0	\$0.0
Total Owner Furnished Equipment	\$309.6	\$309.6	\$309.6	\$309.6
EPC Costs				
Equipment				
Condenser	\$59.5	\$59.5	\$59.5	\$59.5
Other Equipment	\$83.3	\$83.3	\$83.3	\$83.3
Construction Labor	\$353.0	\$273.5	\$286.9	\$319.1
Other Labor	\$72.9	\$66.6	\$67.7	\$70.2
Materials	\$72.8	\$72.8	\$72.8	\$72.8
Sales Tax	\$0.0	\$0.0	\$0.0	\$0.0
EPC Contractor Fee	\$95.1	\$86.5	\$88.0	\$91.5
EPC Contingency	\$104.6	\$95.2	\$96.8	\$100.6
Total EPC Costs	\$841.3	\$737.5	\$754.9	\$797.1
Non-EPC Costs				
Project Development	\$57.5	\$52.4	\$53.2	\$55.3
Mobilization and Start-Up	\$11.5	\$10.5	\$10.6	\$11.1
Net Start-Up Fuel Costs	-\$13.9	-\$14.0	-\$9.8	-\$13.5
Electrical Interconnection	\$24.3	\$24.4	\$23.8	\$23.6
Gas Interconnection	\$32.5	\$32.5	\$32.5	\$32.5
Land	\$2.1	\$1.7	\$0.9	\$1.8
Fuel Inventories	\$0.0	\$0.0	\$0.0	\$0.0
Non-Fuel Inventories	\$5.8	\$5.2	\$5.3	\$5.5
Owner's Contingency	\$9.6	\$9.0	\$9.3	\$9.3
Emission Reduction Credit	\$2.2	\$2.2	\$2.2	\$2.2
Financing Fees	\$28.2	\$25.8	\$26.2	\$27.2
Total Non-EPC Costs	\$159.8	\$149.6	\$154.4	\$154.9
Total Capital Costs	\$1,310.7	\$1,196.7	\$1,218.9	\$1,261.6
Overnight Capital Costs (\$million)	\$1,311	\$1,197	\$1,219	\$1,262
Overnight Capital Costs (\$/kW)	\$1,120	\$1,020	\$1,065	\$1,113
Installed Cost (\$/kW)	\$1,212	\$1,104	\$1,153	\$1,204

Gas CC Fixed O&M Costs

O&M Costs	CONE Area			
	1 EMAAC 1171 MW	2 SWMAAC 1174 MW	3 Rest of RTO 1144 MW	4 WMAAC 1133 MW
Fixed O&M (2026\$ million)				
LTSA	\$0.8	\$0.8	\$0.8	\$0.8
Labor	\$5.0	\$5.3	\$3.8	\$3.9
Maintenance and Minor Repairs	\$6.3	\$6.4	\$5.7	\$5.8
Administrative and General	\$1.3	\$1.4	\$1.1	\$1.1
Asset Management	\$1.5	\$1.6	\$1.1	\$1.2
Property Taxes	\$0.1	\$16.0	\$7.9	\$0.1
Insurance	\$7.9	\$7.2	\$7.3	\$7.6
Firm Gas Contract	\$9.6	\$12.0	\$15.7	\$13.9
Working Capital	\$0.1	\$0.1	\$0.1	\$0.1
Total Fixed O&M (2026\$ million)	\$32.5	\$50.9	\$43.6	\$34.4
Levelized Fixed O&M (2026\$/MW-yr)	\$27,800	\$43,300	\$38,100	\$30,400
Variable O&M (2026\$/MWh)				
Major Maintenance - Hours Based	1.27	1.26	1.29	1.31
Consumables, Waste Disposal, Other VOM	0.72	0.72	0.73	0.74
Total Variable O&M (2026\$/MWh)	1.99	1.98	2.03	2.04

Gas CT Capital Costs

	CONE Area			
	1	2	3	4
	EMAAC	SWMAAC	Rest of RTO	WMAAC
Capital Costs (in \$millions)	361 MW	363 MW	353 MW	350 MW
Owner Furnished Equipment				
Gas Turbines	\$75.5	\$75.5	\$75.5	\$75.5
HRS / SCR	\$32.2	\$32.2	\$32.2	\$32.2
Steam Turbines	\$0.0	\$0.0	\$0.0	\$0.0
Sales Tax	\$0.0	\$0.0	\$0.0	\$0.0
Total Owner Furnished Equipment	\$107.8	\$107.8	\$107.8	\$107.8
EPC Costs				
Equipment				
Condenser	\$0.0	\$0.0	\$0.0	\$0.0
Other Equipment	\$23.2	\$23.2	\$23.2	\$23.2
Construction Labor	\$45.4	\$34.0	\$36.5	\$40.4
Other Labor	\$14.7	\$13.8	\$14.0	\$14.3
Materials	\$7.8	\$7.8	\$7.8	\$7.8
Sales Tax	\$0.0	\$0.0	\$0.0	\$0.0
EPC Contractor Fee	\$19.9	\$18.7	\$18.9	\$19.4
EPC Contingency	\$21.9	\$20.5	\$20.8	\$21.3
Total EPC Costs	\$133.0	\$118.0	\$121.3	\$126.4
Non-EPC Costs				
Project Development	\$12.0	\$11.3	\$11.5	\$11.7
Mobilization and Start-Up	\$2.4	\$2.3	\$2.3	\$2.3
Net Start-Up Fuel Costs	-\$0.6	-\$0.6	\$0.1	-\$0.5
Electrical Interconnection	\$7.5	\$7.5	\$7.3	\$7.3
Gas Interconnection	\$32.5	\$32.5	\$32.5	\$32.5
Land	\$0.4	\$0.3	\$0.2	\$0.3
Fuel Inventories	\$0.0	\$0.0	\$0.0	\$0.0
Non-Fuel Inventories	\$1.2	\$1.1	\$1.1	\$1.2
Owner's Contingency	\$4.4	\$4.4	\$4.4	\$4.4
Emission Reduction Credit	\$0.0	\$0.0	\$0.0	\$0.0
Financing Fees	\$6.6	\$6.3	\$6.3	\$6.5
Total Non-EPC Costs	\$66.5	\$65.0	\$65.7	\$65.6
Total Capital Costs	\$307.2	\$290.9	\$294.8	\$299.8
Overnight Capital Costs (\$million)	\$307	\$291	\$295	\$300
Overnight Capital Costs (\$/kW)	\$852	\$802	\$835	\$857
Installed Cost (\$/kW)	\$909	\$853	\$889	\$913

Gas CT Fixed O&M Costs

O&M Costs	CONE Area			
	1 EMAAC 361 MW	2 SWMAAC 363 MW	3 Rest of RTO 353 MW	4 WMAAC 350 MW
Fixed O&M (2026\$ million)				
LTSA	\$0.3	\$0.3	\$0.3	\$0.3
Labor	\$1.1	\$1.2	\$0.8	\$0.9
Maintenance and Minor Repairs	\$0.5	\$0.5	\$0.5	\$0.5
Administrative and General	\$0.2	\$0.3	\$0.2	\$0.2
Asset Management	\$0.5	\$0.6	\$0.4	\$0.4
Property Taxes	\$0.0	\$4.0	\$2.0	\$0.0
Insurance	\$1.9	\$1.8	\$1.8	\$1.8
Firm Gas Contract	\$4.2	\$5.2	\$6.8	\$6.0
Working Capital	\$0.0	\$0.0	\$0.0	\$0.0
Total Fixed O&M (2026\$ million)	\$8.8	\$13.8	\$12.8	\$10.2
Levelized Fixed O&M (2026\$/MW-yr)	\$24,400	\$38,100	\$36,400	\$29,100
Variable O&M (2026\$/MWh)				
Consumables, Waste Disposal, Other VOM	1.14	1.13	1.10	1.16
Total Variable O&M (2026\$/MWh)	1.14	1.13	1.10	1.16
<i>Major Maintenance - Starts Based</i>				
<i>(\$/factored start, per turbine)</i>	20,249	20,249	20,249	20,249