2026 Variable Operations and Maintenance Cost Review

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Market Analysis

Stakeholder Meeting
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CAISO Public

Engagement Best Practices

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Summary

- CAISO has committed to reviewing the default Variable Operations and Maintenance (VOM) adders triennially.
- The previous review occurred in 2023, making 2026 the next appropriate cycle for review.
- CAISO proposes an 8.2% inflation increase to the default VOM adder values based on inflation from June 2023 to March 2026.
- In this year's review cycle, CAISO is exploring a new default variable operations costs for storage resources and is seeking stakeholder feedback.

Background – VOM Adders

- Scheduling coordinators (SCs) register VOM adders with CAISO to reflect their resources' cost of operations (e.g., consumables) and maintenance (e.g., wear-and-tear) in CAISO markets
- VOM adders are used in the calculation of:
  - Default energy bids (used to replace bids if resource is mitigated in the market power mitigation process)
  - Default commitment costs (used to cap the minimum load cost, startup cost, and transition cost bids submitted by SCs)
- VOM adders are set at "default" values or can be negotiated if the default values are insufficient
- In the previous cycle, CAISO increased the default VOM adders by 18.73% based on inflation from December 2019 to June 2023

Key Factors Considered for VOM Adder Update

- Inflation
  - Since the last review cycle, inflation has increased 8.2% from June 2023 to March 2026*
- Frequency of VOM negotiations
  - CAISO continues to conduct a steady amount of VOM negotiations with SCs
  - If default values were too low, there would be a high volume of VOM negotiations; if values were too high there would be infrequent VOM negotiations
- Broader industry-wide study
  - Current default VOM adders sufficiently cover the range of technologies seen participating in the market

**Based on the US Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (https://www.bls.gov/cpi/data.htm)*

Proposal – Default VOM with Inflation Adjustments

- CAISO proposes to adjust the default VOM adders based on Consumer Price Index data from the US Bureau of Labor Statistics from June 2023 to March 2026 (8.2% increase)

Current Values

Technology Type	Default VOM-EN Adder *($/MWh)*	Default VOM-ML Adder *($/run-hour/MW)*	Default VOM-SU Adder *($/start/MW)*
Coal	3.19	-	-
Steam turbines	0.39	-	-
Natural gas-fired combined-cycle	0.70	2.07	-
Frame combustion turbines	1.15	-	61.89
Aeroderivative combustion turbines	2.55	5.20	-
Reciprocating internal combustion engines	1.31	-	-
Nuclear	1.28	-	-
Biomass	1.96	-	-
Geothermal	1.38	-	-
Landfill gas	1.44	-	-
Hydroelectric	-	0.77	-
Solar	-	-	-
Wind	0.33	-	-

Inflation Adjusted Values

Technology Type	Default VOM-EN Adder *($/MWh)*	Default VOM-ML Adder *($/run-hour/MW)*	Default VOM-SU Adder *($/start/MW)*
Coal	3.45	-	-
Steam turbines	0.42	-	-
Natural gas-fired combined-cycle	0.76	2.24	-
Frame combustion turbines	1.24	-	66.96
Aeroderivative combustion turbines	2.76	5.63	-
Reciprocating internal combustion engines	1.42	-	-
Nuclear	1.38	-	-
Biomass	2.12	-	-
Geothermal	1.49	-	-
Landfill gas	1.56	-	-
Hydroelectric	-	0.83	-
Solar	-	-	-
Wind	0.36	-	-

Background – Variable Operations Costs for Storage Resources

- As part of the Storage Default Energy Bid, SCs may opt to register a variable operations costs for storage resources. If the SC does not register a variable operations cost, a value of $0/MWh is used.
- The variable operations costs for storage resources is used to reflect costs associated with the battery operations, including cycling and cell degradation costs.
- Applications may include estimates from battery manufacturers, cost estimation models, or some other supporting methodology.
- The ISO is exploring four options for the default variable operations cost for storage resources and seeks feedback from stakeholders on each option.

Proposal – Variable Operations Costs for Storage Resources

- Option 1: Long-term service agreements (LTSA)-based values
  - LTSA is a contractual arrangement between a resource owner/operator and a service provider, and maintenance is predefined based on Original Equipment Manufacturer (OEM) recommendations
  - Currently 64% of registered variable operations costs are based on LTSA, providing a reliable and contractually supported basis for cost estimation across most registered cases.
  - The median value from LTSA-based variable operations cost applications is $14.74/MWh; the mean value is $17.87/MWh
  - The ISO's recommended option is the median value of $14.74/MWh since it is reflective of actual variable operations costs directly from OEM and not distorted by outliers

Proposal – Variable Operations Costs for Storage Resources

- Option 2: All active negotiated values
  - Accounts for all active negotiated to capture the variety of application types
  - The median variable operations cost from all active negotiated values is $19.43/MWh; mean value is $23.25/MWh
  - This option reflects the full set of active negotiated values which also includes applications based on Power Purchasing Agreements (PPAs) or future projections

Proposal – Variable Operations Costs for Storage Resources

- Option 3: Manufacturer-based values
  - Due to variations in cost structure across different OEMs, this approach introduces different values according to the manufacturer
  - This approach is conceptually similar to VOM categorization based on fuel and technology type
  - At current stage, the dataset is not large enough to support robust categorization and validation, this option is not recommended
  - ISO plans to keep gathering information to refine this option for future review cycles

Proposal – Variable Operations Costs for Storage Resources

- Option 4: Status quo values
  - Keep the existing process where the variable operations cost used is $0/MWh if no value is registered
  - Continuing to evaluate incoming negotiations to allow for the development of a more comprehensive dataset over time
  - Over time, having a larger dataset may provide a more representative cost but would require SCs to continue to negotiate a value

Proposed Values – VOM Adders and Variable Operations Cost for Storage Resources

Current Values

Technology Type	Default VOM-EN Adder ($/MWh)	Default VOM-ML Adder ($/run-hour/MW)	Default VOM-SU Adder ($/start/MW)
Default values represents:	*Variable Operations Costs*	*Variable Maintenance Costs*	*Variable Maintenance Costs*
Coal	3.19	-	-
Steam turbines	0.39	-	-
Natural gas-fired combined-cycle	0.70	2.07	-
Frame combustion turbines	1.15	-	61.89
Aeroderivative combustion turbines	2.55	5.20	-
Reciprocating internal combustion engines	1.31	-	-
Nuclear	1.28	-	-
Biomass	1.96	-	-
Geothermal	1.38	-	-
Landfill gas	1.44	-	-
Hydroelectric	-	0.77	-
Solar	-	-	-
Wind	0.33	-	-

Variable Operations Costs for Storage Resources	0

Proposed Values

Technology Type	Default VOM-EN Adder ($/MWh)	Default VOM-ML Adder ($/run-hour/MW)	Default VOM-SU Adder ($/start/MW)
Default values represents:	*Variable Operations Costs*	*Variable Maintenance Costs*	*Variable Maintenance Costs*
Coal	3.45	-	-
Steam turbines	0.42	-	-
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Nuclear	1.38	-	-
Biomass	2.12	-	-
Geothermal	1.49	-	-
Landfill gas	1.56	-	-
Hydroelectric	-	0.83	-
Solar	-	-	-
Wind	0.36	-	-

Variable Operations Costs for Storage Resources	Option 1	Option 2	Option 3	Option 4
	14.74	19.43	By manufacturer	0

Next Steps

Comments due June 18, 2026, via ISO Commenting Tool

Publish Final Proposal and Draft Tariff Language by July 2

Please note that the dates above are tentative until the CAISO publishes a notice formally confirming them

2026 Variable operations and maintenance cost review
https://stakeholdercenterpub.oa.caiso.com/Preview/StakeholderInitiatives/2026-Variable-operations-maintenance-cost-review

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