



Stakeholder Comments Template

Variable Operations and Maintenance Cost Review Working Group – Storage Resources

This template has been created for submission of stakeholder comments on the VOM Cost Review working group for storage resources that was held on July 17, 2019. The workshop, stakeholder meeting presentations, and other information related to this initiative may be found on the initiative webpage at:

<http://www.caiso.com/informed/Pages/StakeholderProcesses/VariableOperations-MaintenanceCostReview.aspx>.

Upon completion of this template, please submit it to initiativecomments@caiso.com. Submissions are requested by close of business on **July 30, 2019**.

Note: Upon submission, please indicate if you would like your comments to be confidential.

Submitted by	Organization	Date Submitted
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The ISO has permission to post these comments publicly (please reply yes or no):

yes

Please provide your organization's comments on the following topics and questions.

1. Please provide any comments or updates you may have to the definitions of Major Maintenance Costs, Variable Operations Costs, and General and Administrative Costs, if any, listed in the July 2, 2019 report found on the stakeholder initiative website. Please comment in particular as to how these definitions relate (or do not relate) to non-generating resources (NGRs). Note that other considerations related to how NGRs' costs will be modeled in our markets (e.g. via a default energy bid) should be discussed as part of the Energy Storage and Distributed Energy Resources (ESDER) stakeholder process.

PG&E has concerns with the idea of defining a master file value that will not be used by any market or settlement processes in the near future or for an extended period of time likely to exceed a year. Also, because the definition of storage-specific default energy bids (DEBs) is currently scoped for the ESDER4 initiative, it is probably inappropriate to define an official value prior to the full definition of the DEB calculation in that initiative, and PG&E would support tabling the calculation of a VOM for storage at least until that initiative has resulted in changes to bidding systems and/or tariff that would require (or at least make use of) it.

That said, PG&E would like to support the following principles for the setting of a storage VOM value:

- 1) The calculated value should not include wholesale costs of charging in the market during the flow interval or set of intervals in which the calculated VOM may be applied. However, the carryover value of charging in previous intervals should be captured in the default energy bid calculation for a given interval or set of intervals, perhaps in the form of a calculation of average carryover value. If the carryover value is set to zero (as it is in the market at present), any positive energy or AS value would be sufficient, with discharge bids set to the default level of zero, to cause the market optimization to use all initial available state of charge above the minimum state of charge over the optimization horizon, such as a day, and take the state of charge to its minimum value at the end of the horizon: this outcome is not desirable considering potential value of discharge in periods beyond the horizon.
- 2) If there is a single VOM calculated for all NGR resources, it should be sufficient to compensate variable costs for all battery (or battery-like) technologies: e.g., lithium-ion, sodium-sulfur, flow, zinc-air, as well as new technologies as they are brought to the CAISO markets.
- 3) If there is a single VOM calculated for an NGR resource (i.e., considering the possibility that a VOM would be resource-specific) it should capture a worst-case cycling cost rather than an average or expected cycling cost. For example, if deep cycling of a lithium-ion battery would result in higher wear-and-tear per MWh of discharge than shallow cycling, the calculated VOM should be based on deep cycling rather than average or expected cycling.
- 4) A useful check on the VOM calculation is to determine whether a bid consisting only of the VOM would be sufficient to cover a battery's operating costs, including carryover value, when the cost of incremental charging is zero (considering both market awards and bid cost recovery).

2. Please offer your feedback on structure of this stakeholder initiative and working groups.

Additional comments

Please offer any other feedback your organization would like to provide on the topics discussed during the working group.