



Stakeholder Comments Template

Variable Operations and Maintenance Cost Review Working Group – Hydro Resources

This template has been created for submission of stakeholder comments on the VOM Cost Review working group for Hydro resources that was held on July 19, 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 **August 2, 2019**.

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

Submitted by	Organization	Date Submitted
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Please provide your organization's comments on the following topics and questions.

1. Appendix A to this template contains a list of maintenance activities for Hydro resources. What maintenance activities are missing from this list that should be included for consideration?
2. Appendix A also allocates the maintenance activities to three cost components (Major Maintenance [green], Other Maintenance – Variable [yellow], Other Maintenance – Fixed [red]). Please review and note whether you disagree with our proposed allocation and why.

As noted in PGE's comments on gas resources, maintenance activity costs are most easily classified as costs related to "wear-and-tear" from dispatch (i.e., repair money only spent if the unit is started up and/or operated) and "other" costs that ensure stand-by dispatchability (i.e., money spent regardless of whether it operates 0 days or 1 month, 3 months or 12 months). PGE

maintains that the first classification would be considered “variable” and the second would be considered “fixed.” It should be noted, however, that there will always be specific exceptions or hybrids to these classifications. PGE could classify some of the items listed as “variable” and “fixed” because it depends on the type of unit and the accounting of the operating profile of the asset in question, the age of the asset, the asset management strategy, and whether there is a service agreement in place with a maintenance provider. For hydro units this is an especially critical variable for “run of river” dams with limited bypassing versus those that have some ponding / storage capability.

3. 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.

PGE agrees with the Variable Operations Cost and General and Administrative Cost definitions presented in this process. However, PGE is concerned with CAISO’s attempt to divide “Major Maintenance” and “Other Maintenance” costs based on how large the scale of the costs are and the frequency of spending. Separating “Major Maintenance” and “Other Maintenance” is difficult to defend because the frequency with which a generator owner performs repairs related to wear-and-tear is highly dependent. Factors influencing frequency include the asset age, the operating profile, equipment type, risk tolerance for reliability, and vendor agreements (if applicable).

In general, the largest difference between hydro resources and fossil resources is the absence of a wear and tear component related to combustion high temperature or fuel processing. There are still the requisite rotating equipment components as well as the thermal stresses placed on the generator that result from utilizing river flow to generate power. This inherently supports the idea that the VOM for hydro resources should not be assumed to be zero.

PGE’s Hydro facilities were commissioned more than half a century ago and have changed their operating requirements from baseloaded, low-cost power producers as originally designed to on-off cycling and load following system stabilizers to provide regulating margin, spinning reserves, and to support PGE renewable energy initiatives. This shift in operating profiles is significant as hydro turbines were originally designed to have a single “Best Operating Point” (BOP). At the BOP, water exiting the turbine runner has a small radial component and minimal cavitation and exits vertically downward through the draft tube, thus creating the most optimal operation, with little noise and vibration. As units follow load increase and decrease demands, they can experience higher fluctuations in pressure (e.g., excessive draft tube pressure pulsations, high vibrations, etc.) which create “rough zones” of operation between different MW thresholds. If units drag through these rough zones frequently, increased cavitation and vibration can cause greater damage to the turbine/generator set than at other loading levels.¹

¹ <https://www.hydroworld.com/articles/hr/print/volume-35/issue-10/articles/standardizing-parameters-for-managing-rough-load-zones-and-no-run-zones.html>

At PGE, increases in plant cycling have resulted in increased wear-and-tear, shortened the lifetime of equipment, and required more frequently scheduled maintenance events to maintain unit reliability. The correlation between maintenance costs and how hydro resources are operated in the market contradicts the December 2018 reports' assertion that these resources have no VOM costs.

Additionally, PGE is concerned by how these costs have been separated. The governance of the representation of the variable wear-and-tear costs are different depending on the mechanism CAISO has offered to a market participant. The VOM component can be effectively "marked up" as part of the energy bid to well over \$1000/MWH, but the Major Maintenance Adder component is capped at 125% of actual. This inconsistency persists even when market mitigation is engaged; the VOM is subject to a 110% cap, while the MMA is capped at 125%.

Given the fact that the guidelines CAISO has proposed to differentiate "Other Maintenance Costs" and "Major Maintenance Costs" are entirely dependent on a survey of generator owners who may be using very different asset management strategies (or accounting processes) and that the represented costs are not being equitably treated in mitigation or bidding caps, PGE strongly encourages the CAISO to align the governance and economic treatment of the maintenance components across all of the representations of energy costs in the market.

4. Please provide any comments or updates to the categories/sub-categories of generation technologies for VOM adders. Should the categories currently found in the CAISO BPM for Market Instruments be further disaggregated into sub-categories (e.g. Solar PV and Solar Thermal)?

PGE recommends simplifying to the highest standard within reason. CAISO has a negotiated DEB option for those market participants seeking more specificity in their cost representation. CAISO should consider an O&M component related to ramping to compensate for rough zone maintenance incursion. At minimum, CAISO should retain a VOM cost adder that can be used in CAISO markets.

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

PGE appreciates the opportunity to provide comments on the ISO's efforts to review the VOM cost adders and recognizes the challenges associated with identifying those maintenance activities that are directly linked to variable costs.

Appendix A:

Cost Component Allocation		
Major Maintenance	Other Maintenance - Variable	Other Maintenance - Fixed

Maintenance Activity	Please note if you disagree and why
Inspections, Repairs and Overhauls, and Replacements:	
1) Bearings and Bushings	
2) Communication Systems	
3) Distributed Control Systems	
4) Exciter Water Wheels and Turbines	
5) Generator Cooling System	
6) Generator Field Rewinds	
7) Lubricating Systems	
8) Main Penstock Valves and Appurtenances	
9) Main Turbines and Water Wheels	
10) Plant Electrical Systems	
11) Runner Seals	
12) Servomotors	
13) Shaft Sleeves and Seals	
14) Valves	
15) Wicket Gate Seals	

Other	
16) Balance-of-Plant	

Materials	
17) Instruments	
18) Safety Equipment	
19) Shop Supplies	
20) Tools	