



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
<i>Nate Moore (425) 456-2622</i>	<i>Puget Sound Energy</i>	<i>August 2, 2019</i>

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?**

Please see comments in Appendix A.

- 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.**

Please see comments in Appendix A.

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.

Fixed cost

Straight-time labor costs are incurred irrespective of the operational status of a unit or plant, and should be considered fixed at the baseline staffing level. Where staffing is supplemented for around-the-clock operations, whether by contractors or crew reassignment, then such labor costs should be considered variable.

Preventive maintenance, which is work regularly performed based on pre-determined time intervals to reduce the likelihood of functional failure, does not vary with energy production or run time and should be considered a fixed cost.

Routine inspections and performance monitoring during operations are performed regardless of energy production or run-time and should be considered a fixed cost. Maintenance work identified during such inspections should be considered variable.

Variable Operations

In addition to consumables, there may be other costs that are incurred only when a plant is operating that could be considered variable operations costs (e.g., production-based fees associated with permits or licenses, or supplemental labor cost in support of plant operations).

Other Maintenance - Variable

Maintenance costs are not typically defined by the granularity of energy markets (day-ahead, hour-ahead, 15 minute, 5 minute), so defining them as “short-run” or “long-run” is not particularly relevant. It may be helpful to discuss maintenance costs in terms of corrective, preventive, and predictive maintenance and consider the drivers of those costs to determine what should be considered variable or fixed. Some maintenance costs (e.g., straight time labor) are unrelated to production. But other maintenance costs, such as repairing broken equipment (wear & tear and/or functional failures), are incurred only because a plant has operated, so are related to energy production and should be included in variable cost.

Corrective maintenance, which is work that is performed to restore performance or function after a failure has occurred, should be also considered a variable maintenance cost, because these expenditures would not be incurred if the plant had not operated.

Predictive maintenance should also be considered a variable maintenance cost. Predictive maintenance is work performed based on the results of inspection or performance monitoring to reduce the likelihood of functional failure. It is performed when functional deterioration is identified in order to maintain equipment performance and/or function.

Major Maintenance

The definition of major maintenance offered by CAISO in the Variable Operations and Maintenance Cost Definitions Report mentions only the prime mover (such as an engine or turbine), which is only a portion of the equipment that requires routine maintenance and prolonged outages. This is a significant limitation on costs related to run-hour production or startup of the unit. Examples of other equipment that should be considered for major maintenance costing include electrical generators, steam boilers, condensers, cooling towers, fuel handling/forwarding equipment, exhaust gas clean-up systems, and dams and waterways. Please align the written definition of major maintenance with Appendix A.

- 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)?**

The existing hydro category could be broken into Run-of-River hydro (no reservoir impoundment), Storage hydro (with reservoir impoundment), and Pumped Storage. Recommended default VOM adders may be useful to market participants, or market participants can negotiate specific default energy bids for particular plants if they deem it is necessary.

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

PSE appreciates CAISO's efforts to address the feedback that stakeholders provided about the Nexant report published in December 2018, and looks forward to working with CAISO and the other stakeholders as this initiative moves forward.

Additional comments

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

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	Guide, journal, or thrust bearing work should be considered Major Maintenance, accessory equipment bearings should be considered Other Maintenance - Variable.
2) Communication Systems	Agree
3) Distributed Control Systems	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
4) Exciter Water Wheels and Turbines	Agree
5) Generator Cooling System	Agree
6) Generator Field Rewinds	Agree
7) Lubricating Systems	Agree
8) Main Penstock Valves and Appurtenances	Agree
9) Main Turbines and Water Wheels	Depending on the scope of work, this work could be Major Maintenance, Other Maintenance – Variable. For example, cavitation repairs on a turbine runner (water wheel) should be considered Other Maintenance – Variable, while Seal Ring repairs should be considered Major Maintenance.
10) Plant Electrical Systems	Depending on the scope of work, this work could be Major Maintenance, Other Maintenance – Variable, or Fixed.
11) Runner Seals	Agree
12) Servomotors	Agree
13) Shaft Sleeves and Seals	Agree
14) Valves	Depending on the scope of work, this work could be Major Maintenance, Other Maintenance – Variable, or Fixed.
15) Wicket Gate Seals	Re-title this to “Wicket Gates, Seals, Bushings, and Face Plates.” Agree
Other	
16) Balance-of-Plant	Depending on the component, this work could be Major Maintenance, Other Maintenance – Variable, or Fixed. For example, work on the fire

	protection system should be considered Fixed, while work on the flowline isolation valves or flow measurement systems should be considered either Major Maintenance or Other Maintenance – Variable.
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Materials	
17) Instruments	Agree
18) Safety Equipment	Agree
19) Shop Supplies	Agree
20) Tools	Agree

Other Maintenance Activities for CAISO Consideration	
21) Governor and Hydraulic systems	This work should be considered Major Maintenance
22) Transformer	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable. For example, replacement of a bushing should be considered Major Maintenance. Replacement of a cooling fan should be considered Other Maintenance – Variable.
23) Dams & Waterways	This work should be considered Major Maintenance
24) Distributed Control Systems	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable
25) Alignment Checks	Turbine-generator alignment should be considered Major Maintenance, accessory equipment alignment should be considered Other Maintenance - Variable.
27) Device Calibrations	This work should be considered Fixed Maintenance.
28) Pumps & Motors	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable. For example, maintenance on the Governor hydraulic pump or motor should be considered Major Maintenance. Replacement of an air compressor should be considered Other Maintenance – Variable.
29) Vibration Analysis Monitoring	This work should be considered Fixed Maintenance
30) Relay Cleaning	This work should be considered Other Maintenance – Variable.
31) Spiral Case, Draft Tube, Head Cover	This work should be considered Major Maintenance.