



Stakeholder Comments Template

Variable Operations and Maintenance Cost Review Working Group – Gas Resources

This template has been created for submission of stakeholder comments on the VOM Cost Review working group for gas resources that was held on July 15, 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 26, 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>July 26, 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 gas-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

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 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 “Combined Cycle and Steam” or “Combustion Turbine & Reciprocating Engine” categories currently found in the CAISO BPM for Market Instruments be further disaggregated into sub-categories (e.g. CC H Frame, CC F Frame, E Class CT, H Class CT)?**

The existing categories of combined cycle and combustion turbine are sufficient. 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) Air Heater/Pre-Heater	Agree
2) Alignment Checks	Turbine-generator alignment should be considered Major Maintenance, accessory equipment alignment should be considered Other Maintenance - Variable.
3) Battery System	Agree
4) Bearings	Turbine-generator bearings work should be considered Major maintenance, accessory equipment bearings should be considered Other Maintenance - Variable.
5) Boilers, Burners, and Related Items	Agree
6) Borescopes	Borescopes are simply tools used for inspection. Consider this to be Other Maintenance – Variable.
7) Casings, Shells, and Frames/Diffusers	There is almost nothing that can be done on these components not requiring an lengthy outage. Work on these components should be considered Major Maintenance.
8) Combustion Turbine Generator Evaporative Cooling System	Agree
9) Combustion Turbines and Related Items	Note that some work can be done with the turbine in operation, while other work requires an outage. Depending on the scope of work, this activity could be considered Major Maintenance or Other Maintenance – Variable.
10) Compressor, Generator, and/or Turbine Rotors	Agree
11) Condensers and Evaporators	Agree
12) Communication Systems	Agree
13) Compressor Blades	Agree
14) Compressor Wash System	Agree
15) Condensate Systems	Depending on the scope of work, this work could be considered Major Maintenance or Other Maintenance – Variable.
16) Clutches and Gears	Agree
17) Cooling Tower Equipment	Depending on the scope of work, this work could be considered Major Maintenance or Other

	Maintenance – Variable. For example, replacement of cooling tower fill or a fan gearbox should be considered Major Maintenance.
18) Demineralization Systems	Depending on the scope of work, this work could be considered Major Maintenance or Other Maintenance – Variable. For example, replacement of resin beads should be considered Major Maintenance.
19) Device Calibrations	Agree
20) Distributed Control Systems	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
21) Duct Burner and Liners	Agree
22) Emissions Control Equipment Repairs	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
23) Emissions Monitoring Tests	Agree
24) Filters	Agree
25) Fuel Metering Equipment	Agree
26) Fuel Treatment System	Agree
27) Generator Field Rewinds	Agree
28) Heat Transfers	Not certain what components or systems this refers to.
29) High Energy Piping	Agree
30) Hot Gas Paths	Agree
31) Hot Sections	Agree
32) Hotwell and Related Items	Agree
33) Instrument and Service Air and Water Supply Systems	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
34) Main Steam Piping	Agree
35) Nozzle Block	Agree
36) Oil Changes	This work should be considered Major Maintenance given the expense and lengthy outage required.
37) Oxygen Boiler	Not certain what components or systems this refers to.
38) Plant Electrical Systems	Depending on the scope of work, this work could be Major Maintenance, Other Maintenance – Variable, or Fixed.
39) Pumps & Motors	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable. For example, replacement of the cranking motor or ID/FD fan motor should be considered Major Maintenance. Replacement of

	an inertial separator fan should be considered Other Maintenance – Variable.
40) Radial and Axial Clearance Checks	This work should be considered Major Maintenance given the complexity and lengthy outage required.
41) Seals	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
42) Steam Drum and Related Items	This work should be considered Major Maintenance given the complexity and lengthy outage required.
43) Tubes and Piping	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
44) 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.
45) Turbine Blades and Diaphragms	Agree
46) Turbine Lube Oil Sampling	Agree
47) Turning and Ratchet Gear Maintenance	Agree
48) Valves	Depending on which valves and the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
49) Vibration Analysis Monitoring	Agree
50) Water Circuits	Not certain what components or systems this refers to.
51) Waterbox	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.

Cleaning	
52) Boiler Cleaning	Agree
53) Chemical Cleaning	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
54) Heat Transfer Cleaning	Depending on the scope of work, this work could be Major Maintenance or Other Maintenance – Variable.
56) Hydro-Blast Cleaning	Agree
57) Relay Cleaning	Agree

Testing	
58) Hydrogen Embrittlement Testing	Agree

59) Non-Destructive Testing	Agree
60) Performance Testing (Oxygen Boiler Tests, On-Line Testing, Pre-Air Heater Test)	Generally agree. Not certain what components or systems "Oxygen Boiler" refers to.
61) Relay & Interlock Testing	Agree

Other	
62) 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 fuel gas compressors should be considered either Major Maintenance or Other Maintenance – Variable.
63) Distributed Control System Upkeep	Agree

Materials	
64) Instruments	Agree
65) Safety Equipment	Agree
66) Shop Supplies	Agree
67) Tools	Agree