## Phase 2 Ex Ante Review Findings

### Table 1-1: Project Information

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|---|---|
| **IOU** | PG&E |
| **Application ID** | 1433-01 |
| **Application Date** | TBD |
| **Program ID** | PGE2223 |
| **Program Name** | Heavy Industry Energy Efficiency Program |
| **Program Year** | TBD |
| **Itron Project ID** | X183 |
| **IOU Ex Ante Savings Date** | 8/16/12 |
| **ED Measure Name** | Install new bladder tank |
| **Project Description** | Install vapor bladder tank to reduce vapor combustion unit cycling |
| **Date of ED Review(s)** | 8/28/2012, 1/11/2013 |
| **Primary Reviewer and Firm** | Keith Rothenberg/Energy Metrics |
| **Review Supervisor and Firm** | Joseph Ball/Itron |
| **Type of Review (Desk, On-site, Full M&V, Tool)** | Desk |
| **ED Recommendation** | Ex ante savings estimates are not approved, ED will continue to review the project pending fulfillment of data request for more information. |

## Measure Description

The application documents the installation of a 110,000 $ft^3$ vapor bladder tank to reduce vapor combustion unit (VCU) cycling. According to the documentation, vapor is collected from a tank farm and from a shipping dock. This project involves eliminating the combustion of vapor from the tank farm by installing a bladder tank that can contain the tank vapor as the ambient air temperature increases. Vapor in the bladder tank will return to the tanks in the tank farm as the ambient air temperature decreases and vapor pressure decreases. Currently when the vapor system reaches a defined set point, the VCU cycles on and burns the vapor to reduce vapor system pressure. According to the documentation, the VCU consumes natural gas during its start up phase to heat the combustor to 1,400 ºF. Vapor collected from the shipping dock will not be connected to the bladder tank.

The application documents 735,715 annual therms savings with an incentive of $738,715.

## Summary of Review

This document is ED's second ex ante review for this project. ED initially reviewed the project in August 2012. ED performed an ex ante review and requested additional information from the IOU regarding the project. Responses were received in September 2012. ED discussed the project with the IOU and third party (3P) implementer in October 2012 and requested additional information for the project in a data request. ED was concerned about free ridership issues considering that the customer's consultant's report stated that the proposed project "was studied and found to be a good solution to prevent BAAQMD permit violations".

ED requested additional information including that the IOU provide a detailed M&V plan for the project. The IOU has submitted a proposed M&V plan based on a regression analysis. ED has reviewed the regression analysis provided by the IOU. ED has found that the proposed regression model for the measurement and verification of the project impacts is inadequate. The M&V plan is not approved.

ED requests that the IOU provide more details regarding the customer's operations so that ED can better comprehend the important variables required to construct a regression model.

ED requests that the IOU revise and resubmit the M&V plan and also provide additional information for this project.

## Review Conclusion

The ex ante energy savings could not be validated and are not approved pending additional information from the IOU. ED will perform a net to gross review for this project.

## Summary of ED Requested Action by the IOU

In order to complete an ex ante review the ED recommends that the IOU submit the following documentation due on *1/29/2013* (14 days from submittal date to IOU):

1. Gas valve position data file: (0020 is ship dock, 0304 is valve at VCU)

(Excel workbook file: 1433-01 XXXXX calcs QC KD)

A. Explain why the data have been provided in 7.1 day intervals.

B. Explain what "Null" means in column B.

C. Are gas valve position data available in other intervals, i.e. daily? Are natural gas usage data available in other intervals, such as daily or are pulse data available?

D. Please explain what the gas valve data (PCV0020 %-% Open, PCV0304 % Open) represent:
i. Does the data provided depict the average values over the 7.1 day time increments or the instantaneous values at the time stamp?
ii. Does the data provided depict a) the actual position of the valve (this would require a feedback loop in the control system), (b) the position the valve is being commanded by the control system based on satisfying other control parameters, or c) something else?

E. Data tag name is "valve % open". ED notes that most valves do not have a linear relationship between % open and flow rate, and that the % open may not be an accurate representation of the volume of natural gas consumed by the system or the relative volume of gas passing through each of the two valves. Discuss how this might influence the accuracy of the analysis.

F. The project documentation states that gas valve 0304 is located at the VCU and gas valve 0020 is located in the vapor collection system from the ship dock. Also implied is that natural gas is mixed directly with the vapor collected from the ship dock and then combusted in the VCU, where natural gas is directly combusted in the VCU when vapor from the tank farm is being combusted in the VCU. Explain the difference in treatment of the two vapor sources and describe what control parameters are used to determine the position of each gas valve.

2. Shipping data:

Excel workbook file (1433-01 Utility Product Data Analysis).

A. ED requests that the IOU provide more details regarding the customer's operations so that ED can better comprehend the important variables required to construct a regression model. Does the customer both export and import product through pipeline networks and by ships, or by ships only.

B. The data used in the regression analysis appear based on the various products loaded and unloaded on ships. Please explain how this is representative of the inventory in the tank farm. If this customer is involved in the transportation of petroleum products by both ship and pipelines the tank inventory may be changing frequently i.e. product received by ship may be distributed from the tanks into pipelines in the customer's network. Please advise if this is accurate? Discuss the average duration of storage in the tank farm for typical products.

C. Considering that there appear to be several other important factors associated with the operation of the vapor system and VCU, discuss how shipping data and monthly total billing therm data alone are representative of the inventory in the tanks at any given time and related to the generation of VOC's collected in the vapor system.

D. What does Y* mean in column L of the "Customer Supplied" Tab of the Excel workbook file

E. Explain what the hours are in column N the "Customer Supplied" Tab of the Excel workbook file

3. IOU Submitted Regression analysis

A. ED has reviewed the regression analysis provided by the IOU. ED has found that the proposed regression model for the measurement and verification of the project impacts is inadequate.

B. The IOU proposed model is based on 7 observations. 7 observations are too few for the regression analysis. There are 5 degrees of freedom (DOF) for the proposed model, and no inferences can be drawn from the regression results. In ED's experience, to make any inference from a regression model, a minimum of 20 DOF are required. That is, the sample should include at least 22 observations.

C. ED requests that the IOU explain why the model is based on only 7 binned observations and why monthly data or other more granular data were not used for the analysis. More granular data would provide more variation in the model.

E. ED notes that either daily or pulse gas meter consumption data are likely available for this customer and could possibly be used to enhance the model.

F. ED requests that the IOU explain why it is not using the regression model to construct the baseline, since it is not clear whether the natural gas usage would be the same between the two valves when open.

G. ED recommends collecting either 1) more monthly data for the regression analysis- at least 5 additional months of gas valve position data, shipping data, and gas consumption data up to the end of 2012 - using the gas meter read date information to match the natural gas usage better to the valve open data; or 2) daily or pulse natural gas consumption data, sum up to the same intervals as the valve operation data for the analysis, and analyzing the project in shorter time intervals such as weekly or daily (if daily valve operation data are also available).

H. Documentation provided by the IOU indicates that the amount of VOCs generated is sensitive to ambient temperature. ED requests that the IOU explain why temperature is not considered in the regression model. If the weather data are added to the model, ED recommends including both the weather variable and the interaction of weather variable with the controlled product loading.

I. Please provide a 90% confidence interval (CI) of the predicted natural gas usage by valve #0020 from the regression model, and if possible, for other non-valve usages, as well.

J. If data are adequate, please consider using heteroskedasticity robust standard errors.

K. ED requests that the IOU revise the regression model based on the suggestions above. The revised model should be resubmitted for ED review and include:

i. T tests for the model, reporting the statistical significance of the relationship of the variables used in the model.
ii. R-square for the model measuring the goodness-of-fit.

L. If simple ordinary least squares (OLS) standard errors are used instead of the heteroskedasticity standard errors, please include Breusch-Pagan test for the heteroskedasticity standard error assessment.

4. Additional ED requests:

A. Provide the EUL for the project.

B. ED requests that PG&E continue to keep ED informed of progress and next steps on this project.

C. ED requests to be informed of any future site visits including the post-installation inspection, in case it chooses to send a representative on-site.

D. ED requests the opportunity to review the requested data, analysis and calculations prior to the freezing of ex ante savings impacts for this project.

**Table 1-1: Project Overview**

| Description | IOU Proposed Ex Ante Data | ED Recommendations |
|---|---|---|
| **Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)** | Add-on Measure. | Approved |
| **Project Cost Basis (Full Cost, Incremental Cost)** | Full cost | Approved |
| **RUL (Early retirement projects only, otherwise N/A (not applicable))** | NA | NA |
| **EUL** | TBD | TBD |
| **First Year kWh Savings** | 0 | TBD |
| **First Year Peak kW Savings** | 0 | TBD |
| **First Year Therms Savings** | 735,715 | TBD |
| **kWh Savings (RUL Period)** | NA | TBD |
| **Peak kW Savings (RUL Period)** | NA | TBD |
| **Therms Impact (RUL Period)** | NA | TBD |
| **kWh Savings (EUL thru RUL Period)** | NA | TBD |
| **Peak kW Savings (EUL thru RUL Period)** | NA | TBD |
| **Therms Savings (EUL thru RUL Period)** | 735,715 | TBD |
| **Annual Non-IOU Fuel Impact (RUL Period)** | NA | NA |
| **Annual Non-IOU Fuel Impact (EUL thru RUL Period)** | NA | NA |
| **Net-to-Gross Ratio** | Not provided | Assessment not completed |

### Table 1-2: Detailed Review Findings

| Reviewed Parameter | Analysis |
|---|---|
| **Project Gross Savings Baseline (**for early retirement projects only, include RUL through EUL baseline) | IOU Proposal: in situ |
| | ED Assessment: Correct |
| | ED Recommendation: Approved |
| **Project Cost Basis (**for early retirement projects only, include RUL through EUL cost basis treatment) | IOU Proposal: Full cost |
| | ED Assessment: Full cost is appropriate for add-on measures. |
| | ED recommendation: Submit final cost documentation for ED review after the completion of the project. |
| **RUL** (required for early retirement projects only, otherwise n/a) | IOU Proposal: NA |
| | ED Assessment: NA. |
| | ED recommendation: NA |
| **EUL** | IOU Proposal: TBD |
| | ED Assessment: TBD |
| | ED Recommendation: TBD |
| **Savings Assumptions** | IOU Proposal: Regression model |
| | ED Assessment: Refer to comments above. |
| | ED Recommendation: Model not approved. |
| **Calculation Methods/Tool review** | IOU Proposal: Regression model. |
| | ED Assessment: Refer to comments above. |
| | ED Recommendation: Model not approved. Additional work is required to improved the model and validate if it is an acceptable approach |
| **Pre- or Post-Installation M&V Plan** | IOU Proposal:<br>Based on regression model. |
| | ED Assessment: IOU needs to improve the4 model in accordance with comment s above in “Summary of Requested Action by IOU”. |
| | ED Recommendation: Model not approved. |
| **Net-to-Gross Review** | IOU Proposal: Not addressed |
| | ED Assessment: TBD |
| | ED Recommendation: TBD |