

Phase III Ex Ante Review Findings

Table 1-1: Project Information

IOU	PG&E
Application ID	1440-13-1237 (formerly 1261-12-860)
Application Date	11/5/2012
Program ID	PGE23036
Program Name	Comprehensive Food Process Audit & Resource Efficiency Program
Program Year	2014
Itron Project ID	X239
IOU Ex Ante Savings Date	5/19/2014
Staff Measure Name	Compressed Air System Modifications
Project Description	Install new air compressor trim station (one 350 HP and one 397 HP air compressor with a VFD), compressor controls, two new air dryers, two 5,000 gallon air receivers, a pressure flow controller and four no loss condensate drains.
Date of CPUC Staff Review	2/7/2013, 6/13/2014, 9/12/2014
Primary Reviewer / Firm	Keith Rothenberg/Energy Metrics
Review Supervisor / Firm	JJ Hirsch & Associates
CPUC Staff Project Manager	[REDACTED]
CPUC Staff Policy Authorization (as needed)	
Type of Review (Desk, On-site, Full M&V, Tool)	Desk
CPUC Staff Recommendation	This project was previously approved for classification as early retirement with an RUL of 4.33 years and a EUL of 13 years. A NTG was previously approved at 1.0. The ex ante savings estimates are approved by this disposition at the Commission staff calculated values of 1,652,321 kWh and 211.5 kW for the RUL period and 329,795 kWh and 42.6 kW for the EUL-RUL period. An approved project TRC project cost for incentive limiting purposes is set by this disposition at \$309,029 using initial and incremental costs of \$939,951 and \$71,235

Phase III Ex Ante Review Findings

	respectively. The IOU should resubmit the installation report showing the approved ex ante values.
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Measure Description

The project included the following measures:

- Replace two air compressors with a new air compressor trim station which includes one 350 HP oil flooded rotary screw air compressor and one 397 HP oil flooded rotary screw air compressor with a VFD.
- Install sequencing controls for the two new compressors,
- Replace two air dryers with two new air dryers (air dryer description not provided),
- Replace air receivers with a two new 5,000 gallon receivers.
- Install a pressure flow controller
- Install four no loss condensate drains.

Summary of Review

The Investor-Owned-Utility (IOU) submitted the following documents on 8/15/2014 for this Phase III review:

- CR_1440-13-1237_Completion Report_Rev9.docx'
- CR_1440-13-1237_EE_Results_Calcs_Rev9.xlsx,
- [Customer Name] - 1st Baseline Model.mdb,
- [Customer Name] - 2nd Baseline Model.mdb,
- [Customer Name] memo for May 9th supplemental data.docx,
- [Customer Name] usage data.pdf
- CPC_1440-13-1237_Signed.pdf,
- Customized Measure EUL v23.0 02-10-14.xlsx,
- Invoices_1440-13-1237_C&H.pdf,
- M&V Report Review - 1440-13-1237 [Customer Name] rev 2014.05.19.docx,
- MD Brochure # 2935-0345-10.pdf,
- X239_EAR PGE_FPP 1261-12-678 2013_0215 ver 1 (2) (5).docx,
- X239_Phase II EAR PGE_FPP 1440-13-1237.pdf,
- ZEKs 75-19200 Non-Cycle Dryers (Oct 2012).pdf

The IOU documents were revised in response to the Phase II ex ante review provided to the IOU on 6/19/2014. In the Phase II review, Commission staff representatives noted that the IOU had not followed the M&V plan and calculation methodology guidance provided by Commission Staff in December 2012. The Commission staff M&V plan and calculation methodology

guidance were acknowledged by the IOU in February 2013, before the project installation commenced.

In the Phase II ex ante review, Commission staff reviewers calculated the ex ante impacts for the project using the calculation methodology guidance provided by Commission staff for the project and data collected by the IOU. The detailed analysis is described in the Phase II ex ante review document and the associated MS Excel Spreadsheet file named “CR_1440-13-1237_EE_Results_Calcs_Rev4 CS Review 2014_0609.xlsx”. This spreadsheet includes the post installation data and analysis previously submitted by the IOU with three additional spreadsheet tabs containing Commission staff reviewer’s analysis added to the spreadsheet. The Commission staff estimate of the project RUL period impacts is 1,652,321 kWh annual energy savings with a peak demand reduction of 211.5 kW. In its most recent submission, the IOU estimates the project RUL period impacts to be 2,426,831 kWh annual energy savings with a peak demand reduction of 259.77 kW with an incentive of \$244,392.

The IOU Program Manager requested that Commission staff participate in a phone call with the IOU and the implementer to review IOU’s 8/15/2014 documentation submission. The phone call was held on 8/26/2014. During the phone call, Commission staff requested that the IOU explain the resubmitted calculation methodology. The IOU responded that the revised ex ante calculation approach for the RUL period, subtracted the post installation measured electric compressor power from baseline measured electric compressor power making several adjustments for various parameters and annualizing the result. Some of the adjustments made included:

- removing the energy usage of the base-loaded air compressor from the calculations since its energy use was not included in the post project analysis;
- adjusting for observed difference in air flow between the pre and post project analysis where the pre project air flow was approximately 20% greater than the post project airflow;
- accounting for the baseline and post project air dryer energy usage;
- and adjusting the claimed airflow reduction of 200 cfm due to the installation of four no loss air drains to be in alignment with the agreed upon values based on PG&E’s air compressor savings analysis tool.

An alternative ex ante savings methodology is also described in the IOU documents which yield a similar project impact result.

Commission staff has found that the IOU has not followed the guidance provided for calculation methodology for the project. The calculation methodology used by the IOU in its most recent

submission is not approved for this project and further, is inappropriate for most projects of this type. Complex systems with numerous interactive parameters require a more direct measurement and analysis approach. Subtracting the measured post project power from the measured pre-project power, is inappropriate.

As noted in the Phase II ex ante review, the IOU missed a significant opportunity to more accurately establish the baseline for this project by not measuring the electric compressor power after the flow measurement equipment had been installed, and before the remainder of the project was implemented. From the Phase II ex ante review dated 6/19/2014:

“For this project, the implementer measured the electric power on three compressors for one week and used a simulation to estimate the air flow associated with the power consumption. Based on Commission staff’s request, the implementer installed air flow metering as the first phase of the project to establish the baseline operation of the steam turbine driven compressor. The project could have been further enhanced at this point by installing power data loggers on the electric compressors for a four week or more period to more accurately establish the baseline specific power which is one of the most important parameters in the analysis of this project.”

In the Phase II ex ante review, Commission staff requested that the IOU provide savings estimates for the project EUL-RUL (post-RUL) period. The proposed impacts for the EUL-RUL period are not clear in the IOU documentation. Commission staff has used the AIRMaster+ analysis provided by the IOU in its recent submission for the EUL –RUL period. The second baseline specific power was calculated from the AIRMaster+ analysis to be 0.185 kW/CFM. The estimated the EUL-RUL period impacts for the project to be 329,795 kWh annual energy savings with a peak demand reduction of 42.6 kW, using a similar approach to that used by Commission staff to estimate the RUL period impacts. Please refer to the associated MS Excel Spreadsheet file named “CR_1440-13-1237_EE_Results_Calcs_Rev4 CS Review 2014_0912 EUL-RUL.xlsx” and the Phase II ex ante review document “X239_Phase II EAR PGE_FPP 1440-13-1237.pdf”, dated 6/19/2014

Exhibit 1 below summarizes the Commission staff reviewer’s estimated savings impacts and the IOU reported savings impacts. Commission staff estimate the project RUL period impacts to be 1,652,321 kWh annual energy savings with a peak demand reduction of 211.5 kW. The IOU estimates the project RUL impacts to be 2,426,831 kWh annual energy savings with a peak demand reduction of 259.77 kW. The difference in the ex ante annual energy savings estimates calculated by the IOU and the Commission Staff reviewer are 32% which is greater than 20%, therefore the Commission Staff reviewer estimates are the approved values for this project.

Exhibit 1 Summary of Commission Staff Estimated RUL Period Ex Ante Savings Impacts:

Ex Ante Savings Impacts	kW	kWh
New Compressors, sequencing controller, pres./ flow controller, air pressure reduction	166.22	1,286,403
No Loss Drains	0.9	7,819
Artificial Demand Reduction	28.7	222,131
Air Dryers	15.7	135,968
Total Commission Staff Estimated Ex Ante Impacts	211.5	1,652,321
IOU Claimed Impacts	259.8	2,426,831
Difference	(48.3)	(774,510)
% Difference	-19%	-32%

Review Conclusion

The ex ante savings estimates are approved at the Commission staff estimated values of 1,652,321 kWh annual energy savings with a peak demand reduction of 211.5 kW for the RUL period; and 329,795 kWh annual energy savings with a peak demand reduction of 42.6 kW for the EUL-RUL period.

In the Phase II ex ante review, Commission staff requested that the IOU ensure that the project incentive does not exceed the TRC cost. The methodology for calculating the TRC project cost was provided in the Phase II EAR. The IOU did not provide this calculation. The IOU established the EUL for the project as 13 years based on the SCE document, Customized Measure EUL v23.0 02-10-14. The IOU, in the absence of better information then followed Commission staff recommendation and estimated the RUL as 1/3 of EUL. The RUL was set at 4.33 years. Commission staff has calculated the TRC cost for this project using an RUL of 4.33 years, a discount rate of 7.66%, a full cost of \$939,951 and an incremental cost of \$71,235. The TRC cost for this project is \$309,029 calculated as detailed below.

TRC cost = $PC - ((PC-INC)/(1+D)^{RUL})$, where PC=project total cost, INC=incremental cost over code/ISP, D=discount rate, and RUL is the remaining life of early retired equipment.

TRC cost = $\$939,951 - ((\$939,951 - \$71,235)/(1+7.66\%)^{4.33})$

TRC cost = \$309,029.

The IOU should resubmit the installation report to reflect all the approved ex ante parameters including the savings impacts approved in this disposition and ensure that the incentive does not exceed the TRC cost.

Summary of CPUC Staff Requested Action by the IOU

CPUC Staff requests that the IOU undertake the recommended steps and submit the following information **due on 10/1/2014** (or 14 days from submittal date to IOU):

For this project, Commission staff request that the IOU:

1. Resubmit the installation report to reflect the Commission staff approved ex ante savings impacts, the TRC cost for the project, and ensure that the incentive does not exceed the TRC cost.
2. After submission of the reviewed installation report, schedule a meeting with Commission staff, the IOU Program manager and IOU reviewer to discuss the Commission Staff's comments on this project and how to avoid similar issues on future projects whether they are selected by Commission staff for ex ante review or not selected for ex ante review. Commission staff request that several members of the IOU reviewer's staff participate in this meeting so that they can benefit from the discussion, and avoid similar issues on the projects that they are responsible to review.

For all future projects (submitted after receipt of this review) Commission staff requires that the IOU:

1. In the phase II ex ante review, Commission staff required that the IOU “Provide precise step-by-step calculation methodology and equations proposed to be used to estimate the ex ante impacts for each custom project with detailed descriptions associating the proposed methodology with specific equipment and systems affected by the project. Provide system diagrams to facilitate the review of the project. The energy savings principle for each measure should be discussed. The calculation methodology description should be comprehensive and complete leaving only the final verified variables and data to be determined after project completion. All that should be required after the project is completed is to input final project post verified data and assumptions into the proposed formulae to determine the ex ante impacts. Generic methodology lacking such detailed specific associations is not acceptable.”

The recent documentation submission for this project has failed to address this requirement. The calculation methodology is difficult to follow, the equations used to calculate the project impacts are not provided, and there are simply references to cells in spreadsheets such as “See Cell B54 on tab Energy Savings Summary”. As noted in the Phase II ex ante review, “For this project, Commission staff found that the savings analysis required reviewers to hunt through numerous documents and analysis spreadsheet cells to investigate the ex ante savings impacts. This is not acceptable.”

2. Where M&V is proposed, the M&V plan should provide concise descriptions including measurement points, measurement period, measurement interval, measurement equipment, system diagrams, discussion of the accuracy measurement equipment and uncertainty associated with the results. For most projects, calculation methodologies with M&V plans which propose subtracting the measured post project energy use from the measured pre-project energy use, making adjustments based on various assumptions and annualizing the result are inappropriate. M&V plans for complex systems with numerous interactive parameters require a more direct measurement and analysis approach.

For this project, Commission staff required that an analysis of the specific power be used as the basis for all measures impacting system efficiency improvements. The IOU acknowledged this requirement before the project commenced. Most of the impacts associated with this project are compressed air system efficiency improvements. The IOU did not follow this guidance, and in the original post installation documentation submitted for Commission staff review did not explain that the guidance was not being followed, or why it was not being followed. For all future projects, the IOU should be

diligent in following Commission guidance, seeking clarification where guidance is unclear, and not deviate from guidance without approval from Commission staff.

3. In the Phase II ex ante review, Commission staff required that the IOU “Provide the cost basis for the EUL-RUL period and ensure that the TRC project cost limit for early retirement projects is calculated based on the Commission Decision requirements for dual baseline projects¹. If PC=project total cost, INC=incremental cost over code/ISP, D=discount rate, and RUL is the remaining life of early retired equipment, then the TRC cost at time of project installation is: $TRC\ cost = PC - ((PC-INC)/(1+D)^{RUL})$.” The IOU did not calculate the TRC cost, to ensure that the proposed incentive does not exceed the TRC cost. For all future dual baseline projects, the documentation should include a calculation of the TRC cost.

¹ Decision 12-05-015 at 349 states: “The measure or project cost utilized in an early-retirement case is the full cost incurred to install the new high-efficiency measure or project, reduced by the net present value of the full cost that would have been incurred to install the standard efficiency second baseline equipment at the end of the remaining-useful-life period. Thus, the early-retirement cost is higher than the incremental cost used in a replace-on-burnout or normal-replacement case, only by the time value of the dollar amount of the standard equipment full installed cost, using our adopted cost-effectiveness discount rate to calculate that time valuation. As with all measures, our policy expects that incentives offered for early retirement will not exceed the actual early retirement cost.”

Table 1-3 Energy Savings Summary, Project Costs & Incentive

Description	IOU Ex Ante Claim	CPUC Staff Recommendations
First Year kWh Savings	2,426,831	1,652,321
First Year Peak kW Savings	259.77	211.5
First Year Therms Savings	0	0
kWh Savings (RUL Period)	2,426,831	1,652,321
Peak kW Savings (RUL Period)	259.77	211.5
Therms Impact (RUL Period)	0	0
kWh Savings (RUL thru EUL Period)	Unclear	329,795
Peak kW Savings (RUL thru EUL Period)	Unclear	42.6
Therms Savings (RUL thru EUL Period)	0	0
Annual Non-IOU Fuel Impact (RUL Period)	NA	NA
Annual Non-IOU Fuel Impact (RUL thru EUL Period)	NA	NA
Project Costs for Baseline #1 (RUL or EUL)	\$939,951	\$939,951
Project Costs for Baseline #2 (EUL minus RUL period)	\$71,235	\$71,235
Project Incentive Amount	\$244,392	TBD