Phase 1 Ex Ante Review Findings

Table Error! No text of specified style in document.**-1: Project Information**

IOU	PG&E
Application ID	Ecos 295
Application Date	TBD (Audit report dated 10/8/2012)
Program ID	PGE2224
Program Name	Industrial Compressed Air
Program Year	2012
Itron Project ID	X217
IOU Ex Ante Savings Date	11/20/12
ED Measure Name	Compressed Air Retrofit
Project Description	Compressed air system modifications
Date of ED Review(s)	11/30/12
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	The project is conditionally approved, pending ED pre-installation inspection, post-installation measurement and verification (M&V) and fulfillment of the data request for more information. Ex ante savings estimates will be determined based on M&V.

Measure Description

Install a new 200 HP, two stage oil-free rotary screw variable frequency drive (VFD) controlled air compressor, replace two heatless desiccant dryers with two heated purge desiccant dryers. The new VFD compressor will be operated as the plant's "trim" air compressor.

Summary of Review

ED selected this project for ex ante review in October 2012. The IOU provided documentation for the project in early November 2012 and requested that ED expedite the review of the project. In order to expedite review of the project, ED representatives have been working directly with the IOU and the 3rd party program (3PP) implementer through email correspondence and phone conferences to clarify the project scope, review the IOU calculations and discuss other matters pertinent to the project. The IOU has provided additional information and updated calculations for the project as part of this process.

ED reviewed the supplied information including the IOU's draft and final pre-installation calculations, the project audit report, and pre installation monitoring data provided by the IOU including 7 days of air compressor amperage monitoring and system pressure data. ED performed independent calculations to estimate the project baseline system specific power (kW/100 CFM). ED's estimate of the project baseline system specific power is significantly different than the estimate of the project baseline system specific power calculated by the IOU's Compressed Air Analysis tool. However ED's estimate of the project baseline system specific power is nearly identical to the estimate of the project baseline system specific power calculated from the analysis provided by the IOU's third party implementer. The baseline system specific power values calculated by the IOU calculation tool, the 3PP implementer and ED are summarized in Table 1A below.

Table 1A Summary Of Baseline System Specific Power Values

Calculation-Pre Install	Average kW	Average CFM	kW/100 ACFM	% difference from ED
PG&E Tool	221.3	825.0	26.82	19.8%
3PP Implementer	180.6	824.3	21.91	-2.2%
ED	180.6	806.1	22.40	0%

ED has also reviewed the IOU analysis for the air dryer retrofit. ED obtained data from a manufacturer's catalog for similar capacity air dryers to those proposed for this project and found that the IOU's estimated 2.5% purge rate from the heated dryer and the IOU estimated average 4 kW associated with the heater are lower than those shown in the information ED obtained, 7% purge rate, 7 kW average power consumption.

ED's estimate of the project baseline system specific power and review of heated purge dryer purge rate and power use indicates that the savings estimated by the IOU's compressed air analysis tool are likely overstated (possibly significantly) and will likely result in a reduction in the savings and incentives associated with this project. ED requires that the project ex ante

savings estimates be based on normalized system performance calculated from pre and post installation measurements as described below. Additionally, ED will perform a pre-installation site inspection to verify the current operating parameters for the project.

The application documents an annual savings impact of 493,904 kWh, peak demand reduction of 56.4 kW with an incentive amount of $50,090. The estimated project cost is $166,761.

Review Conclusion

ED will perform a pre-installation site inspection to verify the current operating parameters for the project. The ex ante baseline compressed air system performance estimated by ED (22.40 kW/100 CFM) is conditionally approved as the project baseline system specific power. The post-installation compressed air system performance will be verified by the post-installation M&V. The final ex ante savings estimate will be calculated based upon the post-installation M&V.

The ex ante savings for this project will be calculated using the average pre- and post- project compressed air system efficiency (kW/100 CFM) as calculated from pre- and post-measurements, to determine system efficiency improvements associated with the project. The annual air demand profile will be estimated from the post installation measurements and be used to calculate the annual savings impacts. The compressed air demand reduction measure (installation of heated purge desiccant dryers) will be accounted for separately as shown in the M&V plan below.

The ex ante values for this project will not be frozen until the project M&V is completed.

Summary of ED Requested Action by the IOU

ED requests that the IOU submit the following documentation as it becomes available and take the recommended actions for the ex ante review to be completed in an expeditious manner:

1. Provide site contact information to facilitate ED's pre-installation inspection. ED will perform a pre installation inspection prior to the IOU authorizing the customer to proceed with the installation.
2. Submit comments on ED's draft proposed M&V plan for this project prior to authorizing the customer to proceed with the installation. The M&V plan is included below. The IOU will continue to work with ED to finalize the M&V plan.
3. Provide the RUL for the 200 HP water cooled compressor.
4. Provide the baseline and savings impacts for the EUL-RUL period. ED notes that beginning 1/1/2014, VSD driven compressors may be mandatory under Title 24 for certain applications. This should be considered in the EUL-RUL period baseline.
5. Provide CAGI data sheets for the existing and proposed compressors, and manufacturer data sheets for the existing heatless and proposed heated air dryers showing the average purge rate and average heater kW for the heated dryer.

6. Notify ED a minimum of 2 weeks in advance of any scheduled post implementation data logger installation so that ED can prepare the loggers for installation by the customer or 3PP implementer.
7. Submit the post-installation inspection report, when it becomes available.
8. Provide final cost documentation (itemized paid invoices).

ED is likely to ask for further clarifications and additional information as the details of this project become more clearly defined. ED requests that the IOU:

1. Keep ED informed of the progress and next steps on this project.
2. Inform ED of any future site visits, in case it chooses to send a representative on-site.
3. Provide sufficient opportunity for ED to review the requested data, analysis and calculations prior to the freezing of ex ante savings impacts for this project.

Table 1-2: 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)	Early retirement	TBD
Project Cost Basis (Full Cost, Incremental Cost)	Full cost estimated to be $166,761	TBD
RUL (Early retirement projects only, otherwise N/A (not applicable))	IOU to provide estimated RUL for the 200 HP water cooled compressor.	TBD
EUL	15 years.	Approved
First Year kWh Savings	493,904	TBD
First Year Peak kW Savings	56.4	TBD
First Year Therms Savings	0	TBD
kWh Savings (RUL Period)	TBD	TBD
Peak kW Savings (RUL Period)	TBD	TBD
Therms Impact (RUL Period)	TBD	TBD
kWh Savings (EUL thru RUL Period)	493,904	TBD
Peak kW Savings (EUL thru RUL Period)	56.4	TBD
Therms Savings (EUL thru RUL Period)	0	0
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 1-3: Detailed Review Findings

Reviewed Parameter	Analysis
Project Gross Savings Baseline (for early retirement projects only, include RUL through EUL baseline)	IOU Proposal: Early retirement
	ED Assessment: ED will perform a pre-installation site inspection
	ED Recommendation: TBD
Project Cost Basis (for early retirement projects only, include RUL through EUL cost basis treatment)	IOU Proposal: The total estimated cost has been provided
	ED Assessment: ED will assess the proposed baseline for the project following the pre installation site inspection.
	ED recommendation: TBD
RUL (required for early retirement projects only, otherwise n/a)	IOU Proposal: IOU has claimed early retirement, RUL not provided.
	ED Assessment: TBD
	ED recommendation: IOU to provide RUL for the project.
EUL	IOU Proposal: 15 years
	ED Assessment: Correct.
	ED Recommendation: Approved
Savings Assumptions	IOU Proposal: 7 days of compressor amperage data and pressure data from portable loggers installed by the 3PP implementer were used to estimate the baseline compressed air system energy consumption. The IOU used a customized compressed air calculator to estimate the baseline and post installation compressed air system performance.
	ED Assessment: ED's analysis of the data indicates that the baseline system specific power is significantly lower than that estimated by the IOU's customized compressed air calculator. ED also found that the IOU's estimated purge rate from the heated dryer and the IOU estimated average kW associated with the heater are lower than those shown in the information ED obtained. ED believes that the project impacts will be less than those estimated by the IOU.
	ED Recommendation: The final impacts will be based on the pre and post installation M&V analysis.
Calculation Methods/Tool review	IOU Proposal: The project impacts are calculated using a customized model that was developed by the IOU for specific compressed air project measures.

Reviewed Parameter	Analysis
	ED Assessment: ED has not reviewed this model in detail.
	ED Recommendation: ED will review this model in an effort separate from this project.
Pre- or Post-Installation M&V Plan	IOU Proposal: Post installation data compressor amps and system pressure to be collected.
	ED Assessment: A more robust M&V plan is required. ED is providing a draft M&V plan for the IOU review and comments.
	ED Recommendation: Refer to Draft M&V plan below. IOU to review and comment on ED M&V plan.
Net-to-Gross Review	IOU Proposal: Not addressed
	ED Assessment: TBD
	ED Recommendation: TBD

M&V Plan

PG&E will notify ED with a minimum of 2 weeks advance notice of any scheduled post implementation data logger installation so that ED can prepare the power data loggers for installation by the customer. The customer will provide the amperage and pressure loggers required for the project.

Data Collection:

1. Customer to install amperage data loggers on 4 compressors. Customer to install pressure data logger in same location as was used for the pre installation data collected. Data to be collected in 8 second intervals for 14 days minimum.

2. Customer to install ED supplied power data loggers on air compressors and air dryers.

3. Customer to remove ED supplied power data loggers at the completion of the measurement period. ED will pick up loggers after they are removed.

4. All data to be provided to ED for analysis.

5. Post installation average system performance kW/100 CFM will be determined from post installation measured data using specific power curves for each compressor type.

Ex ante savings calculation:

Compressor system efficiency impacts:
kW savings: (kW/100 CFM_{pre}- kW/100 CFM_{post}) x Average CFM_{post}/100
kWh savings = kW savings x 8,760 hours

Dryer savings:
Purge rate from heatless dryers: 15% of outlet CFM.

Purge rate from heated purge dryers: 7% of outlet CFM.

Purge rate savings: 15%-7%= 8% of outlet CFM

Average CFM reduction from removing heatless dryer: Average CFM_{post}/(1- 0.08)- Average CFM_{post}.

Dryer kW: calculated from measured power data

Average kW impacts: (Average CFM reduction from removing heatless dryer) /100 x (kW/100 Average CFM_{post}) – heated purge dryer kW calculated from data.

kWh: kW x 8,760 hours.

Total savings:
kW: Compressor system kW savings + Dryer kW savings
kWh: Compressor system kWh savings + Dryer kWh savings