

Final Ex Ante Review Findings

Table 1-1: Project Information

PA	PG&E
Application ID	2K1315894C
Application Date	9/23/2013
Program ID	PGE21262
Program Name	University of California/California State University Partnership Program
Program Year	2013
CPUC Staff Project Reference ID	X451
PA Ex Ante Savings Date	11/27/2013
Measure Name	Install laboratory HVAC system controls.
Project Description	Install laboratory HVAC system controls to reduce supply and exhaust air volume during occupied and unoccupied periods.
Date of CPUC Staff Review	12/14/2013, 11/28/14
Primary Reviewer / Firm	Keith Rothenberg/Energy Metrics
Review Supervisor / Firm	JJH and associates
CPUC Staff Project Manager	██████████ / California Public Utilities Commission, Energy Division
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 retrofit add-on (REA). A NTG review has not been performed for this project. The measure EUL for this project is 5 years. The PA is required to revise the documentation to demonstrate that the analysis correctly accounts for the heating penalty associated with reduced HVAC fan energy and the irregular data intervals in the pre and post implementation data. The installation report and calculations should be revised to clearly quantify the heating penalty associated with reduced HVAC fan energy and describe how the irregular data intervals have been adjusted in the analysis. Any adjustments made to the savings

	<p>analysis should be reflected in the final ex ante claim for this project, clearly described in the documentation and uploaded to the CMPA folder for this application.</p> <p>Commission staff waives further review of this project until PA final claim. The PA will upload to the CMPA folder for this project the claim ID number and indicate the quarter claimed.</p>
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Measure Description

The customer installed laboratory HVAC system controls to reduce supply and exhaust air volume during occupied and unoccupied periods. During occupied periods, the level of contaminants in the exhaust air stream is measured and used to control the supply and exhaust air volume. During unoccupied periods, the supply and exhaust air volume are set to a pre-determined minimum.

Summary of Review

The Program Administrator (PA) submitted the following documents for this Final review:

- 2K1315894C Att 1 Aircuity Calc.xlsx
- 2K1315894C Att 2 pre and post-installation trend data.xlsx
- 2K1315894C Att 3 TRC calc check.xlsx
- 2K1315894C Att 4 Invoices and summary.pdf
- 2K1315894C Att 5 ED Checklist.xlsx
- 2K1315894C [CUSTOMER NAME, PROJECT NAME] IR Revr1.xlsx

The PA initially submitted calculation files and the project feasibility study on 11/8/2013. The calculation files provided to CPUC Staff were unreadable. The PA resubmitted the calculation files on 11/14/13. The PA's initial savings impacts were estimated to be 440,146 kWh, 77 kW peak demand reduction and 32,805 therms. CPUC staff noted that savings claim appeared to include electrical energy impacts. CPUC staff also noted that the customer likely purchased electrical energy from a Municipal utility. CPUC staff requested that the PA clarify this issue and submit the PA's review of the project. PA submitted its review of the project on 11/27/13, acknowledging that the customer purchases electricity from a Municipal utility, removing electrical energy savings impacts. The revised PA savings impacts were 0 kWh, 0 kW peak demand reduction and 14,473 therms. CPUC staff reviewed the submitted documentation and requested that the PA clarify if the approved savings impacts include HVAC interactive effects- i.e. HVAC fan energy reduction would increase HVAC heating requirements during heating mode.

A phone call was held to discuss the project on 12/11/2013. The PA agreed to review the savings analysis and determine if the HVAC interactive effects have been properly accounted for and report back to CPUC staff, making adjustments to the analysis as necessary. The PA stated that the project was a fast track project, with the customer planning to implement the measures over the 2013 Christmas holiday break.

Commission staff have reviewed the PA's most recent submission for this project provided on 11/14/2014. The submission includes the installation report for the project, calculations prepared

by the implementer, check calculations prepared by the PA reviewer, pre and post-installation trend data, and invoices for the project.

Documentation provided by the PA indicates that the pre-project system maintained around 11 air changes per hour (ACH) for the labs and 35 fume hoods affected by this project. The post project system utilizes the existing Phoenix controls to modulate the fume hood airflow. The post project system air flow has been reduced to an average of 5.3 ACH during occupied periods and 4.8 ACH during unoccupied periods when no volatile compounds are sensed in the exhaust air. The implementer's calculations estimate that the project has reduced the heating energy by 20,860 therms per year and saved 563,536 kWh of electricity. The reductions in electrical energy use are presumably associated with reduced HVAC fan energy and cooling energy. The electricity is provided by a municipal utility and is not claimed in this application. The PA reviewer performed a check calculation and estimates the heating savings impacts to be 22,593 therms per year. The documentation states that the EUL for the measure is 15 years based on a DEER measure life (HVAC controls).

Commission staff have reviewed the submitted information. The PA installation report states that "As in the PA approved calculation, the IR calculation accounts for the supply fan motors being in the airstream with 100% of the supply fan motor heat accounted for in the thermal calculation." Commission staff are unable to verify in either the implementer's calculations or the PA reviewer's calculations that the analysis has accounted for the increased reheating associated with reduced fan energy and fan heat as was requested in the Phase I EAR and phone call with the PA on 12/11/13. Review of the pre and post installation data submitted by the PA indicates that the data measurement intervals vary from one minute to several hours. It is unclear how the analysis has accounted for the variation in data intervals.

The "Early Retirement Using Preponderance of Evidence ver 1.0¹" document provides guidance on the EUL for REA measures. The EUL of REA measures is capped at the RUL of the equipment being retrofitted. This means that REA measures utilize the RUL of the pre-existing equipment up to and not to exceed the EUL for the REA measure.

The DEER EUL for air conditioning units is 15 years. The age of the HVAC system has not been provided. In the absence of better information, the RUL of the HVAC system is set at 1/3 of the DEER EUL. 1/3 of 15 years = 5 years. 5 years is the EUL of this measure for this project.

¹ Ex Ante Review Custom Process Guidance Documents may be found at the following web address:
<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/Ex+Ante+Review+Custom+Process+Guidance+Documents.htm>

Review Conclusion

The measure EUL for this project is 5 years. The PA is required to revise the documentation to demonstrate that the analysis correctly accounts for the heating penalty associated with reduced HVAC fan energy and the irregular data intervals in the pre and post implementation data. The installation report and calculations should be revised to clearly quantify the heating penalty associated with reduced HVAC fan energy and describe how the irregular data intervals have been adjusted in the analysis. Any adjustments made to the savings analysis should be reflected in the final ex ante claim for this project and clearly described in the documentation. Commission staff waives further review of this project until PA final claim. The PA will upload to the CMPA folder for this project the claim ID number and indicate the quarter claimed.

Summary of CPUC Staff Required Action by the PA

CPUC Staff require that the PA undertake the recommended steps and submit the following information:

For this project:

1. Demonstrate that the analysis correctly accounts for the heating penalty associated with reduced HVAC fan energy. A simple statement that this is accounted for is inadequate. Describe where this is accounted for in the analysis and show how the heating penalty impact is derived. Clearly quantify the heating penalty. If this requirement is unclear, seek clarification from Commission Staff.
2. Demonstrate that the analysis correctly accounts for irregular data intervals.
3. Revise the EUL for the measure to 5 years as described above.
4. Revise calculations, savings claim and installation report to address these issues (1., 2., and 3. above).
5. Upload all final documents to the CMPA folder for this project. Include a separate document with a file name "Claim ID" with the submission. The Claim ID document will include the PA claim ID number and quarter claimed.

For all future projects (submitted after receipt of this review):

1. When Commission Staff requirements are described in a review document, the PA should make a diligent effort to ensure that the PA response provided clearly addresses the requested action. If the requested action or proper response is unclear, the PA should seek guidance before proceeding.

For this project, Commission Staff requested that the PA demonstrate that the approved

savings impacts include HVAC interactive effects- i.e. HVAC fan energy reduction would increase HVAC heating requirements during heating mode. The PA response in the installation report is a simple statement “As in the PA approved calculation, the IR calculation accounts for the supply fan motors being in the airstream with 100% of the supply fan motor heat accounted for in the thermal calculation.” Commission staff are unable to verify that the analysis performed by the implementer or PA reviewer have accounted for this interactive effect.

2. 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.”

For this project, the calculation methodology is difficult to follow, the equations used to calculate the project impacts are not provided and it is unclear if the Commission staff guidance regarding interactive HVAC effects has been followed. Commission staff found that the savings analysis requires reviewers to hunt through numerous documents and analysis spreadsheet cells to investigate the ex ante savings impacts. This is not acceptable.

3. 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 this project, it is unclear why the measurement intervals are irregular and how the irregularity of measurement intervals has been accounted for. The baseline measurement period is 10 days. For most projects 10 days is inadequate for pre or post measurement as this does not capture enough variations in system operation associated daily differences in operation-e.g. weekdays versus weekends. A detailed M&V plan was not provided for this project.

4. The EUL of REA measures is capped at the RUL of the equipment being retrofitted. This means that REA measures utilize the RUL of the pre-existing equipment up to and not to exceed the EUL for the REA measure. The PA reviewer should carefully review guidance documents and ensure that all future reviews incorporate consideration of the

guidance.

For this project, the PA reviewer did not follow the guidance document related to the EUL of REA measures, and the EUL provided was incorrect.

5. Commission staff request that the PA be diligent in determining customer eligibility for Program participation and ensure that it is properly claiming savings impacts.

Commission staff identified during review of the initial documentation submission for this project that the PA was claiming electrical energy savings for this customer when the customer does not purchase electricity from the IOU. Commission staff are concerned that the PA has improperly claimed electrical energy savings for other projects at this customer's facility and the facilities of other customers who participate in this program.

Commission staff will be issuing a separate disposition on this issue in the near future, requesting that the PA identify customers who might have similar issues, and then review its records for both deemed and custom applications and report to Commission staff its findings of any other improperly claimed savings impacts. These impacts may be associated with customers who do not purchase natural gas or electricity from the IOU, who purchase some portion of natural gas or electricity from the IOU and some natural gas or electricity from another party, or customers who own, operate, lease, purchase or use electricity, steam or hot water generated from cogeneration systems.

Table 1-2 Review Findings

Reviewed Parameter	Analysis
<p>Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures, Major Renovation) Note: For early retirement projects only, include RUL through EUL baseline)</p>	PA Proposal: Retrofit add-on
	CPUC Staff Assessment: accept
	CPUC Staff Recommendation: none
<p>Project Baseline Technology (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)</p>	PA Proposal: in situ
	CPUC Staff Assessment: accept
	CPUC Staff Recommendation: none
<p>Project Cost Basis (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)</p>	PA Proposal: Full cost
	CPUC Staff Assessment: accept
	CPUC Staff Recommendation: none
<p>RUL (required for early retirement projects only, otherwise N/A)</p>	PA Proposal: N/A
	CPUC Staff Assessment: accept
	CPUC Staff Recommendation: none
<p>EUL (for each measure)</p>	PA Proposal: 15 years
	CPUC Staff Assessment: 5 years
	CPUC Staff Recommendation: The EUL of REA measures is capped at the RUL of the equipment being retrofitted. This means that REA measures utilize the RUL of the pre-existing equipment up to and not to exceed the EUL for the REA measure.
<p>Savings Assumptions</p>	PA Proposal: Complex analysis using a custom spreadsheet created by the implementer.
	CPUC Staff Assessment: It is unclear if the analysis properly accounts for HVAC interactive effects and how irregular pre and post project measurement

Reviewed Parameter	Analysis
	<p>data have been accounted for.</p> <p>CPUC Staff Recommendation: CPUC Staff require that the PA demonstrate that the approved savings impacts include HVAC interactive effects- i.e. HVAC fan energy reduction would increase HVAC heating requirements during heating mode and describe how the irregular data collection intervals have been accounted for.</p>
<p>Calculation Methods/Tool review</p>	<p>PA Proposal: Custom spreadsheet</p> <p>CPUC Staff Assessment: Complex spreadsheet not reviewed in depth. The spread sheet has a sunset function set to January 2025. For this project, the calculation methodology is difficult to follow, the equations used to calculate the project impacts are not provided and it is unclear if the Commission staff guidance regarding interactive HVAC effects has been followed.</p> <p>CPUC Staff Recommendation: 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. .</p>
<p>Pre- or Post-Installation M&V Plan</p>	<p>PA Proposal: Measured data from the new control system was used to true up the savings estimates after the completion of the project. Measurements were performed for both the pre- project and post project operating conditions during normal periods of operation.</p> <p>CPUC Staff Assessment: It is unclear why the measurement intervals are irregular and how the irregularity of measurement intervals has been accounted for. The baseline measurement period is 10 days.</p> <p>CPUC Staff Recommendation: For this project, it is unclear why the measurement intervals are irregular and how the irregularity of measurement intervals has been accounted for. The baseline measurement period is 10 days. For most projects 10 days is inadequate for pre or post measurement as this does not capture enough variations in system operation associated daily differences in operation-e.g. weekdays versus weekends.</p>
<p>Net-to-Gross Review</p>	<p>PA Proposal: Not addressed</p> <p>CPUC Staff Assessment: TBD</p> <p>CPUC Staff Recommendation: TBD</p>

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

Description	PA Ex Ante Claim	CPUC Staff Recommendations
First Year kWh Savings	0	Waived
First Year Peak kW Savings	0	Waived
First Year Therms Savings	20,860	Waived
kWh Savings (RUL Period)	NA	Waived
Peak kW Savings (RUL Period)	NA	Waived
Therms Impact (RUL Period)	NA	Waived
kWh Savings (RUL thru EUL Period)	0	Waived
Peak kW Savings (RUL thru EUL Period)	0	Waived
Therms Savings (RUL thru EUL Period)	20,860	Waived
Annual Non-PA Fuel Impact (RUL Period)	NA	Waived
Annual Non-PA Fuel Impact (RUL thru EUL Period)	563,536 kWh, Non-PA claimed, Municipal Utility savings impacts	Waived
Project Costs for Baseline #1 (RUL or EUL)	\$152,000	Waived
Project Costs for Baseline #2 (EUL minus RUL period)	NA	Waived
Project Incentive Amount	\$14,213	Waived