Phase IV Ex Ante Review Findings

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

IOU	Pacific Gas and Electric
Application ID	2K1211087C
Application Date	Not provided (but prior to 02/05/2013)
Program ID	PGE21262
Program Name	UC/CSU/CCC Partnership Program
Program Year	2012
Itron Project ID	X205
IOU Ex Ante Savings Date	Not available
CPUC Staff Measure Name	Smart Grid Controls (Phase C)
Project Description	This control upgrade project at nine buildings at an University campus implemented the following measures: i) EEM-1: Advanced Scheduling Controls ii) EEM-3: Minimum Outside Air Reset There were two other measures (EEM-2 and EEM-4, described below), originally included in the scope, that the implementer did not include in the final claimed savings, based on CPUC Staff's recommendation during Phase III EAR: i) EEM-2: Modified Temperature Set points ii) EEM-4: Demand Control Ventilation (DCV) This is Phase C of the three phase comprehensive control upgrade project at the University campus.
Date of CPUC Staff Review	05/24/2013, 07/08/2013, 12/12/2013
Primary Reviewer / Firm	C.D. Nayak / DNV KEMA
Review Supervisor / Firm	Amit Kanungo/ DNV KEMA
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	CPUC staff approves the ex-ante savings for EEM-1 and EEM-3 at the IOU-revised levels of 10,653.1 therms EEM-1 – 10,275.6 therms EEM-3 – 377.5 therms

Measure Description

This control upgrade project is located at nine buildings in a University campus, and replaces the existing pneumatic control systems with DDC, which enabled the campus to add new control measures on the existing HVAC equipment. Phase III EAR report contains the list of measures proposed for each building site, vintage of the existing control systems, and general measure eligibility, etc. IOU technical reviewer completed the post-installation inspection at four sample buildings on 11/6/2013 and verified the implementation of the following two measures:

1. EEM-1 - Advanced Scheduling Controls: The new energy management system implemented zone level controls and enabled changing the temperature set points and scheduling based on real time occupancy at respective buildings. The existing system had no zone level control capability and only a few high-level controls were possible to turn ON/OFF the building heating and cooling.
2. EEM-3 - Minimum Outside Air Reset: The new controls enabled reducing the minimum outside air percentage to 15% depending on the occupancy.

Summary of Review

Phase III Review Summary

For Phase III review summary, refer to the file "PGE 2K1211087C X205 Phase III EAR with NTG Summary.docx" posted in this project's directory in the CMPA.

Phase IV Review Summary

CPUC staff reviewed the eQUEST models submitted for Phase IV review, prepared based on the post-installation site observation. The original Phase IV review documents, which included eQUEST models, model summary, energy savings summary, and cost invoices, submitted on 11/21/2013 were revised by IOU technical reviewer based on discussions it had with CPUC Staff, and were resubmitted on 12/9/2013.

CPUC staff reviewed the inputs used in the eQUEST models during the Phase III EAR and simultaneously held discussions with the campus facility personnel to verify these inputs. Finally, IOU technical reviewer was advised to make changes to the Phase III eQUEST models based on the facility personnel's feedback. Since most of the baseline model input verifications were done during Phase III EAR, no additional model input verification was performed during

this Phase IV EAR. CPUC staff verified the changes made to the model for the measures EEM-1 and EEM-3. For EEM-1, the numbers of zones in the proposed model are based on the as-built building drawings that the IOU technical reviewer documented in the post-installation findings. Similarly, for the proposed EEM-3 model the minimum OA damper position of 15% was used, based on the observation made during post-field visit.

CPUC staff observed that the majority of the claimed savings were from EEM-1 and very little savings were from EEM-3. This is becausethe saving for EEM-1 resulted from nine buildings, while only one building contributed savings for EEM-3.

EEM-3 was implemented only at five buildings ([redacted]) of which four buildings ([redacted]) used Title-24 as the measure baseline (Normal Replacement measure), and for only one building ([redacted]) used the existing condition as the measure baseline (Early Replacement measure). For the normal replacement measure category buildings, though 2008 Title 24 does not provide any minimum OA damper position requirement, the code specifies the minimum ventilation rates based on the building area and the number of occupants, which subsequently decides the minimum OA damper position. The IOU Technical Reviewer confirmed that the campus mechanical contractor selected the minimum OA damper position based on the code requirement for ventilation rate. For the 'normal replacement' buildings, the revised minimum outside air damper positions stay consistent with the Title-24 suggested minimum ventilation rates, and therefore, no savings were approved for these four buildings. For the 'early replacement' building, the existing minimum OA damper position was used as the baseline, and the savings were estimated against the revised post-installation minimum OA damper position.

During Phase III review CPUC Staff learned from the campus facility that the space heating boilers are scheduled to remain off during May 31st to Oct 31st, which it verified from the hourly results of Phase IV eQUEST models.

Review Conclusion

CPUC staff disagrees with the method PG&E used to estimate the project cost which appears to result in about twice the amount to incentive to be awarded. The project cost invoices appear to include unrelated project costs; therefore, PG&E should have made an attempt to identify direct project-related costs. Since the incentive amount is small, staff is not directing a further scrutiny and refinement of project cost estimate. This waiver of project cost review though is not to be construed as setting a precedent.

CPUC staff approves the final ex ante savings of 10,653.1 therm/year, consisting of 10,275.6 therm/year from EEM-1 and 377.5 therms/year from EEM-3.

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Table 1-2 Review Findings

Reviewed Parameter	Analysis
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)	IOU Proposal: Existing operating conditions were taken as the baseline. Therefore, early replacement is baseline.
	CPUC Staff Assessment: Based on the information collected from the facility personnel, the proposed EMS replacement in only four buildings fall under early replacement, and the projects at remaining buildings should be treated as normal replacement.
	CPUC Staff Recommendation: No change
Project Baseline Technology (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)	IOU Proposal: In situ
	CPUC Staff Assessment: In situ applies for four buildings and for the remaining sites Title 24 applies.
	CPUC Staff Recommendation: No change
Project Cost Basis (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)	IOU Proposal: Full cost. The IR review report puts the total project cost at $220,060.50, and the project documents also include the project cost break-down (refer to the file "2K1211087C XXX Phase C Revised Calculations_rev1.xls").
	CPUC Staff Assessment: Full cost applies for early replacement measures, and incremental cost applies for normal replacement measures. IOU has considered full cost for buildings that fall under early replacement category and considered 20% of full cost for buildings that fall under normal replacement category. CPUC Staff discussed the methodology utilized for estimating the incremental cost for normal replacement category buildings, and observed that in the absence of any verifiable cost information of the baseline system, the submitted incremental cost estimation is reasonable. Further, CPUC Staff checked that the estimated final cost does not cap the approved incentive amount.
	CPUC Staff Recommendation: Staff disagrees with the method PG&E used to estimate the project cost which appears to result in about twice

Reviewed Parameter	Analysis
	the amount to incentive to be awarded. The project cost invoices appear to include unrelated project costs; therefore, PG&E should have made an attempt to identify direct project-related costs. Since the incentive amount is small, staff is not directing a further scrutiny and refinement of project cost estimate. This waiver of project cost review though is not to be construed as setting a precedent.
RUL (required for early retirement projects only, otherwise N/A)	IOU Proposal: The project document provides the RUL information. The buildings included in the application were built between 1953 – 1979. It appears that the existing building control systems are 10 – 15 years old.
	CPUC Staff Assessment: Tables-I and II of Phase III EAR report provides the vintage summary of the existing EMS, building, and their RUL.
	CPUC Staff Recommendation: No change
EUL (for each measure)	IOU Proposal: Per DEER 2008, EUL for the Energy Management System is 15 years.
	CPUC Staff Assessment: EUL information is adequate and correct.
	CPUC Staff Recommendation: No change.
Savings Assumptions	IOU Proposal: The submitted eQUEST energy models utilize default and identical values for many parameters in both pre- and post-installation phases, such as, building construction components, lighting load, internal load, domestic hot water system, and chilled water system, etc. The IOU technical noted in its project report that majority of the model parameters were considered default because of the limitation on project budget.
	CPUC Staff Assessment: The assumptions made in the submitted eQUEST models are reasonable.
	CPUC Staff Recommendation: No change required.

Reviewed Parameter	Analysis
Calculation Methods/Tool review	IOU Proposal: The final claimed savings are based on the eQUEST model developed during the project application stage, and revised based on CPUC Staff approved project scope, and the observation made during the post-installation verification. Subsequently, CPUC Staff discussed the baselines used for five buildings used in EEM-3. CPUC Staff noted that because of the fact that four of these five buildings fall under normal replacement category, therefore 2008 Title 24 should be used as the baseline for them and the building categorized as early replacement should use the existing condition as baseline. Thus, IOU technical reviewer revised the eQUEST models based on the discussion it had with CPUC Staff, and for EEM-3, the baseline condition for normal replacement category buildings ([redacted]) were revised as Title 24 minimum suggested requirement. Therefore, the final claimed savings for EEM-3 does not include any savings from these four buildings that fall under normal replacement category.
	CPUC Staff Assessment: CPUC Staff considers the final revised eQUEST models appropriate. There are two models submitted for the final savings estimation. The first model "XXXX Baseline - EEM1.pd2" is a parametric model for baseline condition and proposed EEM-1, and estimates the savings for EEM-1.The second model "XXX - EEM3.pd2", which is based on the proposed condition of EEM-1, estimates the savings for EEM-3.
	CPUC Staff Recommendation: No change required.
Pre- or Post-Installation M&V Plan	IOU Proposal: IOU technical reviewer conducted the post-installation site visit on 11/06/2013 and verified the installed measures at four buildings. The post-installation inspection report suggests that IOU reviewer verified the new-zone configuration, scheduling of HVAC equipment, percentage of minimum OA air set point, and demand control ventilation. Majority of the buildings now appears to have more number of zones as compared to the pre-case. In the post-installation phase, the classroom schedule is from 7 am to 10 pm (Mon-Thu) and 7 am to 4 pm (Fri) and office schedule is from 6 am to 10 pm (Mon-Thu) and 6 am to 5 pm (Fri). Further, IOU technical reviewer also collected EMS screenshot that verifies the minimum OA damper open position at 15%.
	CPUC Staff Assessment: The available post-installation verifications are adequate.
	CPUC Staff Recommendation: No change.
Net-to-Gross Review	IOU Proposal: Not available
	CPUC Staff Assessment: Refer to Phase III EAR for details.

Reviewed Parameter	Analysis
	CPUC Staff Recommendation: NTGR = 0.58

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

Description	IOU Ex Ante Claim	CPUC Staff Recommendations
First Year kWh Savings	N/A	N/A
First Year Peak kW Savings	N/A	N/A
First Year Therms Savings	10,653.1 EEM-1 – 10,275.6 EEM-3 – 377.5	10,653.1 EEM-1 – 10,275.6 EEM-3 – 377.5
kWh Savings (RUL Period)	N/A	N/A
Peak kW Savings (RUL Period)	N/A	N/A
Therms Impact (RUL Period)	10,653.1 EEM-1 – 10,275.6 EEM-3 – 377.5	10,653.1 EEM-1 – 10,275.6 EEM-3 – 377.5
kWh Savings (RUL thru EUL Period)	N/A	N/A
Peak kW Savings (RUL thru EUL Period)	N/A	N/A
Therms Savings (RUL thru EUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL thru EUL Period)	N/A	N/A
Project Costs for Baseline #1 (RUL or EUL)	N/A	N/A
Project Costs for Baseline #2 (EUL minus RUL period)	N/A	N/A
Project Incentive Amount	$10,653	$10,653