

## **Phase II Ex Ante Review Findings**

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

|   |   |
|---|---|
|   |   |
| <b>IOU</b>  | Pacific Gas and Electric  |
| <b>Application ID</b>                                     | 2K12082172  |
| <b>Application Date</b>                                   | 2/29/2012   |
| <b>Program ID</b>   | PGE21011  |
| <b>Program Name</b>                                       | Non Residential Retrofit Program  |
| <b>Program Year</b>                                       | 2012  |
| <b>Itron Project ID</b>                                   | X103  |
| <b>IOU Ex Ante Savings Date</b>                           | TBD   |
| <b>ED Measure Name</b>                                    | HVAC & Controls Upgrade   |
| <b>Project Description</b>                                | <p>This customized retrofit project at an office building includes the following measures:</p> <ol style="list-style-type: none"> <li>1. EEM-1: Replace existing box car units with high efficiency units,</li> <li>2. EEM-2: Replace old pneumatic control system with DDC, which includes static pressure reset, optimum start/stop controls, CO<sub>2</sub> based demand control ventilation (DCV), and HHW temperature reset,</li> <li>3. EEM-3: Convert to variable volume HHW flow, and</li> <li>4. EEM-4: Upgrade lighting.</li> </ol> |
| <b>Date of ED Review(s)</b>                               | 09/26/2012  |
| <b>Primary Reviewer and Firm</b>                          | C.D. Nayak/DNV KEMA   |
| <b>Review Supervisor and Firm</b>                         | Kunal Desai & Joseph Ball/Itron   |
| <b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b> | Desk review   |
| <b>ED Recommendation</b>                                  | Ex ante savings are conditionally approved subject to post-installation M&V and IOU true-up.  |

## Measure Description

This project is located at an office building (2029) in XXXXXXXX, and was carried as part of PG&E's Large Integrated Audit program. Earlier, four other buildings were selected for similar measures under the same incentive application. However, all other buildings were withdrawn from the application. The following energy efficiency measures were involved:

1. EEM-1: Upgrade to Premium Efficiency Package Units - Replace existing box car units with high efficiency units. Most of the units are original, installed in the late 80's to early 90's, and have reached the end of their useful life. The new premium efficiency units have efficiency ratings 10.2 EER.
2. EEM-2: Replaced the old pneumatic control system with DDC, which will implement the static pressure reset, optimum start/stop controls, CO<sub>2</sub> based demand control ventilation (DCV), and HHW temperature reset,
3. EEM-3: Hot Water Pump Variable Speed Drives - To convert the existing constant volume hot water system to variable volume HHW flow, and
4. EEM-4: Advanced Lighting Upgrades - The current lighting efficiency is approximately 0.75 Watts/sqft, and fitted with T8s, T5s and compact fluorescents. With enhanced controls and dimmable ballast, the facility is to reduce the lighting loads on average to 0.50 - 0.35 Watts/sqft.

## Summary of Review

For Phase-I Ex Ante Review, see previously sent Phase I EAR document entitled:  
PGE\_2K12082172\_PR.docx

### *Phase II Ex Ante Review*

Based on the feedback provided by ED and the series of discussions held with the IOU's Technical Reviewer, the submitted eQUEST files for Phase-II review had the following changes:

1. The revised eQUEST model incorporated the savings estimates for DCV and advanced lighting controls. The lighting power density selected for the office space (0.5 watt/sq.ft) is lower than Title-24 suggested minimum value.
2. The revised models are calibrated with the actual annual electric and gas usages. From the metered data recorded for a complete year, the existing electric usage is [REDACTED] kWh, and the existing gas usage is [REDACTED] therm (refer to the file "2K12082172 - XXXXX Bldg 1 - Calibration Data (092012).xls"). The revised model was calibrated and the baseline annual electric usage became [REDACTED] kWh and the baseline annual gas usage became [REDACTED] therm.

3. Based on the discussion with ED, the revised model no longer includes the supply air temperature reset measure that was originally included in the project application.

Based on discussions with ED, the IOU's technical review now includes the post-retrofit M&V details in the project review report to verify the operation of DCV and the logic for zone level VAV box controls, static pressure reset control, and optimum start/stop.

From the project application review report, IOU claimed annual energy savings is 287,212 kWh and 12,715 therms, and peak demand reduction is 48.32 kW. This is equivalent to 10.5% of the building's electric energy usage, 36.8% of the annual gas usage, and 8.9% of the building peak electric power.

From the parametric run of the resubmitted eQUEST model, the following measure savings were found: i) EEM-1: Upgrade to Premium Efficiency Package Units (electric – 6,080 kWh), ii) EEM-2: Replaced the old pneumatic control system with DDC (electric – 96,235 kWh, 12,383 therm), iii) EEM-3: Hot Water Pump Variable Speed Drives (electric – 16,146 kWh, and negative 455 therm), and EEM-4: Advanced Lighting Upgrades (electric – 193,670 kWh, and negative 432 therm). The total electric and gas savings obtained from the parametric runs are 312,131 kWh and 11,496 therm, which are different from the amount reported in the PA review report. The reviewer discussed this issue with IOU's technical reviewer and learned that the eQUEST model will be revised after the completion of the project. ED notes that the claimed peak demand reduction (as appears in the PA review report) is calculated as 90% of the peak demand observed in the baseline condition, and is not based on DEER peak demand definition.

### **Review Conclusion**

This project is conditionally approved subject to installation of proposed measures and post-installation M&V.

### **Summary of ED Requested Action by the IOU**

None

**Table 1-2: Project Overview**

| Description  | IOU Proposed Ex Ante Data  | ED Recommendations   |
|--|--|--|
| <b>Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)</b> | Appears to be normal replacement for the DX units and early replacement for other add-on measures              | All measures are under normal replacement based on the information provided by IOU's technical reviewer  |
| <b>Project Cost Basis (Full Cost, Incremental Cost)</b>  | Full cost - \$1,967,146.00 per the first summary document, and \$2,156,123.00 per the second summary document. | The PA review report provides the cost break for the full cost of the project. Incremental costs apply for all measures.                                 |
| <b>RUL (Early retirement projects only, otherwise N/A (not applicable))</b>  | Not provided   | N/A  |
| <b>EUL</b>   | Not provided   | Per DEER 2008, 15 years for VFD installation on pumps, 15 years for new commercial air conditioners, and 15 years for energy management system controls. |
| <b>First Year kWh Savings</b>  | 287,212  | 312,131 (obtained from the parametric run results)   |
| <b>First Year Peak kW Savings</b>  | 48.32  | 89.12 (obtained from the hourly results for parametric run-1 and parametric run -11)   |
| <b>First Year Therms Savings</b>   | 12,715   | 11,496 (obtained from the parametric run results)  |
| <b>kWh Savings (RUL Period)</b>  | N/A  | N/A  |
| <b>Peak kW Savings (RUL Period)</b>  | N/A  | N/A  |
| <b>Therms Impact (RUL Period)</b>  | N/A  | N/A  |

| <b>Description</b>                                      | <b>IOU Proposed Ex Ante Data</b> | <b>ED Recommendations</b>  |
|---|----------------------------------|--|
| <b>kWh Savings (EUL thru RUL Period)</b>                | 287,212                          | 312,131 (obtained from the parametric run results)                                   |
| <b>Peak kW Savings (EUL thru RUL Period)</b>            | 48.32                            | 89.12 (obtained from the hourly results for parametric run-1 and parametric run -11) |
| <b>Therms Savings (EUL thru RUL Period)</b>             | 12,715                           | 12,410 (obtained from the parametric run results)                                    |
| <b>Annual Non-IOU Fuel Impact (RUL Period)</b>          | N/A                              | N/A  |
| <b>Annual Non-IOU Fuel Impact (EUL thru RUL Period)</b> | N/A                              | N/A  |
| <b>Net-to-Gross Ratio</b>                               | Not provided                     | Assessment not completed   |

**Table 1-3: Detailed Review Findings**

| Reviewed Parameter   | Analysis  |
|--|---|
| <b>Project Gross Savings Baseline</b> (for early retirement projects only, include RUL through EUL baseline) | IOU Proposal: Appears to be normal replacement for the DX units and early replacement for other add-on measures   |
|  | ED Assessment: All measures are under normal replacement based on the information provided by IOU’s technical reviewer  |
|  | ED Recommendation: All measures are under normal replacement based on the information provided by IOU’s technical reviewer  |
| <b>Project Cost Basis</b> (for early retirement projects only, include RUL through EUL cost basis treatment) | IOU Proposal: Appears to be full cost   |
|  | ED Assessment: The PA review report provides the anticipated itemized measure full cost   |
|  | ED recommendation: Provide incremental costs for the normal replacement baseline measure and full cost for early replacement measures                                   |
| <b>RUL</b> (required for early retirement projects only, otherwise n/a)                                      | IOU Proposal: Not provided  |
|  | ED Assessment: N/A.   |
|  | ED recommendation: N/A  |
| <b>EUL</b>   | IOU Proposal: Not provided  |
|  | ED Assessment: Consult DEER 2008 for EULs   |
|  | ED Recommendation: Per DEER 2008, 15 years for VFD installation on pumps, 15 years for new commercial air conditioners, 15 years for energy management system controls. |
| <b>Savings Assumptions</b>   | IOU Proposal: Energy saving calculations for the proposed measures were estimated with eQUEST model   |
|  | ED Assessment: The input parameters are based on the site inspections done by IOU technical reviewer  |
|  | ED Recommendation: No change  |
| <b>Calculation Methods/Tool review</b>   | IOU Proposal: Energy saving calculations for the proposed measures were estimated with a separate eQUEST model  |
|  | ED Assessment: Only after final discussions with ED were the final measures   |

| Reviewed Parameter                            | Analysis   |
|---|--|
|   | <p>selected in the final eQUEST model. The original model was calibrated with the actual annual building energy usage.</p> <p>ED Recommendation: No change</p>   |
| <b>Pre- or Post-Installation M&amp;V Plan</b> | <p>IOU Proposal: No M&amp;V plan was provided</p> <p>ED Assessment: It appears that no baseline M&amp;V was done, and no post-retrofit plan was provided either. The baseline conditions were taken from the pre-installation inspection findings.</p> <p>ED Recommendation: No change</p> |
| <b>Net-to-Gross Review</b>                    | <p>IOU Proposal: Not provided</p> <p>ED Assessment: Not assessed</p> <p>ED Recommendation: None</p>  |