

## **Phase 2 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>	Given an arbitrary ID of PGEHOTEL001RCX. Actual application ID was not provided
<b>Application Date</b>	Not provided
<b>Program ID</b>	PGE21011
<b>Program Name</b>	Lodging Savers Program (NRR-DR)
<b>Program Year</b>	2012
<b>Itron Project ID</b>	X151
<b>IOU Ex Ante Savings Date</b>	Not provided
<b>ED Measure Name</b>	<p>Per the RCx Phase II preliminary report by Ecology Action, the following measure codes and descriptions are used:</p> <ol style="list-style-type: none"> <li>1. Commissioning; RCx Recode Controls - HVAC-Airflow (CCB14)</li> <li>2. HVAC; Retrofit / New-AHU / Package Units-VAV-Convert, including Terminal Boxes (CHA31)</li> <li>3. Commissioning; RCx Repair Hardware - HVAC Economizer / Outside Air (CCC11)</li> <li>4. Commissioning; RCx Recode Controls - HVAC Setpoint Change (CCB12)</li> <li>5. HVAC; Retrofit / New-Exhaust / Ventilation - Building Exhaust VFD (CHH10)</li> <li>6. HVAC; Retrofit / New-Exhaust / Ventilation - Garage Exhaust-VFD &amp; Controls (CHH22)</li> <li>7. Pools; Retrofit / New-Pumps -</li> </ol>

	Variable Flow (CWA10)
<b>Project Description</b>	This project (PGEHOTEL001RCX) is a retro-commissioning (RCx) and non-residential retrofitting (NRR) endeavor for a large hotel, involving multiple EEMs including VFD controls on fans and pumps, temperature and pressure reset controls, and re-commissioning the economizer controls. An additional measure, the guestroom HVAC controls, has been removed from the original PGEHOTEL001RCX project application and allocated under a new, separate application, with project ID PGEHOTEL001ARCX
<b>Date of ED Review(s)</b>	Phase 1 Review: 07/20/2012 Phase 2 Review: 11/29/2012
<b>Primary Reviewer and Firm</b>	Chris Williams / DNV KEMA
<b>Review Supervisor and Firm</b>	Joseph Ball/Itron
<b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b>	Desk Review
<b>ED Recommendation</b>	Savings conditionally approved, pending post-implementation inspection and M&V. All measures have reasonable savings methodologies and pre-/post-M&V plans.

## **Measure Description**

All measures planned for implementation according to the Phase 2 Energy Efficiency Preliminary Report (with exception of the guestroom controls measure, which has been allocated under a different program application) dated September 25, 2012 are claimed to be an RCx measures and include the following:

- EEM-01 – Static Pressure Reset for all VAV air handlers. This measure applies to air handlers AC 1-5, AC 7-15, and AC 201-208.
- EEM-02 – Install VFD on AHU-6. This would retrofit the 20-hp supply fan motor with VFD controls.
- EEM-03 – Re-commission the Economizer Controls. The economizers for four (4) air handling units, AH-4, AH-6, AH-11, and AH-202, are not functioning properly. Air handler AH-4 and AH-6 have locked dampers at 10% open, and air handler AH-11 and AH-202 are locked at 100% open. The measure will replace either the broken linkages or the malfunctioning actuators, or both, and re-commission the operation of the economizers.
- EEM-04 – Implement Chilled Water Supply Temperature Reset. The chiller is currently set at a fixed set point of 42 °F. The building Energy Management System (EMS) is capable of a reset strategy. The EMS needs to be re-programmed with the possible requirement of setting additional control points.
- EEM-06 – Install Variable Frequency Drives (VFD) on Exhaust Fans. This measure would install VFDs on 22 exhaust fan motors: EX-1, -2, -3, -4, -5, -6, -11, -12, -13, -15, -20, -21, -22, -23, -201, -202, -203, -204, -205, -206, -207, and -208.
- EEM-07 – Isolate the Parking Structure Exhaust System and Install an Exhaust Fan to Serve the Corridor and Laundry Areas. There are two ventilation exhaust fans, 40-hp EF-24 and 50-hp EF-25, serving both the hotel parking structures, and the corridor and laundry areas. The exhaust fans are equipped with CO sensor controls that are meant to modulate the fan operation. However, they operate continuously to serve the corridor and laundry rooms which represent a smaller, more constant exhaust load. This measure separates and isolates the ventilation exhaust systems, dedicating the EF-24 and EF-25 exhaust fans to serve the parking structures only. The measure installs a new 5-hp ventilation exhaust fan to serve the corridor and laundry areas.
- EEM-08 – Install VFDs on the Swimming Pool Pumps. There are two 3-hp circulation pumps serving the swimming pool and spa continuously (24/7), operating at full speed. This measure installs VFD controls on the pump motors and allows them to match the required flow rate and pressure during the open pool/spa hours (6:00 am – 11:00 pm), and reduces their flow rate during closed hours.

The updated Phase II preliminary report (dated September 25, 2012) lists annual energy savings for these seven measures as 818,013 kWh and an on-peak demand reduction of 82.78 kW. A total incentive amount of \$81,899 was calculated for the seven measures. The total incentive amount was based on the Lodging Savers Program incentive rates of \$0.09/kWh and \$100/kW.

## **Summary of Phase 2 Review**

New documents provided for the phase 2 review include the following:

- LodgingSavers Program Owner Retrocommissioning Agreement (ORA)
- EEM-08 (Pool Pump VFD measure) supporting documents (Ecology Action pool pump work paper)
- Pool and Spa specifications (volume)
- Documents showing site details such as plant and ancillary equipment schedules, EMS screenshots, site inspector notes, and nameplate and equipment condition photos
- Updated Phase II Energy Efficiency Preliminary Report dated September 25, 2012 showing EULs and revised M&V plans.
- A photo confirming the status of the parking garage CO monitoring system
- Photos showing nameplate specifications for the EEM-07 exhaust motors and proposed specifications for the 5-hp exhaust motor that will serve the laundry and corridor space
- Updated eQuest models, savings report, and savings calculation worksheets addressing the issues presented in the phase 1 EAR.

See the phase 1 EAR for other documentation that were available for review.

The phase 2 review focused primarily on the updated savings calculation worksheets.

The six issues (relating to the measures presented in the phase 2 EAR for PGEHOTEL001RCX) that were presented in the phase 1 EAR were addressed individually in the phase 1 response. Please see the phase 1 response document (EnergyEfficiencyOIR-Post-2008\_DR\_ED\_222\_EEGA\_2210.doc) for context, if necessary.

1. EEM-06 savings calculations now has motor efficiency losses included in the existing motor energy consumption
2. EEM-08 savings calculations now includes VFD control losses
3. The hot water loop supply temperature was changed to 200 °F in the eQuest model to conform with site specific conditions
4. The DHW water loop temperature was changed to 140 °F in the eQuest model to conform with site specific conditions

5. EEM-07 metering period recommendation was taken in to consideration
6. VFD-related measures (EEM-02 and -06) were re-classified as NRR

The phase 1 EAR response states that the eQuest model was calibrated to annual site-specific energy usage. Also, EEM-06 (Install VFDs on exhaust fans) would resolve a negative building pressure issue that is caused by several zones that are served by VAV air handling units and constant volume exhaust fans with inlet guide vanes locked in the 100% open position. EEM-06 would resolve this negative building pressure issue by matching exhaust flow rates with supply air flow rates, thereby eliminating significant differential building pressure relative to outside.

**Review Conclusion**

Savings conditionally approved, pending post-implementation inspection and M&V. All measures have reasonable savings methodologies and pre-/post-M&V plans.

**Table 1-2: Project Overview**

Description	IOU Proposed Ex Ante Data	ED Recommendations
<p><b>Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)</b></p>	<p>All measures use existing equipment as the baseline since the measures are either RCx or retrofits. EEM 07 (Isolate Garage Exhaust and Install Exhaust for Corridor/Laundry) introduces a new exhaust motor which could be considered capacity expansion; however, the existing exhaust motors' load will be significantly reduced due to this additional motor and zonal changes and will function as intended after its initial commissioning.</p>	<p>EEM 1, 3, 4, 7 are System Optimization measures. EEM 2, 6, and 8 are Add-on Measures. The baseline equipment used for these measures appear to be appropriate</p>

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<b>Description</b>	<b>IOU Proposed Ex Ante Data</b>	<b>ED Recommendations</b>
<b>Project Cost Basis (Full Cost, Incremental Cost)</b>	\$300,023; This is the total estimated project cost per the phase II assessment report	Full cost
<b>RUL (Early retirement projects only, otherwise N/A (not applicable))</b>	Not provided	N/A
<b>EUL</b>	Provided in updated assessment report:  EEM 1, 3, and 4 – Five (5) years  EEM 2, 6, 7, and 8 – Fifteen (15) years	Use IOU-proposed EULs
<b>First Year kWh Savings</b>	818,013	818,013
<b>First Year Peak kW Savings</b>	82.78	82.78
<b>First Year Therms Savings</b>	N/A	N/A
<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>kWh Savings (EUL thru RUL Period)</b>	818,013	818,013
<b>Peak kW Savings (EUL thru RUL Period)</b>	82.78	82.78
<b>Therms Savings (EUL thru RUL Period)</b>	N/A	N/A
<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: Baseline equipment is existing equipment. The measures are RCx or retrofit measures
	ED Assessment: Baseline equipment appears to be appropriate for this project.
	ED Recommendation: Use IOU proposal
<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: RCx and NRR measures should use full cost basis
	ED recommendation: When project is complete, provide project cost documentation in the form of vendor invoices, quotes, or estimates for equipment, labor, and materials, categorized by individual measure
<b>RUL</b> (required for early retirement projects only, otherwise n/a)	IOU Proposal: N/A
	ED Assessment: N/A
	ED recommendation: N/A
<b>EUL</b>	IOU Proposal: Provided in updated assessment report: EEM 1, 3, and 4 – Five (5) years EEM 2, 6, 7, and 8 – Fifteen (15) years
	ED Assessment: IOU-proposed EULs match DEER 2008 or the PG&E RCx Project Submittal Guidelines and are appropriate.
	ED Recommendation: Use the IOU-proposed EULs:
<b>Savings Assumptions</b>	IOU Proposal: Uses a combination of site-specific inputs for plant equipment, building characteristics, and equipment performance specifications for EEMs 1 through 4. EEMs 1 through 4 savings are derived from the eQUEST model. EEM 06 and 08 (VFD on exhaust fans and VFD on pool/spa pumps) use an assumed (post-installation) duty cycle distribution and site specific run time hours, motor hp, and motor efficiency to estimate measure savings. EEM 07 (Garage exhaust fans measure) uses a statewide savings calculation (ESC) tool for CO Mitigation for Parking Structures.
	ED Assessment: Savings assumptions for all EEMs are reasonable.
	ED Recommendation:

Reviewed Parameter	Analysis
	None
<b>Calculation Methods/Tool review</b>	IOU Proposal: Uses a combination of eQUEST model results and spreadsheet calculation tools to derive individual measure savings
	ED Assessment: IOU approach is appropriate for these types of measures and magnitude of savings
	ED Recommendation: None
<b>Pre- or Post-Installation M&amp;V Plan</b>	<p>IOU Proposal: Pre- and post-installation M&amp;V plans are briefly given for each measure in the Report. For measures whose savings are less than 75,000 kWh (EEMs 01, 02, 03, and 08), plans include collecting photos of affected equipment (motors, pumps, etc.) pre- and post-installation of the measure for verification of installation purposes. For measures whose savings are more than 75,000 kWh (EEMs 04, 06, and 07):</p> <ul style="list-style-type: none"> <li>• EEM 04 (CHW Loop Reset) – EMS screen shots of the existing fixed CHWST and the proposed CHWST logic will be provided. Post implementation trend data (CHWST versus outside air temperature over a 2-week period) will also be supplied to support the CHWST logic is functioning and to true-up the model inputs and subsequent post-implementation savings</li> <li>• EEM 06 (VFDs on Exhaust fans) – Pre- and post-installation photos of the existing exhaust fan motors, with pre-installation photos showing direct motor control and post-installation photos showing VFD controls. Additionally, 2 weeks of VFD trending from a representative sample (8 of the 22) of exhaust fans to verify and true-up post-implementation duty cycles</li> <li>• EEM 07 (Garage exhaust measure) – Pre- and post-installation M&amp;V plan includes metering the garage exhaust fans (EF-24 and EF-25) over a 2-week period (run times and energy usage, kWh). Also, photos will be taken (post-installation) of the new exhaust fan installed along with the supporting ductwork, for verification purposes.</li> </ul>
	ED Assessment: M&V efforts are appropriate for the level of measure savings
	ED Recommendation: None



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<b>Reviewed Parameter</b>	<b>Analysis</b>
<b>Net-to-Gross Review</b>	IOU Proposal: Not provided
	ED Assessment: Assessment not completed
	ED Recommendation: No work is recommended at this time