

## **Phase III Ex Ante Review Findings**

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

<b>IOU</b>	PG&E
<b>Application ID</b>	NC0124586
<b>Application Date</b>	10/20/2011
<b>Program ID</b>	
<b>Program Name</b>	Savings by Design
<b>Program Year</b>	2011
<b>Itron Project ID</b>	X335
<b>IOU Ex Ante Savings Date</b>	Pending
<b>ED Measure Name</b>	Whole Building
<b>Project Description</b>	The project includes a [REDACTED] square foot data center in [REDACTED], CA. Savings are claimed for a proposed design as compared with the criteria of the report “Energy Efficiency Baselines for Data Centers” dated November 30, 2011.
<b>Date of ED Review(s)</b>	6/3/2013, 6/26/2013, 11/5/2013
<b>Primary Reviewer / Firm</b>	Doug Maddox, James J. Hirsch & Associates
<b>Review Supervisor / Firm</b>	Nikhil Gandhi/ Strategic Energy Technologies, Inc.
<b>ED Project Manager</b>	[REDACTED] / California Public Utilities Commission, Energy Division
<b>ED Policy Authorization (as needed)</b>	
<b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b>	Desk Review
<b>ED Recommendation</b>	Savings approved as calculated by ED; need clarification on incremental construction costs.

## Summary of Review

The Investor-Owned-Utility (IOU) submitted the following documents for review:

- [REDACTED] xxx IR\_ED Response\_10182013.xlsx
- [REDACTED] xxxx IR Revised Calcs.xlsx
- [REDACTED] xxxx Trend Data.xlsx
- AHU Specification Sheet.pdf
- Chiller Specification Sheet.pdf
- invoice1.pdf through invoice6.pdf

Key parameters that were investigated in the post-installation verification are listed in Table 1-2 below. The analysis and conclusions were generally found to be reasonable. One issue that was identified was the calculation of fan power for the installed CRAH units. The CRAH fan power calculations in “[REDACTED] xxxx IR Revised Calcs.xlsx” did not account for motor or drive efficiencies. ED has modified the workbook to correct this issue (see “[REDACTED] xxxx IR Revised Calcs\_EDFinal.xlsx” and [REDACTED] xxx IR\_ED Response\_10182013\_EDFinal.xlsx).

**Table Error! No text of specified style in document.-2: Key Parameters and Verification Results**

Parameter	Baseline	Proposed	Post Field Verified	Verification Notes
Data center equipment load	696 kW	1,160 kW	696 kW	60% of expected servers are installed
Air management scheme	Hot aisle/ cold aisle, Open (Scheme I)	Hot aisle/ cold aisle, fully enclosed (Scheme II)	Hot aisle/ cold aisle, Open (Scheme I)	Post field inspection revealed that fully enclosed air management was not implemented
Supply/ return air temperatures	62 F/ 70 F	75 F/ 97 F	59 F/ 71F	Calculated based on the 1 month of supply and return temperature data from Customer’s EMS. See Attachment 2 “[REDACTED] xxxx Trend Data”
Supply fan speed control	None	Variable speed drives	Variable speed drives	Visually observed during the site inspection.
Total supply fan air flow	285,600 cfm	240,000 cfm	240,000 cfm	12 Supply fans, each rated at 20,000 cfm. See Attachment 3 “AHU Specification Sheet”
Total supply fan kW	185.9 kW	115.5 kW	171.1 kW	Calculated fan power needed to supply the required flow (post field verified value calculated by ED)
Air economizer	No	Yes	Yes	Visually observed during the site inspection.
Humidification	Yes	No	No	Visually observed during the site inspection.
Chiller Rated Efficiency (kW/ton)	0.542	0.568	0.568	See Attachment 4 “Chiller Specification Sheet”
Cooling tower set point	80 F	70 F	68 F	Calculated based on the 1 month of supply and return temperature data from Customer’s EMS. See Attachment 2 “[REDACTED] xxxx Trend Data”

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Chilled water set point	44 F	45 F	47 F	Calculated based on the 1 month of supply and return temperature data from Customer's EMS. See Attachment 2 "██████ xxxx Trend Data"
Number of chilled water pumps	1	2	2	Visually observed during the site inspection (Third pump is installed as backup)
Number of cond water pumps	1	2	3	Visually observed during the site inspection.
Cooling tower approach	10 F	16.5 F	16.5 F	From design documents
Chilled water pump total kW	21.1 kW	29.4 kW	29.4 kW	Calculated (Three 25-hp pump motors (one as backup) installed,
Condenser pump total kW	22.8 kW	29 kW	29.0 kW	Calculated (Three 25-hp pump motors )
Cooling tower fan max kW	13.4 kW	10.1 kW	10.1 kW	Site inspection/ Spec Sheet (15-hp motor with LF of 90%)

The incremental cost table submitted by the IOU is shown below in Table 1-3. While it makes sense that a portion of the Siemens controls system cost should be attributable to the economizer, there are other aspects of the project that also are presumably controlled by this same system, such as the chillers and general air handler function. Thus, clarification is needed on the scope of the Siemens Control system, and whether it needs to be prorated for applicability to the efficiency measures. Similarly, the California United Mechanical line item is prorated at 20%, but no explanation is given as to how that number was established.

**Table Error! No text of specified style in document.-3: Key Parameters and Verification Results**

Line Item	Vendor	Invoice #	Construction Cost	Prorated % applied to proposed energy savings	Construction Cost Applied to Incentive
Siemens Control System	Siemens	5442250851 and 5442506641	\$148,400	100%	\$148,400
AHU	ACIS	111102-004	\$261,396	0%	\$0
EF	ACIS	120102-001	\$58,294	100%	\$58,294
VFD	Control Concepts Inc.	339129	\$52,368	100%	\$52,368
Chiller, CT and state tax	ACIS	111102-004	\$205,635	0%	\$0
Mech	California United Mechanical	151859	\$366,760	20%	\$73,352
Economizer Duct Work	Aircom Mechanical Inc	32254	\$22,037	100%	\$22,037
<b>Total</b>					<b>\$354,451</b>

## **Review Conclusion**

The ex ante savings are approved, as modified by ED. Other ex ante parameters, incentives and incremental costs are not approved. Clarification of incremental construction costs is needed, with adjustments, as appropriate.

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

ED requests that the IOU undertake the recommended steps and submit the following information:

- Thus, clarification is needed on the scope of the Siemens Control system, and why its cost should not be prorated for applicability to the efficiency measures.
- Additional detail on the invoice from California United Mechanical with an explanation of what portions of that work were relevant to the measures and how the 20% prorating was established.

**Table 1-4 Review Findings**

Reviewed Parameter	Analysis
<b>Project Baseline Type</b>	IOU Proposal: New Construction
	ED Assessment: Correct
	ED Recommendation: Accept
<b>Project Baseline Technology</b> (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)	IOU Proposal: “Energy Efficiency Baselines for Data Centers” dated November 30, 2011.
	ED Assessment: Appropriate
	ED Recommendation: Accept
<b>Project Cost Basis</b> (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)	IOU Proposal: Incremental Cost
	ED Assessment: Correct
	ED recommendation: Accept
<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> (for each measure)	IOU Proposal: 17.0
	ED Assessment: Recalculate with updated savings.
	ED Recommendation: 18.7
<b>Savings Assumptions</b>	IOU Proposal: Baseline and proposed values for specific measures are listed above in Table 1-2
	ED Assessment: Final CRAH fan power was changed by ED from 153.8 to 171.1 to account for motor and drive efficiencies
	ED Recommendation: Accept with changes.
<b>Calculation Methods/Tool review</b>	IOU Proposal: Baseline and proposed energy were evaluated using a spreadsheet tool.
	ED Assessment: Reasonable
	ED Recommendation: Accept
<b>Pre- or Post-Installation M&amp;V Plan</b>	IOU Proposal: Findings are listed in Table 1-2
	ED Assessment: Reasonable
	ED Recommendation: Accept

Reviewed Parameter	Analysis
Net-to-Gross Review	IOU Proposal: None stated
	ED Assessment: NTG interview may be warranted
	ED Recommendation: TBD

**Table 1-5 Energy Savings Summary, Project Costs & Incentive**

Description	IOU Ex Ante Claim	IOU Post M&V Claim	ED Recommendations
First Year kWh Savings	2,726,798	1,465,590	1,287,556
First Year Peak kW Savings	136	60	39
First Year Therms Savings	N/A	N/A	N/A
kWh Savings (RUL Period)	N/A	N/A	N/A
Peak kW Savings (RUL Period)	N/A	N/A	N/A
Therms Impact (RUL Period)	N/A	N/A	N/A
kWh Savings (RUL thru EUL Period)	N/A	N/A	N/A
Peak kW Savings (RUL thru EUL Period)	N/A	N/A	N/A
Therms Savings (RUL thru EUL Period)	N/A	N/A	N/A
Annual Non-IOU Fuel Impact (RUL Period)	N/A	N/A	N/A
Annual Non-IOU Fuel Impact (RUL thru EUL Period)	N/A	N/A	N/A
Project Costs for Baseline #1 (RUL or EUL)	\$363,812	\$354,451	Provide clarification and adjustments as needed
Project Costs for Baseline #2 (EUL minus RUL period)	N/A	N/A	N/A
Project Incentive Amount	N/A	\$194,250.60	\$175,914.47; subject to change if the incremental cost changes