

## **Final 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>CPUC Staff 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 CPUC Staff Review(s)</b>	6/3/2013, 6/26/2013, 11/5/2013, 12/24/2013
<b>Primary Reviewer / Firm</b>	Doug Maddox, James J. Hirsch & Associates
<b>Review Supervisor / Firm</b>	Nikhil Gandhi/ Strategic Energy Technologies, Inc.
<b>CPUC Staff Project Manager</b>	[REDACTED] / California Public Utilities Commission, Energy Division
<b>CPUC Staff Policy Authorization (as needed)</b>	
<b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b>	Desk Review
<b>CPUC Staff Recommendation</b>	This project’s first year ex ante savings of 1,327,025 kWh and 44 kW are approved.

## Summary of Review

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

- [REDACTED] XXXX IR\_Revised ED Response\_12192013.xlsx
- [REDACTED] XXXX IR Revised Calcs\_ED\_PhaseIII\_IOU Revised.xlsx
- [REDACTED] XXXX Trend Data.xlsx
- AHU Specification Sheet.pdf
- Chiller Specification Sheet.pdf
- invoice1.pdf through invoice6.pdf
- [REDACTED] XXXX Siemens Invoice.xlsx
- Aircom Economizer Invoice.pdf

Key parameters that were investigated in the post-installation verification are listed in Table 1-2 below. The analysis and conclusions were found to be reasonable.

**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	167.6 kW	Calculated fan power needed to supply the required flow
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)	0.577	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%)

An updated version of the incremental cost table submitted by the IOU is shown below in Table 1-3. The latest submitted documents included invoices showing the portions of the how the Siemens control system cost that are attributable to the air economizer. Also, an error in the economizer duct work item was corrected, and the corresponding invoice was submitted to back up that change. The California United Mechanical line item is prorated down to 0% since it appears to be irrelevant.

**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	23%	\$34,132
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	11%	\$22,866
Mech	California United Mechanical	151859	\$366,760	0%	\$0
Economizer Duct Work	Aircom Mechanical Inc	32254	\$220,365	100%	\$220,365
<b>Total</b>					<b>\$388,025</b>

**Review Conclusion**

The ex ante savings and incentives are approved.

**Table 1-4 Review Findings**

Reviewed Parameter	Analysis
<b>Project Baseline Type</b>	IOU Proposal: New Construction
	CPUC Staff Assessment: Correct
	CPUC Staff 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.
	CPUC Staff Assessment: Appropriate
	CPUC Staff 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
	CPUC Staff Assessment: Correct
	CPUC Staff Recommendation: Accept
<b>RUL</b> (required for early retirement projects only, otherwise N/A)	IOU Proposal: N/A
	CPUC Staff Assessment: N/A
	CPUC Staff Recommendation: N/A
<b>EUL</b> (for each measure)	IOU Proposal: 18.3
	CPUC Staff Assessment: Reasonable
	CPUC Staff Recommendation: Accept
<b>Savings Assumptions</b>	IOU Proposal: Baseline and proposed values for specific measures are listed above in Table 1-2
	CPUC Staff Assessment: Correct
	CPUC Staff Recommendation: Accept
<b>Calculation Methods/Tool review</b>	IOU Proposal: Baseline and proposed energy were evaluated using a spreadsheet tool.
	CPUC Staff Assessment: Reasonable
	CPUC Staff Recommendation: Accept
<b>Pre- or Post-Installation M&amp;V Plan</b>	IOU Proposal: Findings are listed in Table 1-2
	CPUC Staff Assessment: Reasonable

<b>Reviewed Parameter</b>	<b>Analysis</b>
	CPUC Staff Recommendation: Accept
<b>Net-to-Gross Review</b>	IOU Proposal: None stated
	CPUC Staff Assessment: NTG interview may be warranted
	CPUC Staff Recommendation: TBD

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

<b>Description</b>	<b>IOU Ex Ante Claim</b>	<b>IOU Post M&amp;V Claim</b>	<b>CPUC Staff Recommendations</b>
<b>First Year kWh Savings</b>	2,726,798	1,327,025	Accept
<b>First Year Peak kW Savings</b>	136	44	Accept
<b>First Year Therms Savings</b>	N/A	N/A	N/A
<b>kWh Savings (RUL Period)</b>	N/A	N/A	N/A
<b>Peak kW Savings (RUL Period)</b>	N/A	N/A	N/A
<b>Therms Impact (RUL Period)</b>	N/A	N/A	N/A
<b>kWh Savings (RUL thru EUL Period)</b>	N/A	N/A	N/A
<b>Peak kW Savings (RUL thru EUL Period)</b>	N/A	N/A	N/A
<b>Therms Savings (RUL thru EUL Period)</b>	N/A	N/A	N/A
<b>Annual Non-IOU Fuel Impact (RUL Period)</b>	N/A	N/A	N/A
<b>Annual Non-IOU Fuel Impact (RUL thru EUL Period)</b>	N/A	N/A	N/A
<b>Project Costs for Baseline #1 (RUL or EUL)</b>	\$363,812	\$388,025	Accept
<b>Project Costs for Baseline #2 (EUL minus RUL period)</b>	N/A	N/A	N/A
<b>Project Incentive Amount</b>	N/A	\$179,945	Accept