

Ex Ante Review Findings

Table 1-1: Project Information

IOU	PG&E
Application ID	NC0124586
Application Date	10/20/2011
Program ID	
Program Name	Savings By Design
Program Year	2011
Itron Project ID	X335
IOU Ex Ante Savings Date	Pending
ED Measure Name	Whole Building
Project Description	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.
Date of ED Review(s)	6/3/2013, 6/26/2013
Primary Reviewer and Firm	Doug Maddox, James J. Hirsch & Associates
Review Supervisor and Firm	Nikhil Gandhi/ Strategic Energy Technologies, Inc.
Type of Review (Desk, On-site, Full M&V, Tool)	Desk Review
ED Project Manager	[REDACTED], California Public Utilities Commission, Energy Division
ED Policy Authorization (as needed)	
ED Recommendation	Conditionally approved subject to post-installation verification findings.

Measure Description

Energy savings for this building were accomplished by a number of improvements relative to the criteria defined in the document “Energy Efficiency Baselines for Data Centers” dated November 30, 2011. The key parameters for the baseline and proposed models are as follows:

Table 1-2: Key Parameters

Parameter	Baseline	Proposed	Verification Plan
Air management scheme	Hot aisle/ cold aisle, ducted return	Hot aisle/ cold aisle, fully enclosed	On-site inspection
Supply/ return air temperatures	64 F/ 74 F	75 F/ 97 F	Short term EMS trending/design docs/ measure w/ temp gun
Supply fan speed control	None	Variable speed drives	On-site inspection
Data center equipment load	1,160 kW	1,160 kW	Equipment specification, sheet/nameplate data (or spot monitored)
Total supply fan air flow	379,200 cfm	240,000 cfm	
Total supply fan kW	251.5 kW	115.5 kW	Spot monitored
Air economizer	No	Yes	On-site inspection
Humidification	Yes	No	On-site inspection
Chiller Rated Efficiency	0.542	0.568	Equipment specification sheet/ nameplate data
Cooling tower set point	80 F	70 F	Short term EMS trending/ design documents
Chilled water set point	44 F	45 F	Short term EMS trending/ design documents
Number of chilled water pumps	1	2	On-site inspection
Number of condenser water pumps	1	2	On-site inspection

Cooling tower approach	16.5 F (modeled) 10 F (required)	16.5 F	Short term EMS trending/ design documents
Chilled water pump total kW	21.1 kW	29.4 kW	Calculated
Condenser pump total kW	22.8 kW	29 kW	Calculated
Cooling tower fan max kW	33.6 kW (modeled) 13.4 kW (required)	10.1 kW	

Summary of Review

The following documents submitted by the Investor Owned Utility (IOU) were used in this review:

- XXX_CNC_2012 Live Calcs.xlsx – Energy calculation workbook
- XXX Report.pdf – Summary report

The baseline assumptions and analysis methods for this project were generally found to be consistent with the requirements of the document “Energy Efficiency Baselines for Data Centers”. Two discrepancies that were identified are as follows:

1. Cooling tower approach was modeled at 16.5 F in the baseline, whereas the required value is 10 F.
2. Cooling tower fan power was entered as 50 hp in the baseline. The baseline document specifies a requirement of 60 gpm/hp, which translates to 20 hp for the project. The resulting baseline fan electric power should change from 33.6 to 13.4 kW.
3. In the proposed building, the chilled water and condenser water pumps are modeled as running continuously, even when cooling is provided entirely by the air-side economizer. Please confirm that this is the intended sequence of operation.

In addition to the issues listed above, there are some discrepancies between the report document and the analysis workbook. The report document lists the building area as [REDACTED] square feet, whereas the workbook has it at [REDACTED] square feet. The Report document describes the HVAC systems as nine new 40-ton units and five existing units (14 total). The workbook lists twelve 40 ton units for the proposed building.

Review Conclusion

The issues described above may have a significant impact on measure savings, and thus need to be addressed before the project is approved.

Summary of ED Requested Action by the IOU

The Implementer provided responses to the following ED requested and recommended action items:

1. Provide clarification and corrections for discrepancies described in the Summary of Review above. Implementer responses are as follows:
 - The correct Baseline Cooling Tower Approach is 10F (instead of 16.5F) and Cooling Tower Baseline Fan Power is 13.4 kW (instead of 33.6 kW). Savings calculations are revised accordingly. See attached excel spreadsheet titled as “████████ XXXXX Revised Calcs”.
 - Reviewer also confirmed that the submitted calculations were correct in showing the proposed data center space as ██████ sq. ft. The total building area is ██████ square feet.
 - Reviewer confirmed that the submitted calculations were correct in showing twelve (12) 40-ton units.
 - Reviewer confirmed that it is possible for the chilled water pumps and condenser water pumps to be operating even when cooling is provided entirely by the air-side-economizers.
2. Submit itemized list of incremental construction costs for the key components that distinguish the proposed building from the baseline. Submitted costs are listed below.

The contractor has provided incremental costs by the construction as shown in the Table below.

Table 1-3: Preliminary Incremental Costs

Line Item	Construction Cost	Prorated % applied to proposed energy savings	Construction Cost Applied to Incentive
Roof Curb	\$106,642	100%	\$106,642
Controls	\$76,000	100%	\$76,000
Control wiring	\$35,000	100%	\$35,000
AHU	\$232,925	0%	\$0
EF	\$47,671	100%	\$47,671
OA	\$12,625	100%	\$12,625
VFD	\$19,999	100%	\$19,999
Mech	\$220,365	20%	\$44,073
Electrical	\$109,010	20%	\$21,802
Total			\$363,812

- Determine effective useful life (EUL) for each component and calculate the weighted average EUL for the project.

Table 1-4: Effective Useful Life Calculations

Measure Description	Measure Code	kWh Savings	kW Savings	EUL (Years)	EUL Source
AHU - Hot/Cold Aisle Containment	CHA63	1,071,739.2	120.53	4	Engineering Judgment
AHU - Other (Eliminate Humidification)	CHA00	5,248	8.80	N/A (no new equipment installed)	
Chiller - Efficient Unit	CHC21	1,516,274.9	2.92	20	DEER 2008
CHW Pump - Reduce/Optimize Flow/Configuration	CHI12	47,668.3	-8.10	15	DEER08: Water Loop Pumps
CW Pump - Reduce/Optimize Flow/Configuration	CHI22	72,472.8	8.27	15	DEER08: Water Loop Pumps
Cooling Tower - Efficient Unit	CHF10	13,394.7	3.36	15	DEER08: Cooling Tower for Packaged System, HVAC Other Central Plant
		2,726,797.7	135.78	<i>Weighted EUL (13Years)</i>	

- Submit a post-installation verification plan describing how the key parameters listed in Table 1-2 will be verified.
 - The verification tasks have been added to Table 1-2.

Remaining ED request utility action item:

- Lincus Reviewer will work with the project contractor to obtain measure-by-measure incremental cost during the post review.

Table 1-5: Project Overview

Description	IOU Proposed Ex Ante Data	ED Recommendations
Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)	New Construction	Accept
Project Cost Basis (Full Cost, Incremental Cost)	Incremental Cost	Measure-by-measure incremental costs will be calculated during post review.
RUL (Early retirement projects only, otherwise N/A (not applicable))	N/A	N/A
EUL	Not provided	Need values.
First Year kWh Savings	2,726,798	Accept
First Year Peak kW Savings	136	Accept
First Year Therms Savings	N/A	N/A
kWh Savings (RUL Period)	N/A	N/A
Peak kW Savings (RUL Period)	N/A	N/A
Therms Impact (RUL Period)	N/A	N/A
kWh Savings (EUL thru RUL Period)	N/A	N/A
Peak kW Savings (EUL thru RUL Period)	N/A	N/A
Therms Savings (EUL thru RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (EUL thru RUL Period)	N/A	N/A
Net-to-Gross Ratio	Not provided	TBD

Table 1-6: Detailed Review Findings

Reviewed Parameter	Analysis
Project Gross Savings Baseline (for early retirement projects only, include RUL through EUL baseline)	IOU Proposal: Energy Efficiency Baselines for Data Centers, November 30, 2011.
	ED Assessment: As described in Summary of Review, problems were found and corrected.
	ED Recommendation: Accept
Project Cost Basis (for early retirement projects only, include RUL through EUL cost basis treatment)	IOU Proposal: Preliminary incremental costs provided
	ED Assessment: Since incentive is limited by incremental cost, clearly identified incremental costs are needed.
	ED recommendation: Measure-by-measure incremental costs will be calculated during post review.
RUL (required for early retirement projects only, otherwise n/a)	IOU Proposal: Not applicable
	ED Assessment: Not applicable
	ED recommendation: None
EUL	IOU Proposal: Weighted EUL calculation table listed above
	ED Assessment: Appears reasonable
	ED Recommendation: Accept
Savings Assumptions	IOU Proposal: Baseline and proposed values for specific measures are listed above in the Measure Description
	ED Assessment: Savings assumptions are reasonable
	ED Recommendation: Accept
Calculation Methods/Tool review	IOU Proposal: Baseline and proposed energy were evaluated using a spreadsheet tool.
	ED Assessment: Measure values are correctly implemented in the models. Baseline model issues have been corrected.
	ED Recommendation: Accept
Pre- or Post-Installation M&V Plan	IOU Proposal: Listed in Table 1-2.
	ED Assessment: Plan is reasonable.
	ED Recommendation: Accept
Net-to-Gross Review	IOU Proposal: Note stated
	ED Assessment: NTG interview may be warranted.
	ED Recommendation: TBD