Phase I Ex Ante Review Findings

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

IOU	IOU
Application ID	7293
Application Date	4/23/2012
Program ID	CNC
Program Name	Customized New Construction Program
Program Year	2013
Itron Project ID	X488
IOU Ex Ante Savings Date	
CPUC Staff Measure Name	Whole building
Project Description	New data center pods in existing building
Date of CPUC Staff Review	7/22/14
Primary Reviewer / Firm	Doug Maddox/ J. J. Hirsch Associates
Review Supervisor / Firm	Nikhil Gandhi/ J. J. Hirsch Associates
CPUC Staff Project Manager	[redacted] / California Public Utilities Commission, Energy Division
CPUC Staff Policy Authorization (as needed)	
Type of Review (Desk, On-site, Full M&V, Tool)	Desk
CPUC Staff Recommendation	This project is conditionally approved; however, CS requires additional information regarding calculation assumptions and model details to review the project's ex ante savings estimates.

Measure Description

A whole building custom analysis was performed for POD II and POD III of a data center build-out. The following measures were considered in the analysis:

1. Water-side economizer serving computer room air handlers (CRAHs)
2. Air flow management to allow increased CRAH return air temperatures

Table 1-2: Key Savings Assumptions

Parameter	Baseline	Proposed	Notes
Water-side economizer	No	Yes	Fixed approach of 3°F was modeled.
Tower fan VFD	Yes	Yes	Oversized VFD has been proposed to meet future demand.
Condenser pump VFD	No	Yes	Oversized VFD has been proposed to meet future demand.
Chilled water pump VFD	No	Yes	Oversized VFD has been proposed to meet future demand.
CRAH fan VFD	No	Yes	
CRAH supply temperature	65°F	POD II: 77.4°F POD III: 74.7°F	This is critical to savings
CRAH return air temperature	78°F	POD II: 103°F POD III: 103°F	This is critical to savings

Summary of Review

The Investor-Owned-Utility (IOU) submitted the following documents on 7/18/2014, which were used for this Phase I review:

(1) 7293-A-100 AESC POD II III Energy Efficiency Final Report.pdf

(2) 7293-A-100 AESC POD II Calcs_Rev2.xlsx

(3) 7293-A-100 AESC POD III Calcs_Rev2.xlsx

The CPUC review staff found the following issues in the analysis:

1. In the Final Report it is stated that "Additional IT load may be added over the next two to four years". Some of the HVAC systems for the facility are sized for the future expected load, which will be significantly greater than the current load. For example, the modeled cooling load for POD II is 448 tons, whereas the capacity of the cooling towers for the water-side economizer in that building is 1,600 tons. Where variable

speed drives are used in these systems, this oversizing results in estimated savings that might not be realized when full expansion takes place. .

2. A safety factor of 1.2 is applied to the load when calculating both equipment capacities and energy consumption. While it is appropriate to use a safety factor for sizing, it is not appropriate for energy calculations.

3. Some information was submitted regarding energy consumption of the existing buildings, but it is not clear how the trend data were used to estimate the loads. The loads values in the workbook were hard values, not formulas, and thus it was not possible to determine how they were determined.

4. The analysis assumes constant approach of 3°F for the cooling towers serving the water-side economizer. While this scenario is possible, a more efficient control scenario would involve resetting the approach to a higher value as outdoor temperature drops. There is a trade-off between tower fan energy consumption and condenser pump power, which could be optimized by a reset control.

5. Total incremental costs are listed in the calculation workbooks, but details regarding how the costs were calculated are limited. When costs are updated at the post-verification stage, additional detail should be provided showing how the incremental costs were calculated. Include breakdown of costs by component, where appropriate, including component sizes and quantities.

Review Conclusion

The project is conditionally approved. However, the ex-ante savings are contingent upon utility submittal to CS of corrections and additional information as requested below.

Summary of CPUC Staff Requested Action by the IOU

CPUC Staff requests that the IOU undertake the recommended steps and submit the following information due on 8/18/2014:

1. Change the capacities of the water-side economizer cooling towers and associated fans and pumps for the proposed models in the calculation workbooks such that the sizing factors are 1.2 relative to the modeled cooling loads.
2. Modify the calculation workbooks such that energy calculations are not subject to the sizing factors.
3. Provide a description of how trend data were used to estimate the equipment loads for POD II and POD III. Include description of the calculation process for the estimated loads in the calculation workbooks, especially certain values that appear to refer to an external source and lacked documentation
4. Confirm whether the water-side economizer system is intended to operate with a constant approach. If this is not the case, provide a description of the cooling tower temperature control concept and modify the calculation workbooks accordingly.
5. Notify when post-installation inspection is planned. A staff consultant will accompany PG&E reviewer/s.

Table 1-2 Review Findings

Reviewed Parameter	Analysis
Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures, Major Renovation) Note: For early retirement projects only, include RUL through EUL baseline)	IOU Proposal: New Construction
	CPUC Staff Assessment: Correct
	CPUC Staff Recommendation: Accept
Project Baseline Technology (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", March 1, 2013
	CPUC Staff Assessment: Correct
	CPUC Staff Recommendation: Accept
Project Cost Basis (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)	IOU Proposal: Incremental
	CPUC Staff Assessment: Costs are provided without much granularity or explanation.
	CPUC Staff Recommendation: Appropriately calculated incremental measure costs should be provided at the time of the post-installation verification.
RUL (required for early retirement projects only, otherwise N/A)	IOU Proposal: N/A
	CPUC Staff Assessment: N/A
	CPUC Staff Recommendation: N/A
EUL (for each measure)	IOU Proposal: N/A
	CPUC Staff Assessment: Measure EULs are required to be assigned at this time to assess the measure eligibility. Since all measures appear to have longer than a five-year EUL, specific EUL assignments are not necessary at this time.
	CPUC Staff Recommendation: Submit measure EULs at the time of post-installation verification.
Savings Assumptions	IOU Proposal: Listed in Table 1-2
	CPUC Staff Assessment: Basic assumptions are reasonable except the sizing

Reviewed Parameter	Analysis
	factor and approach temperature listed in the Review Conclusion where a correction/explanation is needed.
	CPUC Staff Recommendation: Size equipment in proposed case calculations based on current building load. Apply sizing factor to equipment size, but not to energy calculations.
Calculation Methods/Tool review	IOU Proposal: Spreadsheet analysis
	CPUC Staff Assessment: Locked spreadsheet was provided; unable to assess.
	CPUC Staff Recommendation: Submit unlocked spreadsheet.
Pre- or Post-Installation M&V Plan	IOU Proposal: Perform visual inspections of relevant equipment components; collect 20 days of trend data for key parameters.
	CPUC Staff Assessment: Reasonable.
	CPUC Staff Recommendation: Acceptable. Notify staff of post-installation site-visit.
Net-to-Gross Review	IOU Proposal: None
	CPUC Staff Assessment: May be needed.
	CPUC Staff Recommendation: A NTG screening should be done.

Table 1-3 Energy Savings Summary, Project Costs & Incentive

Description	IOU Ex Ante Claim	CPUC Staff Recommendations
First Year kWh Savings	7,278,900	TBD
First Year Peak kW Savings	774	TBD
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 (RUL thru EUL Period)	N/A	N/A
Peak kW Savings (RUL thru EUL Period)	N/A	N/A
Therms Savings (RUL thru EUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL thru EUL Period)	N/A	N/A
Project Costs for Baseline #1 (RUL or EUL)	$1,060,945	TBD
Project Costs for Baseline #2 (EUL minus RUL period)	N/A	N/A
Project Incentive Amount	$500,000	TBD