Ex Ante Review Findings

Project Information

IOU	Pacific Gas and Electric
Application ID	2K12108487
Application Date	7/25/11
Program Number	
Program Name	Non-Residential Customized Retrofit
Program Year	2012
Project ID	2K12108487
IOU Ex Ante Savings Date	
Itron ID	X195
ED Measure Group Name	
IOU Measure Name	Turbocor Chiller Installation
End Use	Cooling
Date of ED Review	October 17, 2012
Type of Review	Desk Review
Primary Reviewer and Firm	Doug Maddox, James J. Hirsch & Associates
ED Review and QC	Nikhil Gandhi, DMQC
ED Recommendation	Conditional approval subject to post-installation verification and true-up and modeling Title 24 Baseline for the RUL through EUL period.

Measure Description

The measure replaces two 100 ton screw compressors with two 100 ton Turbocor variable speed drive compressors. The existing chillers are 13 years old, and have a remaining useful life (RUL) of 7 years based on the DEER useful life of 20 years for a chiller.

Summary of Review

The measure analysis was performed using eQuest. The baseline model total energy consumption is [redacted], which is reasonably close to the 2011 utility bill value of [redacted]. Similarly, annual peak demand for the baseline model is [redacted], which compares well with the [redacted] found in the 2011 bill data. Based upon a review of the eQuest input files and clarifications received in response to the Phase I review, the model appears to be reasonable.

One issue that still needs to be addressed is the calculation of savings for the period after the remaining useful life (RUL). This requires a second baseline simulation for which the chiller just meets the 2008 Title 24 requirement of 2.8 COP (1.26 kW/Ton), which is slightly better than the

existing chiller baseline. The total lifetime savings is then calculated as the sum of the accumulated savings during the RUL period and the EUL savings after the RUL period.

Description	IOU Proposed Ex Ante Data	ED Recommended Changes
Project Baseline (Early Replacement, Normal Replacement, Capacity Expansion)	New Construction	Accept
Project Cost Basis (Full Cost, Incremental Cost)	Compressor cost $164,000	Accept
RUL	7 years	None
EUL	20 years	None
kWh Savings through RUL	395,000	None
KW Savings through RUL per CPUC Definition	51.8	None
Therms Savings through RUL	0	None
kWh Savings through EUL	Not reported	Savings vs. 2008 Title 24
KW Savings through EUL	Not reported	Savings vs. 2008 Title 24
Therms Savings through EUL	n/a	n/a
Lifetime Savings kWh	Not reported	Calculate as sum of RUL and EUL savings
Lifetime Savings KW	Not reported	Calculate as sum of RUL and EUL savings
Lifetime Savings Therms	n/a	n/a
Secondary Impact kWh	n/a	n/a
Secondary Impact KW per CPUC Definition	n/a	n/a

Description	IOU Proposed Ex Ante Data	ED Recommended Changes
Secondary Impact Therms	n/a	n/a
Interactive Effects kWh	Not reported	n/a
Interactive Effects Therms	Not reported	n/a
Net-to-Gross Ratio	Not stated	None

Detailed Review Findings

Reviewed Parameter	Analysis
Project Baseline	IOU Proposal: Existing air-cooled chiller, installed in 1999. Rated efficiency is 1.3 kW/Ton. Minimum condensing temperature was run at 75°F.
	ED Assessment: Existing model is reasonable. 2008 Title 24 baseline is needed.
	ED Recommendation: Accept existing model. Add 2008 Title 24 baseline.
Project Cost Basis	IOU Proposal: Incremental estimated costs are described in "2K12108487 – COM_2012 PG&E Review Form v1.2.xlsm" $164,000 for compressors only
	ED Assessment: Seems reasonable.
	ED recommendation: Accept.
RUL	IOU Proposal: Existing chiller is 13 years old, and DEER EUL for chillers is 20 years. Hence, RUL is 7 years.
	ED Assessment: Correct
	ED Recommendation: Accept
EUL	IOU Proposal: 20 years

Reviewed Parameter	Analysis
	ED Assessment: 20 years
	ED Recommendation: Accept
Savings Assumptions	IOU Proposal: The measure efficiency is specified in the model as an electric input ratio of 0.2815. This corresponds to 1.0 kW/Ton.
	ED Assessment: Basic assumptions are reasonable
	ED Recommendation: Accept
Calculation Methods/Tool review	IOU Proposal: Analysis done using eQuest. For the Turbocor air-cooled chiller eQuest model performance curves were used that were developed for a water-cooled Turbocor chiller. Also, minimum condensing temperature for the baseline appears to be high, as described for the Project Baseline above.
	ED Assessment: Based on performance data provided on 10/11/2012, the eQuest performance curves are expected to be conservative when applied to an air-cooled chiller. The adjustments to minimum condensing temperature are found to be acceptable in light of the limitations of eQuest and the relative magnitudes applied to the baseline and measure models.
	ED Recommendation: Accept.
Pre- or Post-Installation M&V Plan	IOU Proposal: None.
	ED Assessment: Clarify whether the IOU intends to conduct post-installation M&V.
	ED Recommendation: Suggest conduct post-installation verification.

Reviewed Parameter	Analysis
Net-to-Gross Review	IOU Proposal: Not stated
	ED Assessment: None
	ED Recommendation: None.