

Phase II Ex Ante Review Findings

Table-1: Project Information

IOU	PG&E
Application ID	1018-03
Application Date	05/29/13
Program ID	PGE2223
Program Name	Heavy Industry Energy Efficiency Program (HIEEP)
Program Year	2013
Itron Project ID	X374
IOU Ex Ante Savings Date	8/9/2013
ED Measure Name	Lighting and Controls
Project Description	Linear fluorescent and HID lighting retrofit with occupancy sensor installation
Date of ED Review(s)	Phase I - 9/18/2013, Phase – II 10/31/13
Primary Reviewer / Firm	Sepideh Shahinfard / Itron Terrence Redd / Itron
Review Supervisor / Firm	Charles Ehrlich / Itron
ED Project Manager	██████████ / California Public Utilities Commission, Energy Division
ED Policy Authorization (as needed)	
Type of Review (Desk, On-site, Full M&V, Tool)	Desk Review
ED Recommendation	The ex ante savings are conditionally approved as presented pending submittal of the final savings claim being in compliance with all of ED's requests identified in the Phase I and this Phase II review.

Measure Description

The project involves replacing T-12 fluorescent, incandescent, and HID fixtures to T8 fluorescent fixtures in several buildings of a manufacturing facility. The proposed T8 fixtures are equipped with occupancy sensors whereas the pre-existing fixtures are claimed to be manually controlled, but often left on due to safety concerns. Most of the buildings are occupied 24 hours a day, 7 days a week, for a total of 8,760 hrs/yr except for the administrative and research buildings which are operating 10 hours a day, 5 days a week, for a total operating hours of 2,600 hrs/yr.

The total claimed kWh savings and peak demand kW reduction associated with this project (including interactive effects) is 2,008,311.78 and ED conditionally approves 1,048,023 kWh, 141.71 kW, and -202 therms based upon this review. The total project cost is \$300,000 and the incentive amount is \$66,572 for a simple payback of 3.4 years.

Summary of Review

The Investor-Owned-Utility (IOU) resubmitted the following documents in response to the Phase I Review on 10/11/2013 for this Phase II review:

- PGE 1018-03 phase I EAR (X374) LM Response Oct 11.docx
- Figure 2 E-100-1552 [REDACTED] Buildings With Sq Ftg.tif
- Figure 1 [REDACTED] Site Map with Building Names.pdf
- Spec sheets
- Letters of Transmittal
- 1018-03 [REDACTED] Lighting and Controls Upgrade PCIP Rev 3 Oct 11.pdf
- 1018-03 [REDACTED] Lighting and Controls Upgrade Form 2 Rev 3 Oct 11.pdf
- 1018-03 Attachment C [REDACTED] [REDACTED] Lighting Upgrades HID 2nd Baseline Rev 3 Oct 11.xlsx
- 1018-03 Attachment B Appendix B Standard Fixture Watts Mark-Up.pdf
- 1018-03 Attachment A [REDACTED] [REDACTED] Lighting Upgrades T24 Rev 3 Oct 11.xlsx
- PGE 1018-03 phase I EAR (X374) LM Response Oct 11.docx

This phase II review looks closely at the requested changes and spreadsheet calculations resulting from the phase I review. The following comments highlight the Energy Division's findings from our review of the documentation submitted above.

Lighting retrofits of the T-12 lamps were evaluated in accordance with T-24 & DEER baseline fixtures for 4' linear fluorescent measures use 2nd generation T8 fluorescent fixtures (32W): T8-

48in-32w-2g_EI-IS-NLO_112w; LF lamp: T8, 48inch, 32W, 3175 lm, CRI=82, rated hours = 20000 (4 lamps); LF Ballast: Electronic, Instant Start, Normal LO (1 ballast); Total Fixture Watts = 112.

The calculations shown in “Attachment A” misrepresent the project’s calculated savings for energy, kWh and demand, kW due to multiple inaccurate cell references.

Additionally in the “Building Inventory & Recap” tab the existing and proposed Lighting Power Density was documented as “Watts/Sq Ft” identifying a value in the Existing and Proposed calculation sections.

A review of the incandescent measures across the all the candidate buildings identified that screw-in LED measures were the proposed replacement. ED indicates that these are deemed measures and not eligible custom measures.¹ A summary follows:

Building	No. of Incandescent Entries	Proposed Replacement
Administration Bldg.	8	LED22/1-SCRW
R & D Lab & Pilot Plant	1	LED22/1-SCRW
[REDACTED] and Misc.	8	LED22/1-SCRW
[REDACTED] & Pkg	3	LED22/1-SCRW
Maint Stores & Shops Bldg [REDACTED]	9	LED22/1-SCRW
E & R All Buildings	4	LED22/1-SCRW
[REDACTED] All Buildings	8	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	1	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	1	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	1	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	3	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	3	LED22/1-SCRW
[REDACTED] Specialties Bldg [REDACTED]	4	LED22/1-SCRW
Employee Services Bldg [REDACTED]	3	LED22/1-SCRW
Heavy Duty Garage	3	LED22/1-SCRW
[REDACTED] Office and Misc.	1	LED22/1-SCRW
All Bldgs	55	LED22/1-SCRW

The calculations shown in “Attachment C” need to accurately account for all Early Retirement measures when reconciling with tabs in “Attachment A.” This accounts for the project baseline type and affects the calculated 1st and 2nd baseline claims.

In “Attachment C”, the “Interior Calc” tab, shows interactive therm savings that are unaccounted for and not represented anywhere else in the final reporting.

Where lighting calculations are performed, throughout the workbook, for determining the kWh all affected spreadsheet tabs use a custom calculated self-reported value and have a DEER value as well. The current policy is to use either DEER HOU or Custom HOU throughout.

¹ Work Paper WPSCNRLG0106, MR16, PAR30, PAR36 and A-Type LED Lamps Retrofit

Review Conclusion

The ex ante savings are conditionally approved pending submittal of the final project savings claim being in compliance with all of Energy Division's request identified in the Phase I and this Phase II review. Theoretically, the final project savings needs to clearly summarize all values and delineate the appropriate first and second baselines for all measures except the occupancy sensor savings. The spreadsheet calculations need to show, consistently throughout, either the DEER values for lighting operating hours or Custom calculated operating hours that are fully supported with data loggers and circuit panel identification or Custom calculated operating hours obtained from the controlling energy management system used throughout the property.

The Energy Division recommends proceeding with this project and requests that the final project claimed savings be submitted with corrections to address the baseline issues, to correct the entries within Attachment A that affect the final savings, and correctly link and present the revised results of Attachment C. The issues needing further attention in Attachment A and C are provided in the tables with the Summary of Ed's requested Actions.

Since the IOU prefers to identify the Lighting Power density values as the baseline, the table should include the maximum allowable lighting power density that the retrofit/upgrades must meet to be in compliance with T-24. ED recommends that the exact method chosen be identified and the entire submittal be reviewed in order to accurately and comprehensively comply with that methodology. The Watts/Sq Ft shown are lacking a comparative column to demonstrate a compliant watts per square feet from the current version of T-24.

Incandescent Retrofits or upgrades to more efficient screw-in lamps are covered under the IOU deemed savings program and are not allowed here in the custom measures program savings calculations. Should IOU revise the measure at installation stage and determine that a hardwired LED fixture rather than a screw-in type will be used then the final savings submittal needs to include the LED specification as listed on the IOU approved LED fixture lists.

ED requires all lighting operating hours to have sufficient supporting information and documentation. There was no supporting evidence presented with the submittal to justify the self-reported hours of operation. The IOU may choose to revise the entire report to use DEER operating hours, aligned with building type, rather than complete the necessary activity to properly present custom operating hours, i.e., pre- and post-installation data logging.

Summary of ED Requested Action by the IOU

ED requests that the IOU undertake the recommended steps and submit the following information due upon completion of the project:

- Revise the spreadsheet calculations to use either all DEER default values for Hours of Use (HOU), or all custom HOU supported with either M&V logger data or EMS schedules properly identified for each lighting circuit. Do not mix and match the HOU

between the sources. The entire project must be analyzed consistently with the selected method.

- Remove all line item incandescent measures that utilize a screw-in lamp for the proposed fixture as these are captured under the Deemed savings program.
- Revise presentation of calculations to delineate all relevant parameters (savings, baseline, controls, etc.) requested to a summary sheet and remain accordance with program requirements. (i.e. Project baseline claims with associated savings, segregated project savings for RUL, Code, EUL periods and combine accordingly).
- Revise the spreadsheet calculations to correct miscalculated values in various cells and correctly delineate incorporation of all relevant spreadsheet tabs

Issues to Address in Attachment A

Tab	Cell Reference	Calculated/Parameter	Remarks
Building Inventory & Recap	T62	kW, overall savings	Excess of ~68.07 kW
All Bldgs	Row 397-400		Shifted cells caused miscalculations
All Bldgs	Column: X, Y,AA,AB		Correct formulas
All Bldgs	Column H, Row 167 thru 390		Entries and calculations have shifted
All Bldgs	Row 385-390		Four of six rows are duplicated

Issues to Address in Attachment C

Tab	Cell Reference	Calculated/Parameter	Remarks
Interior Calc	I2:I51 and H2:H51	kWh for 1 st year, and baseline claims	Annual Operating hours have a 60% difference between DEER and Custom
Interior Calc	O10	Existing Wattage (W)	Lamp wattage needs correcting, 100% too low!
Interior Calc	Column: AH and AI	Therm Savings	Calculated results are not incorporated into final savings presented in "Attachment A."
Interior Calc	Row 19	DEER Building Type	Correct building type will recalculate the kW and kWh correctly
Interior Calc	Row 5, cell 5P		Incorrect code wattage

Table 1-2 Review Findings

Reviewed Parameter	Analysis
<p>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)</p>	IOU Proposal: Normal Replacement for linear fluorescent fixtures. Early retirement for HID and incandescent fixtures.
	ED Assessment: Incandescent lamps being retrofitted to another screw-in technology are not eligible.
	ED Recommendation: Remove incandescent measures from the savings calculations when submitting the final claimed savings report.
<p>Project Baseline Technology (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)</p>	IOU Proposal: Title 24 baseline for normal replacement measure and <i>in situ</i> equipment for early replacement measures where applicable.
	ED Assessment: Reasonable
	ED Recommendation: None
<p>Project Cost Basis (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)</p>	IOU Proposal: Full cost
	ED Assessment: Both full cost and incremental cost is required
	ED recommendation: Upon the final approval, provide itemized contractor invoices and estimated costs of the baseline measures to support the incremental measure costs required in compliance with the EUL-RUL period. Assure the cost/invoices are itemized sufficiently so as not to include the items generating negative savings. Verify that rebate amounts for normal replacement measures are appropriately capped using the incremental costs.
<p>RUL (required for early retirement projects only, otherwise N/A)</p>	IOU Proposal: More than 1 year, but no documentation provided for the Early Retirement measures.
	ED Assessment: incandescent lamp fixtures have a RUL typically less than 1 year and are therefore disqualified. Use DEER methodology and determine an overall average RUL of the HID fixtures, i.e. 1/3 rd of the DEER EUL.
	ED recommendation: None
<p>EUL (for each measure)</p>	IOU Proposal: Provided
	ED Assessment: Reasonable using weighted average approach
	ED Recommendation: None
<p>Savings Assumptions</p>	IOU Proposal: The savings calculation spreadsheet used 2 nd generation T8 fixtures as the baseline for T12 to T8 measures. For HID replacement, a mixture of existing fixtures and DEER default fixtures were used as the baseline. Some measures use DEER default values and others use custom values that are greater than the DEER default.

Reviewed Parameter	Analysis
	ED Assessment: The project uses DEER default HOU for some fixtures and uses custom self-reported HOU for other fixtures. Post installation data logger data or EMS data is required for the custom HOU fixtures only.
	ED Recommendation: All hours for energy savings calculations need to be either in accordance with DEER HOU or custom calculated with pre- and post-installation data from EMS or logger data to justify, not both.
Calculation Methods/Tool review	IOU Proposal: Savings were calculated using an engineering spreadsheet.
	ED Assessment: Some errors were found
	ED Recommendation: Provide comprehensive summary tab in calculation approach. Link separate calculation tabs appropriately so the calculation methodology can be followed
Pre- or Post-Installation M&V Plan	IOU Proposal: A complete lighting audit of the site was performed. A second audit after installing will be performed to verify the fixture replacements and control additions. Selected areas may be data logged to record the actual controls savings. The default value of 15% savings has been used in the Project Completion Installation Payment (PCIP) estimate. Project cost will be verified with vendor and contractor invoices.
	ED Assessment: The post-installation verification should be completed upon installation of the new fixtures.
	ED Recommendation: M&V Plan should consider data logging fixture operation to verify hours of use for pre- and post-installation conditions along with circuitry and panel identification or use DEER Operating hours of use.
Net-to-Gross Review	IOU Proposal: Not provided
	ED Assessment: An NTG assessment is not warranted.
	ED Recommendation: An NTG interview is not recommended.

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

Description	IOU Ex Ante Claim	ED Recommendations
First Year kWh Savings	1,048,023	TBD
First Year Peak kW Savings	141.71	TBD
First Year Therms Savings	-202.31	TBD
kWh Savings (RUL Period)	Not provided	TBD
Peak kW Savings (RUL Period)	Not provided	TBD
Therms Impact (RUL Period)	Not provided	TBD
kWh Savings (RUL thru EUL Period)	Not Provided	TBD

Phase II Ex Ante Review Findings

Description	IOU Ex Ante Claim	ED Recommendations
Peak kW Savings (RUL thru EUL Period)	Not provided	TBD
Therms Savings (RUL thru EUL Period)	Not provided	TBD
Annual Non-IOU Fuel Impact (RUL Period)	N/A	TBD
Annual Non-IOU Fuel Impact (RUL thru EUL Period)	N/A	TBD
Project Costs for Baseline #1 (RUL or EUL)	Full cost - \$300,000	TBD
Project Costs for Baseline #2 (EUL minus RUL period)	Not provided	TBD
Project Incentive Amount	\$66,572	TBD