

Phase II Ex Ante Review Findings

Table 1-1: Project Information

IOU	PG&E
Application ID	REEP-087
Application Date	11/12/2012
Program ID	PGE2225
Program Name	Refinery Energy Efficiency Program
Program Year	2012
Itron Project ID	X330
IOU Ex Ante Savings Date	3/25/2013
CPUC Staff Measure Name	Boiler Blowdown Controls
Project Description	Install new, automatic blowdown controls on three (3) boilers
Date of CPUC Staff Review(s)	12/16/2013
Primary Reviewer and Firm	Kumar Chittory/Itron
Review Supervisor and Firm	Joseph Ball /Itron
CPUC Staff Project Manager	██████████ / California Public Utilities Commission, Energy Division
CPUC Policy Authorization	
Type of Review (Desk, On-site, Full M&V, Tool)	Desk
CPUC Staff Recommendation	The ex ante savings of 307,283 therms are approved for this project.

Measure Description

This project involves conversion of manual boiler blowdown to automated blowdown for three (3) boilers at the facility. Water used for the steam boilers is a capable solvent and contains minor amounts of impurities. The evaporation of steam concentrates dissolved impurities until they reach unacceptable concentrations. The high concentration of impurities causes scale and/or corrosion which potentially damage the boiler. To mitigate the potential damage, the concentrated impurities are removed by boiler blowdown. The proposed automated boiler blowdown will continuously monitor the level of blowdown water conductivity, and only blowdown the necessary amount of water, thus it protects the boiler while saving blow down water and energy. Therm savings for this project were adjusted from 406,966 to 307,283 therms based on post installation M&V data. The final total project cost of \$148,067 resulted in incentive of \$74,033, capped at 50% of the capital cost.

Summary of Review

The Investor Owned Utility (IOU) submitted the following documents for Data Request (DR) 3795 on December 11th 2013 for this Phase II review:

- Installation Report,
- Invoices,
- Post-installation Calculations
- M&V Title Page
- Responses to CPUC Staff questions;

IOU provided responses to all the questions raised by the CPUC staff in Phase I review. CPUC staff reviewed the post-installation M&V data and true-up savings estimates that were included in the savings calculation spreadsheet. The final savings of 307,283 therms based on the M&V data was lower than the estimated savings value by 24%. The main reason behind the reduction in savings is due to the low average conductivity of the boilers than the proposed average conductivity of 4,800 μ S. In Phase I review, CPUC staff requested clarification behind the assumption of 4,800 μ S and recommended that this number should be updated based on post-installation M&V data. The M&V trend data showed that the actual averaged blowdown water conductivity for CO boiler 1, 2, 3 was 4167 μ S, 4316 μ S and 4198 μ S respectively. The final therm savings are calculated based on the actual average conductivity calculated from the post-installation M&V data.

The savings calculation spreadsheet used boiler efficiency of 78.7% which is estimated from a Steam System Assessment Tool. ~~In cases where Contrary to CPUC guidance, the IOU does did not provide documented evidence of the boiler efficiency, such as results from a boiler combustion efficiency test (flue gas analysis) or a submitted copy of the results from the most recent annual boiler test that includes boiler model numbers and testing dates. CPUC staff recommends boiler efficiency of 80%.~~ Due to the urgency of this project (as requested by the

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IOU), CPUC will let this one go. In the future, CPUC staff will require documented evidence and will reject unsupported default assumptions when CPUC staff-recommended default assumptions were not implemented.

Also, the EUL of the add-on controls is to be limited to the RUL of the equipment on which the controls are installed. Since the IOU did not provide the RUL of the boiler, CPUC will recommend 6.66 years as capped EUL which is one third of the CPUC maximum EUL of 20 years for the boiler.

CPUC staff agrees with the savings calculations and approves the therm savings for this project. The customer incentive level was unaffected by this reduction in energy savings due to the 50% cap of project costs

Between the original CMPA project data submission and this phase II post-install review, the IOU revised their original energy savings estimates based on post-install M&V directed by CPUC staff, as shown in the table below.

Description	Phase I IOU Ex Ante Claim (CMPA)	Phase II IOU- Revised Ex Ante Claim
First Year Therms Savings	406,966	307,283
Project Incentive Amount	\$142,500	\$74,033

Review Conclusion

The ex ante savings of 307,283 therms are approved for this project.

Table 1-2 Review Findings

Reviewed Parameter	Analysis
Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures) Note: For early retirement projects only, include RUL through EUL baseline)	IOU Proposal: Add on measure
	CPUC Staff Assessment: Add on measure
	CPUC Staff Recommendation: Acceptable
Project Baseline Technology (in situ equipment, Title 24 (specify year), other code or other efficiency level (specify), industry standard practice - ISP)	IOU Proposal: In situ equipment
	CPUC Staff Assessment: Acceptable
	CPUC Staff Recommendation: None
Project Cost Basis (Full Incremental, or Both. Note: For early retirement projects, include RUL through EUL cost basis treatment)	IOU Proposal: Full cost
	CPUC Staff Assessment: Full cost basis is acceptable, but CPUC staff cannot verify the costs from the screenshots provided.
	CPUC Staff recommendation: No action required for this project. In the future, ED recommends that the IOU provide better documentation to verify the project costs than using screenshots.
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: 15 Years
	CPUC Staff Assessment: The EUL of the add-on controls is to be limited to the RUL of the equipment on which the controls are installed.
	CPUC Staff Recommendation: CPUC staff recommends EUL of 6.66 years (One third of the CPUC maximum EUL of 20 years for the boiler.)
Savings Assumptions	IOU Proposal: IOU estimates the therm savings by calculating the difference between the baseline and proposed annual natural gas blowdown. Baseline annual boiler blowdown natural gas consumption is estimated using basic

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Reviewed Parameter	Analysis
	<p>thermodynamic equations and one year trend data.</p> <p>CPUC Staff Assessment: Proposed annual natural gas blowdown is estimated based on assumed average conductivity of 4,800 μS. The M&V trend data showed that the actual averaged blowdown water conductivity for CO boiler 1, 2, 3 was 4167 μS, 4316 μS and 4198 μS respectively This value is updated based on the post-installation M&V data.</p> <p>CPUC Staff Recommendation: None.</p>
<p>Calculation Methods/Tool review</p>	<p>IOU Proposal: Calculations were performed in excel spreadsheet based on the equations and assumptions noted in the implementation plan.</p> <p>CPUC Staff Assessment: CPUC Staff agrees with the calculation methodology.</p> <p>CPUC Staff Recommendation: None</p>
<p>Pre- or Post- Installation M&V Plan</p>	<p>IOU Proposal: Detailed M&V plan is provided as part of the implementation plan.</p> <p>CPUC Staff Assessment: CPUC Staff agrees with the proposed M&V plan.</p> <p>CPUC Staff Recommendation: None.</p>
<p>Net-to-Gross Review</p>	<p>IOU Proposal: Not provided.</p> <p>CPUC Staff Assessment: Not completed.</p> <p>CPUC Staff Recommendation: Not recommended.</p>

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

Description	IOU Ex Ante Claim	CPUC Staff Recommendations
First Year kWh Savings	0	0
First Year Peak kW Savings	0	0
First Year Therms Savings	307,283	307,283
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)	Full Cost - \$148,067	Full Cost - \$148,067
Project Costs for Baseline #2 (EUL minus RUL period)	N/A	N/A
Project Incentive Amount	74,033	74,033