

## **Ex Ante Review Findings**

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

<b>IOU</b>	PG&E
<b>Application ID</b>	2K12078819
<b>Application Date</b>	1/30/2012
<b>Program ID</b>	PGE2225 – Refinery Energy Efficiency Program
<b>Program Name</b>	Customized Retrofit
<b>Program Year</b>	2012
<b>Project ID</b>	2K12078819
<b>IOU Ex Ante Savings Date</b>	2/28/2012
<b>ED Measure Name</b>	Preheat BFW with HCO Pump-around in FCC Unit
<b>Project Description</b>	The project adds two heat exchangers on the Heavy Cycle Oil (HCO) loop to pre-heat boiler feed water (BFW). The recovered heat reduces the load on the 250 psig steam loop fed by the feed water system.
<b>Date of ED Review(s)</b>	10/24/12
<b>Primary Reviewer and Firm</b>	John Hill/Energy Division
<b>Review Supervisor and Firm</b>	Nikhil Gandhi/Energy Division
<b>Type of Review (Desk, On-site, Full M&amp;V, Tool)</b>	Desk Review
<b>ED Recommendation</b>	Energy savings approved for freezing as final claim.

## Measure Description

The proposed project adds heat exchangers (E-2XA/B) in the Heavy Cycle Oil (HCO) pump-around loop in an oil refinery. The heat exchangers are used to pre-heat boiler feed water (BFW) to heat recovery steam drums supplying steam on the plant's 250 psig steam header. The higher temperature feed water allows for increased production of 250 psig steam from the heat recovery steam drums. This reduces the need to generate 600 psig steam at Boiler #6, which provides 250 psi through the 600 psig to 250 psig let down. Gas savings are produced since there is continuous supplemental natural gas firing in this boiler.

## Summary of Review

The following documents were reviewed by the ED:

- 2K12078819-██████\_SLID16423.pdf – initial project proposal,
- 2K12078819 - ██████ - calculations.xlsx – initial savings calculation workbook,
- 2K12078819 - ██████ - Review\_Form\_v1.1.v1.2.xlsx – savings review calculation workbook,
- 2K12078819 - ██████ FCC BFW Preheat pumping offset calculation.xlsx – workbook providing pumping system impacts, and
- FCCU\_BFW\_Preheat\_Project\_Cost\_Report\_082812.pdf – cost summary of installed project
- 2K12078819 - ██████ - calculations\_HCO corr.xlsx – savings estimates based on HCO production rate.

The project documentation provided information on the proposed effort, expected changes in the process flows at the refinery, documentation of the heat exchanger installation, post evaluation of process flows as monitored and their impacts on initial ex-ante savings estimates and final project costs.

The IOU via its project reviewer provided live energy savings calculation workbooks to support the energy savings claim. The workbooks identified areas where post installation data differed from those used to produce initial savings estimates, provided estimates of pumping impacts and related savings to HCO feed rates. Saving estimates were revised based on those data. The post-installation calculation spreadsheet claims annual energy savings of 2,186,555 therms. The approved contract incentive for the project is \$1,850,694 based on an initial project cost estimate of \$5,400,000. Documentation supporting project cost of \$6,080,280 was provided for ED review.

There were concerns that savings could be impacted by HCO production rates based on the following statement from pp. 3.2 of the original proposal: *"This project is made possible by increasing the HCO product draw rate with a corresponding decrease in LCO product flow."* This concern was resolved via SCADA data analysis of post measure installation.

**Review Conclusion**

The ex-ante energy savings are approved freezing as final savings claim.

**Table 1-2: Project Overview**

Description	IOU Proposed Ex Ante Data	ED Recommendations
<b>Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)</b>	Project described as Customized Retrofit	Baseline types of System Optimization or Add-on Measure would be appropriate
<b>Project Cost Basis (Full Cost, Incremental Cost)</b>	Original estimate of \$5,400,000	Acceptable. Documented final project cost was \$6,080,280.
<b>RUL (Early retirement projects only, otherwise N/A (not applicable))</b>	N/A	N/A
<b>EUL</b>	Not provided	14 years for heat recovery equipment
<b>First Year kWh Savings</b>	none	ED accepts that any changes associated with pumping issues are insignificant in comparison to projected measure savings.
<b>First Year Peak kW Savings</b>	none	ED accepts that any changes associated with pumping issues are insignificant in comparison to projected measure savings.
<b>First Year Therms Savings</b>	2,186,555	Acceptable
<b>kWh Savings (RUL Period)</b>	N/A	N/A
<b>Peak kW Savings (RUL Period)</b>	N/A	N/A

Description	IOU Proposed Ex Ante Data	ED Recommendations
Therms Impact (RUL Period)	N/A	N/A
kWh Savings (EUL thru RUL Period)	N/A	TBD
Peak kW Savings (EUL thru RUL Period)	N/A	none
Therms Savings (EUL thru RUL Period)	N/A	none
Annual Non-IOU Fuel Impact (RUL Period)	N/A	Accepted
Annual Non-IOU Fuel Impact (EUL thru RUL Period)	N/A	Accepted
Net-to-Gross Ratio	Not provided	To be done

**Table 1-3: Detailed Review Findings**

Reviewed Parameter	Analysis
<b>Project Gross Savings Baseline</b> (for early retirement projects only, include RUL through EUL baseline)	IOU Proposal: none.
	ED Assessment: Project is Add-on.
	ED Recommendation: none.
<b>Project Cost Basis</b> (for early retirement projects only, include RUL through EUL cost basis treatment)	IOU Proposal: Full cost provided in the IOU post installation report.
	ED Assessment: Cost details are provided and reviewed by IOU internal review.
	ED recommendation: none.
<b>RUL</b> (required for early retirement projects only, otherwise n/a)	IOU Proposal: N/A
	ED Assessment: N/A.
	ED Recommendation: N/A
<b>EUL</b>	IOU Proposal: None provided
	ED Assessment: EUL not identified in the documentation received.
	ED Recommendation: 14 years
<b>Savings Assumptions</b>	IOU Proposal: Live energy savings calculation spreadsheet was provided
	ED Assessment: Process details provided based post installation SCADA data.
	ED Recommendation: none
<b>Calculation Methods/Tool review</b>	IOU Proposal: Live energy savings calculation spreadsheet was provided
	ED Assessment: The Calculation method is appropriate for calculating gas savings. A separate workbook provided pumping system impacts, showing

Reviewed Parameter	Analysis
	<p>that secondary fuel impacts would be insignificant. An additional worksheet illustrated that boiler feed water heat recovery is independent of HCO production rates and additional post-installation M&amp;V is not necessary.</p> <p>ED Recommendation: The spreadsheet tool is appropriate.</p>
<p><b>Pre- or Post-Installation M&amp;V Plan</b></p>	<p>IOU Proposal: Not provided</p> <p>ED Assessment: Reviewed savings are based on post-installation SCADA data. No additional data collection or review is required.</p> <p>ED Recommendation: none.</p>
<p><b>Net-to-Gross Review</b></p>	<p>IOU Proposal: None</p> <p>ED Assessment: A NTG interview may be warranted.</p> <p>ED Recommendation: Conduct NTG interview.</p>