

Phase II Ex Ante Review Findings

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

IOU	Pacific Gas & Electric
Application ID	1797
Application Date	7/30/2012
Program ID	PGE2222
Program Name	Energy Efficiency Services for Oil Production
Program Year	2012
Itron Project ID	X220
IOU Ex Ante Savings Date	TBD
ED Measure Name	VSD Retrofit
Project Description	Install new Long Stroke Rotaflex pumping units with VSDs
Date of ED Review(s)	Phase I - 11/26/2012 Phase II – 01/17/2013
Primary Reviewer and Firm	Kumar Chittory/Itron
Review Supervisor and Firm	Joseph Ball/Itron
Type of Review (Desk, On-site, Full M&V, Tool)	Desk Review
ED Recommendation	Ex ante savings estimates are conditionally approved pending review of post-installation M&V data and savings true-up.

Measure Description

The proposed project involves the installation ten (10) new Rotaflex long stroke pumping units with variable speed drives (VSDs). The ex ante project baseline is a standard rod beam pumping unit with no controls.

Summary of Review

In response to the Phase I EAR and Data Request 2510, the IOU submitted the following additional documents:

- Responses for ED's the Data Request 2510 dated November 27, 2012 (EnergyEfficiencyOIR-Post-2008_DR_ED_290_EEGA_2510.doc)
- An excel workbook showing the average pumping hours. (Field Sample POC Pumping Hours_12-10-2012.xlsx)
- Updated project description report (DR_1310-1797-049_Rev1_EDResponse.docx)
- Updated Savings Calculation Spreadsheet (EE Calcs_1310-1797-049_Rev1_EDResponse.xls)

The proposed project involves the installation ten (10) new Rotaflex long stroke pumping units with variable speed drives (VSDs). The long stroke of the Rotaflex pump gives greater displacement per stroke than a conventional rod beam pump thereby allowing the Rotaflex unit to operate at a slower speed to achieve the same production as the baseline rod beam pump. The difference in energy consumption from the reduced speed pumping and standard rod beam pumping will result in kWh savings. The Rotaflex is equipped with a VSD and it will control the speed of the pump to match the dynamic flow conditions of the well to optimize energy consumption and production.

The calculations spreadsheet estimates the total system efficiency of the baseline unit at 45% and it estimates 60% total system efficiency for the Rotaflex long stroke pumping unit from an SPE paper (37499). Based on ED recommendations, baseline for this measure was changed from an uncontrolled rod-beam pump to a rod-beam pump with pump off controllers (POCs). ED recommends post installation true-up using daily or monthly production records (as available) collected from the facility's SCADA system to determine pump operation with POCs for verification. The annual operating hours are estimated at 8,585 hours to account for well maintenance and repairs. From ED's '06-08 impact evaluation including 139 wells at this customer site, a sample of 14 sites were analyzed using onsite SCADA that determined the average annual post-install runtime to be 58.8%, 5151 hours/yr. Load factor for the same sites were determined to be at 32.6% and could be used for the baseline calculations in the revised spreadsheet. IOU has updated the savings calculation spreadsheets with ED's recommendations for the post-install runtime and load factor.

The total project cost is currently estimated at \$1,500,000 and they will be validated by reviewing the invoices during the post-installation verification. For this project, an incentive of \$71,964 is claimed based on the estimated demand and energy savings. ED accepts with IOU approach of using 60% total system efficiency to calculate the post-installation kWh subject to post-installation M&V true-up.

As part of the IOU recommended post-installation M&V plan, the following information is verified from the customer well management software system:

- Well depth, pressure (ft) – from customer
- Variable speed drive (VSD) speed - average strokes per minute (spm) or Hz
- Production rates - from trended well tests
- Energy Usage - kW recorded from VSD unit for a sample of wells in this project, or power metering during well test
- Project cost - validated from invoices

ED has reviewed the post installation M&V plan proposed by the IOU. ED recommends that the energy usage from the VSD unit for at least five wells is recorded for a period of at least two weeks rather than spot measurements. ED recommends that the IOU include this as part of their post-installation M&V plan.

Review Conclusion

The ex-ante energy savings are conditionally approved. ED will review the trued-up savings estimates after the post-installation M&V work is completed.

Summary of ED Requested Action by the IOU

ED requests that the IOU submit the following information:

1. Modify the M&V plan based on ED's recommendation.
2. Submit the post-installation M&V data and trued-up savings estimates, once the measure installation and the post-installation measurements are completed.
3. Provide detailed, itemized invoices and any other pertinent documentation used to determine the project's actual measure cost estimates, when available.

Table 1-2: Project Overview

Description	IOU Proposed Ex Ante Data	ED Recommendations
Project Baseline Type (Early Replacement, Normal Replacement, Capacity Expansion, New Construction, System Optimization, Add-on Measures)	New Construction with equipment baseline as an uncontrolled standard rod beam pump	New Construction with equipment baseline as a standard rod beam pump with pump off controller (POC)
Project Cost Basis (Full Cost, Incremental Cost)	Full cost - \$1,500,000 Incremental cost estimated at \$120,000 per well.	TBD; ED recommends that the IOU submit the actual installed measure costs and incremental costs be calculated as the difference between the baseline POC and the VSD measure cost.
RUL (Early retirement projects only, otherwise N/A (not applicable))	N/A	N/A
EUL	Not provided	TBD
First Year kWh Savings	711,788 kWh as per IOU's calculation spreadsheet.	TBD; pending post-retrofit true-up and baseline adjustment
First Year Peak kW Savings	79.03 kW as per IOU's calculation spreadsheet.	TBD; pending post-retrofit true-up and baseline adjustment
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 (EUL thru RUL Period)	N/A	N/A

Description	IOU Proposed Ex Ante Data	ED Recommendations
Peak kW Savings (EUL thru RUL Period)	N/A	N/A
Therms Savings (EUL thru RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (RUL Period)	N/A	N/A
Annual Non-IOU Fuel Impact (EUL thru RUL Period)	N/A	N/A
Net-to-Gross Ratio	Not provided	TBD

Table 1-3: Detailed Review Findings

Reviewed Parameter	Analysis
Project Gross Savings Baseline (for early retirement projects only, include RUL through EUL baseline)	IOU Proposal: New Construction baseline; uncontrolled rod beam pump used as baseline
	ED Assessment: New Construction baseline acceptable. Uncontrolled equipment baseline not acceptable. POCs on rod beam pumps are standard practice for this customer.
	ED Recommendation: Revise baseline equipment to be rod beam pump with POC
Project Cost Basis (for early retirement projects only, include RUL through EUL cost basis treatment)	IOU Proposal: Full cost is \$1,500,000; incremental cost estimated at \$120,000 per well
	ED Assessment: Incremental cost should represent the differential between the POC and VSD cost.
	ED recommendation: ED recommends that the IOU submit the actual installed measure costs and the incremental cost should represent the differential between POC and VSD cost.
RUL (required for early retirement projects only, otherwise n/a)	IOU Proposal: N/A
	ED Assessment: N/A
	ED recommendation: N/A
EUL	IOU Proposal: Not provided
	ED Assessment: TBD
	ED Recommendation: TBD
Savings Assumptions	IOU Proposal: The total system efficiency for the baseline rod beam pumping unit is estimated at 45% in the savings calculation spreadsheet. The oil well rod beam pumps are assumed to run continuously with only 2% downtime for maintenance yielding an annual runtime of 8,585 hours. Equipment baseline used is rod beam pumps with no controls
	ED Assessment: Equipment baseline not consistent with customer or industry standard practice. From previous evaluations at this customer site, ED determined that the average rod beam pump runtime was 5151 hours/yr.
	ED Recommendation: Revise equipment baseline to rod beam pumps with

Reviewed Parameter	Analysis
	POCs. Use 5151 annual operating hours for baseline estimates.
Calculation Methods/Tool review	IOU Proposal: Custom energy savings calculation spreadsheet submitted.
	ED Assessment: Equipment baseline not consistent with industry standard practice
	ED Recommendation: Revise equipment baseline to rod beam pumps with POCs
Pre- or Post-Installation M&V Plan	IOU Proposal: IOU proposed M&V plan <ul style="list-style-type: none"> • Well depth, pressure (ft) – from customer • Variable speed drive (VSD) speed - average strokes per minute (spm) or Hz • Production rates - from trended well tests • Energy Usage - kW recorded from VSD unit for a sample of wells in this project, or power metering during well test • Project cost - validated from invoices
	ED Assessment: ED agrees with the M&V plan, but has one recommendation.
	ED Recommendation: Record kW from the VSD unit for at least five of wells for at least two weeks.
Net-to-Gross Review	IOU Proposal: Not provided
	ED Assessment: None at this time
	ED Recommendation: TBD