

Pump Overhaul

Measure Eligibility and Calculation Methodology

Guidance Document

Pump Overhaul Measure Eligibility Requirements

- Pump Overhaul Scope of Work
 - The specific work for a pump overhaul may include at least one of the four items below (measure eligibility will be determined by SCE on a project by project basis):
 1. Replacement of either or both pump bowl/volute and impeller, or
 2. Machine work (e.g., re-facing, pit and hole filling, replacing wear rings) to return either or both pump bowl and impeller to original condition, or
 3. Addition or removal of a stage, and/or
 4. Complete pump replacement (In accordance with CPUC Early Opinion Response dated 10/03/2019, complete pump replacement is allowed to be treated as a BRO-RCx measure with a default EUL of 3 years. The pump replacement must meet the existing pump's service level requirements. All remaining provisions in this guidance must be followed.
 - If the project scope changes prior to submission of the Installation Report (IR), SCE must be notified in writing. Changes to the project scope of work will not be eligible for incentives without receiving written consent from SCE prior to the completion of work.
- Pump Test Audit will qualify as pre-inspection within 1 year of program application submission
 - A 3 year Effective Useful Life (EUL) is the assumed default value. The most current pump test shall be used to establish the baseline and the measured efficiency from the post overhaul or replacement pump test to calculate the savings.
 - In accordance with the statewide Custom Project Guidance Document available via <https://www.cpuc.ca.gov>, custom project's EUL must be greater than the Simple Payback Period. If a custom project's simple payback period exceeds its effective useful life, the PA's review and approval is required on a case-by-case basis. The case-by-case consideration must take into consideration the entirety of the project to include, but not limited to, how much longer is the simple payback period compared to the EUL for all of the measures that comprise a project, the reasonableness of the costs of the measures, cost-effectiveness from a ratepayer-funding perspective and program influence. Any project where the simple payback based on incentives only is greater than the EUL will not be eligible. Program influence must be carefully assessed and documented for any project that is not economically beneficial to the customer based on energy cost savings alone.
 - If a custom project's Simple Payback exceeds its EUL, please contact your assigned SCE Account Representative. Projects may receive additional review on a case-by-case basis.
- A historical review of pump test history, multiple years of SCE billing history, and any other available information shall be used to establish the projected baseline and installed savings - if available

- Inoperable pumps are not eligible for incentives
- Overall Plant Efficiency (OPE) at normal operation/baseline conditions must be $\geq 30\%$ and $< 68\%$
- To verify the pump efficiency energy and demand savings, a post-installation SCE Hydraulic Services pump test is required
- Baseline energy savings considerations and review to validate or correct Annual Acre Ft. DemandBase:
 - 3 to 5 years of utility billing history to provide usage profile to verify the proper Annual Acre Ft. DemandBase that will be used as the applied constant for pre and post energy efficiency calculations.
 - For multiple pump and variable operation, 12 months of Customer SCADA Data, 12 months of Customer logs (hour clock reads), or data logging will be conducted in accordance with the approved M&V plan (to reconcile pump usage to utility billing if needed).
 - Review of historical pump tests and audits to provide insight on the energy usage splits for multiple pumps as well as provide a trend for general degradation or lack thereof over an extended period of time - if available.
 - Review of existing pump's performance curve - if available (historical pump tests to provide insight into cause of pump inefficiency).
 - If there are expected changes in future operations to where Annual Acre Ft. demand is different from historical Annual Acre Ft. demand, other methods may be used to estimate energy savings (AnnualAcreFtDemand in equation for energy savings calculations).
- Project Scope Check at Pump Inspection
 - After project approval, pumping equipment will be pulled by contractor or in-house customer staff for inspection. This may result in revised estimated costs and project details after pump contractor quotes or a customer's staff evaluation of pump condition. If significant variations arise, the project scope and costs will be updated as necessary.
 - If the scope of work, energy savings, or costs changes by more than $\pm 10\%$ after application approval, the project must be re-reviewed and approved by SCE Program Management in writing.
 - This request should be made through the Customer's assigned SCE Account Representative.
 - If after application approval, the pump is pulled apart and the overhaul will no longer meet the terms of the BRO Program (Behavioral, Retrocommissioning and Operational also known as RCx) for the work to be completed, it will no longer be eligible for incentives. The program will not pay for incentives for work outside of the allowed scope of that measure.
- The installed energy saving considerations and post-installation energy savings validation plan are project specific, should be identified in the M&V Plan, and includes:

Post Pump Test	Required
Analysis and review of pump performance curves	Required
Data logging	Required if billing history does not isolate pump usage and there is subsequently no SCADA data or customer logs (hour clock reads) are available. Data logging of power, flow, and pressure isolated to pump shall be conducted to determine baseline and installed energy usage.
Annual Acre ft. demand determined through historical analysis and post customer usage. Expected	Required

variations to be normalized for post installation water demand	
Well depth variation impacts to kWh/Acre ft. used to normalize energy savings	Required as outlined in the project M&V plan
Data comparisons/analysis to pump performance curve (required for post energy savings analysis)	Required as outlined in the project M&V plan
Post installation billing history	If available
Post installation SCADA Data	If available
Post installation customer logs of hour clock reads	If available

- For instances of pump seasonal or operational variations the baseline and installed kWh/Acre Ft (energy costs) as well as the Acre Ft. Demand must be normalized. (E.g. environmental conditions, new crop, multiple pump applications, change in pump sequencing, variations in water demand). This analysis will be included in the Installation Report and M&V Plan. (See the above table for M&V requirements.)
- The OASIS Audit Tool is SCE's preferred tool for calculating savings for pump overhaul measures. If the OASIS Audit Tool is used to calculate savings claims, then the following tool restrictions must be observed:
 - If the pump that is subject to the overhaul is not the only load on the meter, supplementary calculations must be provided to show how the pump usage is isolated in the meter data.
 - The tool may only be used for pumps that are constant speed or with pumps that are variable speed but have the majority of operations limited to single operating point. In truly variable flow cases, other calculation methods (such as a bin-flow analysis) must be used instead.
 - The tool may not be used to calculate DEER peak demand savings.
 - The tool may not be used if pumping system goes through changes in the control system (Ex. Throttling control to VFD), or if there are expected changes in future operations to where Annual Acre Ft. demand is different from historical Annual Acre Ft. demand. SCE's Online Application Tool or a bin analysis with existing and proposed flow parameters at different operating modes may be a more appropriate calculation approach for this situation.

Pump Overhaul Measure Calculation Methodology:

Energy Savings (kWh)

Energy Savings (kWh) = (Annual Acre Ft. Demand_{Base} * (kWh/Acre Ft. Base – kWh/Acre Ft. Post))

Where,

Annual Acre Ft. Demand_{Base} = Annual Acre Ft. pumped as derived through pump test and/or customer data validation

kWh/Acre Ft. Base = Derived through baseline pump test

kWh/Acre Ft. Post = Derived through post pump test

The pump's performance curve will be used to normalize the base or post operating efficiencies to a common operating head. The savings values will then be adjusted based on the normalized operating efficiencies.

Note: All customized incentive applications shall have a pre-and post-pump test that will include a thorough engineering review to validate energy savings calculations prior to initial PA (project application) Review/Approval, and at IR (installation report) Review/Approval.

Demand Reduction (kW)

Demand savings cannot be included for any project unless actual kW reductions can be verified through individual pump or multiple pump (i.e. booster stations) performance data (a combination of either pre and post 15 minute interval data, data logging, or SCADA system data) as defined in the Customized Calculated Savings Guidelines (CCSG).