Short Form Work Paper WPSDGEREWP0002

**Revision 8**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Residential Variable Speed Pool Pumps**

**September 17, 2018**

# Residential Variable Speed Swimming Pool Pump Short Form WP

## Introduction

This short form workpaper documents the values adopted from SCE’s workpaper entitled “Residential Variable Speed Pool Pump” (SCE17WP001 Rev 1). SDG&E adopts all of the values in SCE17WP001 Rev 1 with the exception of:

1. For those measures that are MeasureAppType “ER/AR” from SCE’s workpaper, SDG&E will also include additional implementations for “ROB”, should the POE not be satisfied deeming it not eligible for ER/AR 1st baseline savings. The 2nd baseline savings would apply for ROB installs.

## Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 1 | 09/02/2010 | Unknown | Adopted from PGE, PGECOPUM102 R2.doc |
| 2 | 06/05/2012 | Charles Harmstead / SDGE | Revised NTGR for 2011 DEER Res |
| 3 | 10/24/2014 | Nathan Aronson, P.E. / RHA | Original work paper developed by RHA. This workpaper supersedes WPSDGEREWP0002 R2 and incorporates the methodology and data used in SCE workpaper SCEWP001.0 |
| 3.1 | 03/13/2015 | Judelson Enriquez, P.E. / RMS | Added additional NTG ID and value (All-Default <= 2yrs), per SDGE. |
| 4 | 06/16/2015 | Rocaciano Vega / RMS | - Updated to new work paper template  - Incorporated multi-family measure from SCE workpaper SCE13WP0001.2 (Measure E)  - Updated At-A-Glance Summary to include Measure 3 (multi-family)  - Added Measure 3 to Sections 1.1a  - Modified Terms and Conditions in Section 1.1c to remove language limiting to single-family residential homes  - Added Measure 3 to Sections 2.1 and 2.2  - Added building type “Residential Multi-Family” to Section 3 load shape  - Added costs for Measure 3 (multi-family) to Section 4 |
| 5 | 09/22/2016 | David Rojas / RMS | Generated Short Form workpaper adopting SCE approved workpaper SCE13WP001 Rev 3 and applicable values therein.  **Measure 1:** Commissioned Residential VFD Swimming Pool Pump has been removed from this workpaper as SDG&E no longer provides rebates for commissioned installation. Measures codes begin with Measure 2 to preserve the ordering. |
| 5.1 | 12/13/2016 | Kelvin Valenzuela/ SDG&E | Revising short form to include Measure 1. Programs decided to include measure offerings. |
| 6 | 1/1/2017 | Kelvin Valenzuela/ SDG&E | Updating to revise Measure 2 – Non-commissioning values to adhere to impact study results. |
| 7 | 12/26/2017 | Kelvin Valenzuela/SDG&E | Created short form to reflect SCE’s workpaper SCE17WP001.0. Adopted all values with exception to Measure C. |
| 8 | 9/17/2018 | Kelvin Valenzuela/ SDG&E | Created short form to reflect SCE’s workpaper SCE17WP001.1. Adopted all values and measures with the addition of created additional implementation IDs to account for ROB type installs, when the POE for ER/AR measure application types are not met. |

## Measure Summary

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents the values adopted from SCE’s workpaper entitled “Residential Variable Speed Pool Pump” (SCE17WP001 Rev 1). |
| **1.1 Measure & Baseline Data** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Measure Code** | **SCE Sol Code** | **SDG&E Imp IDs** | **Building Type** | **Measure Name** | **Install Type** | **Delivery Type(s)** | | Measure A | PM-78394 | 463003 | Single Family | Commissioned Variable Speed Drive on Pool Pump Controls | ROB | Direct Install,  Down-Stream Incentive, Mid-Stream | | Measure B | PM-98422 | 404011 | Single Family | Self-Installed Variable Speed Drive on Pool Pump Controls | ROB | Down-Stream Incentive, Mid-Stream | | Measure C | PM-69234 | 465304 | Single Family | Commissioned Variable Speed Drive on Pool Pump Controls | ER/AR | Direct Install, Down-Stream Incentive | | Measure D | PM-79353 | 464306  463579 | Multifamily | Programmable Variable Speed Drive on Pool Pump Control | ER/AR  ROB | Direct Install,  Down-Stream Incentive | | Measure F | PM-19753 | 465302  464271 | Multifamily | Programmable Variable Speed Drive on Pool Pump Control **Spa Pool** | ER/AR  ROB | Direct Install,  Down-Stream Incentive, | | Measure G | PM-19754 | 465303  464272 | Multifamily | Programmable Variable Speed Drive on Pool Pump Control for **Wading Pool** | ER/AR  ROB | Direct Install,  Down-Stream Incentive | |
| **1.2 Technical Description** | Variable speed pool pumps allow the reduction of power consumption by running the motor at slower speeds when compared to single or two speed pumps to perform the same task. The speed is able to modulate based on a schedule, or be load based on the type of feedback control tied into the variable speed pool pump. This is in contrast to single or multi-speed pool pumps which run at either a constant speed or have stepped speed levels, typically two-speeds. |
| Requirements | **Eligibility Requirements**  The following eligibility requirements apply to all measures in this workpaper. Please see Attachment 5 for more details.   * Variable speed pool pump must replace existing single or two speed pool pump. For models that require an automatic control system capable of controlling both high and low speeds, a controller must be installed. * Only main filtration pumps are eligible. Booster pumps which are solely used for added spa jet circulation or secondary pumps used for cleaning purposes are not eligible. * It is recommended for the variable speed (VS) pool pump to match the capacity of the pump being replaced. For this work paper, horsepower rating refers to the nameplate horsepower before service factor is applied. * All climate zones are eligible. * Must be configured to meet program pump configuration requirements (see implementation requirements below). * The following product types are *not* eligible:   + Rebuilt, refurbished, or reconditioned products   + Rented or leased products   + Products won as prizes, or   + New parts installed in existing units. * All ER/AR measures require third party baseline verification and data gathering in full compliance with established POE requirements – Attachment 5.   *Single family*  The following additional eligibility requirements apply to only Single Family Building types:   * Rebates are available for existing single-family properties which include in-ground pools for private, residential properties. * Single Family properties with an active service account(s) served by the utility offering rebate are eligible to participate in the program. The property must be occupied and the existing pool must not already have a Variable Speed Pool Pump. * The existing pool pump must be a single or two speed type unit. * Only swimming pool pumps are eligible. Spa, wading pool or Jacuzzi pumps are not eligible for single family residences.   *Multifamily*  The following additional eligibility requirements apply to only Multifamily Family Building types:   * Property Owners and Managers of residential multifamily property with an active service account(s) served by rebating utility may be eligible to participate in the programs. * The following residential properties are eligible for Multi-family pool pump rebates: apartment house pools, residential community pools, townhouse pools, condominium pools, mobile home park pools, and homeowner association pools. * The following pool types are eligible for Multi-family pool pump rebates: swimming pool, wading pool and spa.   **Implementation Requirements**  The following implementation requirements apply to all measures in this workpaper. Please see Attachment 5 for more detail and additional requirements.   * Pumps being replaced must be disposed of rather than refurbished and sold. * Measure implementation must be completed with both the customer and the installation contractor acknowledgement of energy savings settings. * Self-Installed Measures: Measure B shall be used in applications where the client installs their own variable speed pump, or when no certified contractor is used to installed the equipment. * For Direct Install with Down-stream Incentivized Measures, only utility approved contractors must be used to install. These approved contractors will undergo both technical and incentive program related training in order to assure proper installation. The contractors will be trained such that they can properly collect and submit the correct information for both Accelerated Replacement (ER or AR) and Replace-On-Burnout (ROB) measures. * Per measures’ preponderance of evidence (POE) requirements for both single family (SFM) and multi-family (MF) sectors, contractor shall verify and document existing motor characteristics including, but not limited to, single speed or two-speed. * Before issuing measure incentives, program participants must provide completed POE documentation for each project.   *Single family*  The following implementation requirements apply to only Single Family Building types:   * Only one variable-speed pool pump and motor rebate per residence. * Programming and Operations   + Filtration settings must be configured to operate outside peak hours, as defined by the utility. Customers must acknowledge and confirm operation on application form in order to be eligible for rebate.   *Multifamily*  The following implementation requirements apply to only Multifamily Family Building types:   * Installation must be performed by a contractor approved by the Multifamily Program or one who has the appropriate license and training. * Contractor must follow all manufacturer installation requirements and comply with all applicable regulations. * Variable speed pool pump or motor must be a new, qualifying product installed in a pre-existing in-ground spa or wading pool. * Only one rebate is allowed per spa OR wading pool pumps. * A maximum of 3 rebates are allowed per customer property/site for main filtration pump(s). Incentive applications for more than one mainfiltration pump require supporting documentation verifying existing condition per Authority Having Jurisdiction. * Programming and Operations   + During Pool Operating Hours: Variable speed drive setting must be “right sized” to meet turnover requirements as specified by California Code of Regulations, Title 24, Building Standards Code (2016) [505]: Chapter 31B “Public Swimming Pools,” Section 3124B.   + During Pool Non-Operating Hours: Variable speed drive setting must be configured to at least 50% of full speed operation to achieve energy savings. Running the pump at half speed will theoretically reduce power draw to 1/8 of full power, but actual power draw will likely be higher due to lower motor efficiencies at part load. * Environmental Health & Safety (EH&S) Department Permit Requirements   + Must obtain and submit a Permit from the governing Health and Safety Department (i.e. County or City) of jurisdiction, if applicable.   + Health code requirements and inspections must be passed successfully.   + EH&S approves size and model of pump for installation, as well as, the required minimum and maximum flow rates based on specific site conditions.   **Data Collection Requirements**  IOU programs will require the collection and submission of several pieces of information and documentation in order to ensure proper conformance to eligibility and implementation requirements. The following are the types of information that will be required for all projects:   * Customer/site information * Existing equipment * Replacement equipment * Permits and associated documentation * Pump commissioning information. * Preponderance of Evidence (POE) Questionnaire – POE establishes verification of existing conditions and data collection requirements for supporting Accelerated Replacement measures. The questionnaire is intended to evaluate and demonstrate program influence). Note that POE for both SFM and MFM is documented as part of their corresponding Rebate Application Forms.   Please see Attachment 5 for more specific details on data collection requirements.  **Quality Control and Inspections**  IOU programs will select a percentage of post-installation inspections to establish a performance baseline and/or to ensure that the contractor has met all installation criteria. Inspectors evaluate, and verify all retrofit work. Please see Attachment 5 for more details.  Inspections will serve three main purposes:   1. To verify that equipment claimed for incentive is installed properly and configured per Program requirements. 2. To evaluate and understand program’s effectiveness, and 3. To ensure customer compliance with Program guidelines |
| **1.3 Installation Type and Delivery Mechanisms** | |  |  | | --- | --- | | **Delivery Method** | **Description** | | Financial Support | The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects. | | Mid-Stream Programs | *See Mid-Stream Incentive in the Incentive Method Descriptions table.* |  |  |  | | --- | --- | | **Incentive Method** | **Description** | | Direct Install | The program implements energy efficiency measures for qualifying customers, at no cost to the customer. | | Down-Stream Incentive | The customer installs qualifying energy efficient equipment and submits an incentive application to the utility program. Upon application approval, the utility program pays an incentive to the customer. Such an incentive may be deemed or customized. | | Mid-Stream Incentive  Mid-Stream Buy Down | The program gives a financial incentive to a midstream market actor (distributor, vendor, or retailer) to encourage the promotion of efficient measures. Buy Down means that the incentive is required to be passed down to the end-use customer. | |
| Installation Type | Replace On Burnout (ROB) |
| Delivery Mechanisms | * Financial Support - Downstream Incentive – Deemed * Financial Support – Direct Install * Mid-Stream Programs – Mid-Stream Incentive   Midstream Programs – Buy Down |
| **1.4.1 DEER Data** |  |
| DEER Measure ID | DEER does not contain this type of measure. |
| Net-to-Gross Ratio | Res-Default>2 |
| Effective and Remaining Useful Life | OutD-PoolPump |
| **Section 2. Calculation Methodology** |  |
| Energy Savings/Peak Demand Reduction – All Measures | |  |  |  |  | | --- | --- | --- | --- | | **SCE Product Code** | **SDG&E Imp ID** | **All Other CZ Savings** | | | **kWh Saving** | **kW savings** | | Measure A (PM-78394) | 463003 | 1,092.93 | 0.0 | | Measure B (PM-98422) | 404011 | 506.03 | 0.034 | | Measure C (PM-69234) | 465304 | 1,252.20 | 0.247 | | Measure D (PM-79353) | 464306 463579 | 8,099.13 2,417.90 | 0.759 0.292 | | Measure F (PM-19753) | 465302 464271 | 4,812.17 2,911.80 | 0.237 0.306 | | Measure G (PM-19754) | 465303 464272 | 1,846.18 73.36 | 0.652 0.154 | |
| **Section 3. Load Shapes** | * SDG:19-RES-AllResidential-POOL\_PMP; Annual |
| **Section 4. Costs** | Costs were referenced from SCE’s WP |
| DEER/READI Base CostID | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Measure** | **SCE’s Solution Code** | **SDG&E’s Imp ID** | **Base Cost** | **Measure Cost** | **Incremental Cost** | | Measure A | PM-78394 | 463003 | $1,204.83 | $1,750.44 | $545.61 | | Measure B | PM-98422 | 404011 | $1,204.83 | $1,684.59 | $479.76 | | Measure C | PM-69234 | 465304 | $999.49 | $1,750.44 | $750.95 | | Measure D | PM-79353 | 464306 463579 | $1,220.43 $1,425.77 | $1,971.38 | $750.95 $545.61 | | Measure F | PM-19753 | 465302 464271 | $1,220.43 $1,425.77 | $1,971.38 | $750.95  $545.61 | | Measure G | PM-19754 | 465303 464272 | $1,220.43 $1,425.77 | $1,971.38 | $750.95  $545.61 | |