Work Paper SCE17WP010

**Revision 0**

**Short Form**

**Southern California Edison**

**High Performance Circulator (HPC) Pumps**

**Introduction**

This short form workpaper (WP) documents the values adopted from PGE’s WP entitled “High Performance Circulator (HPC) Pumps” (PGECOPUM107 R0). SCE adopts all the values in PGECOPUM107 R0– “High Performance Circulator (HPC) Pumps”.

# Document Revision History

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| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 3/16/2018 | Kara Vega/TRC | * Savings for PGE workpaper based on PGECOPUM107 R0 – “High Performance Circulator (HPC) Pumps”. * Transferred savings values to SCE Calculation template for the 2017 program year. * Only SCE climate zones are included. * Replaced PG&E load shape with SCE load shape. |

**Measure Summary**

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form work paper documents the inputs for measures that reduce the energy associated with properly sized, high-efficiency ECM pump for domestic hot water recirculation with variable speed capabilities and controls to match demand. The High Performance Circulator (PHC) Pumps included in this workpaper are for residential (single and multi-family) domestic hot water applications.  The savings values are based on PGE’s workpaper PGECOPUM107 R0 – “High Performance Circulator (HPC) Pumps”. |
| **1.1 Measure & Baseline** | **PM-20289** (PGE ID – PM001)  Measure: High Performance Circulator Pump  Baseline: Market standard circulators, which consist of a pump driven by non-regulated, low-efficiency induction type motors, do not utilize variable frequency drives (VFD), and do not have the control capability to match demand. |
| **1.2 Technical Description** |  |
| **Measures** | PM-20289: High Performance Circulator Pump |
| **Code for All Measures** | **Title 20 2016:** No Title 20 requirements exist for this product.    **Title 24 2016:** Section 150.2(b)1Gii of Title 24 2016 mandates that manual demand recirculation controls be used for recirculation distribution systems when an alteration occurs to the water-heating system. As noted, this mandate is only required for alterations. After conferring with EnergyCodeAce, a support organization for Title 24 compliance, it was concluded on February 20th 2017, that only replacing the circulator pump, is considered a “repair” and is not subject to this requirement. For larger replacements of the domestic hot water system such as water heater replacement, piping, etc., Title 24 code is triggered and Section 150.1(c)8, Section 150.1(c)8b, and Section 150.2(b)1Gii of Title 24 2016 would apply as detailed in Section 1.2.2 of PGECOPUM107 R0. |
| **Requirements** | Brass or stainless circulator pumps from any manufacturer which include the following three criteria:   * Utilize an electrically-commutated motor (ECM) * Have an integrated variable frequency drive (VFDs) * Have onboard pump controlling logic with self-optimizing programing allowing the pump to learn and operate at the best efficiency point on the pump curve.   These features must be utilized without any end user interaction and save energy throughout the 15 year useful life of the pumping system.  Implementation and installation requirements:  The High Performance Circulator (PHC) Pumps included in this workpaper are for residential (single and multi-family) domestic hot water applications. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Installation Type** | Replace on Burnout (ROB) |
| **Delivery Mechanisms** | Mid-Stream Programs: Mid-Stream Incentive |
| **1.4.1 DEER Data** |  |
| **Net-Gross-Ratio** | NTG ID: All-Default<=2yrs  NTGR = 0.70 |
| **Effective and Remaining Useful Life** | Motors-pump, EUL = 15 years, RUL = 5 years |
| **Section 2. Calculation Methodology** |  |
| **Energy savings/Peak Demand Reduction – All Measures** | Energy savings and demand reduction for the measure contained in this workpaper were calculated using running watts based on limited Alpha field study that was conducted. The baseline running watts were determined based on submittal data for a pump identified as the most popular in the California market. The measure case running watts were derived from the measured data on the installed pumps in the field study. In order to establish the carried operating hours for the baseline and measure cases for this work paper, a combination of sources to adequately capture the California market were used. A CDF of 0.67 was determined based on the assumed annual operating hours of 5,885 (5,885 / 8760 = 0.67). The CDF was applied to the delta watts to calculate the peak demand reduction.  Refer to the At-a-Glance Summary and Section 2 of PGECOPUM107 R0 for additional details on the energy savings and peak demand calculations. |
| **Section 3. Load Shapes** | SCE:Residential:HeatPump\_WtrHt-RC |
| **Section 4. Costs** |  |
| **Section 4.1 Base and Measure Costs** | Please refer to Attachment #1 Calculation Templates for detailed baseline and measure costs. Details of the costs are provided in Section 3 of PGECOPUM107 R0. |

*No Changes were required for this short form. The savings were simply transferred to SCE’s 2017 Calculation Template.*

**Savings Calculation Workbook**

1. SCE17WP010.0 A1 - Calculation Template