Short Form Work Paper PGECODHW106

**Revision #8**

**Pacific Gas & Electric**

**Electric Heat Pump Water Heater**

**December 07, 2018**

# PG&E Electric Heat Pump Water Heater

## Introduction

This short form workpaper documents (WP) the values adopted from SCE’s WP entitled “Heat Pump Water Heater” (SCE17WH001 Revision 2 – Heat Pump Water Heater.docx). PG&E adopts SCE measure code WH-19959 Heat Pump Water Heater, 50 gal, UEF ≥ 3.09.

## Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 4/18/2008 | Joseph Flores (KEMA Services, Inc.) | Original workpaper:  Elec Storage Water Heater PGECODHW106 |
| 1 | 5/20/2009 | Charlene Spoor (PG&E) | Revision 1 incorporating new NTG, EUL and IMC costs from 2008 DEER Updates, DEER2008 values will be used from R2 for PY 2010 to 2012 |
| 2 | 3/24/2010 | Charlene Spoor (PG&E) | Revision 2 incorporated DEER2008 Values for DMO and SFM , MFM using lowest of DMO or SFM until updated to DEER |
| 3 | 6/1/2012  8/22/2012 | Matt Zwiesler (kW Engineering)  Charlene Spoor (PG&E)  Charlene Spoor (PG&E) | Revision 3  1. Added all climate zones to the calculations  2. Added the measure HA47 for the heat pump water heaters measure and incorporated commercial applications  3. Updated savings per DEER2011 database  4. Used equipment and labor cost adjustment multipliers from DEER2011 to update costs  5. Updated NTG and EUL values according to DEER2011  Changed Vin and CZ to ANY per READI nomenclature |
| 4 | 5/28/1013 | Charlene Spoor (PG&E) | Added measure code and program qualification for HA47 |
| 5 | 5/28/2014 | Charlene Spoor (PG&E) | New Template |
| 6 | 4/1/2016 | Tai Voong (PG&E) | Updated to ex ante format 2016 |
| 7 | 4/1/2017 | Tai Voong (PG&E) | Update to DEER2015 & Cost with Work Order #017 |
| ~~8~~ | ~~12/1/2017~~ | ~~Tai Voong (PG&E)~~ | ~~Update to DEER2017 & Update Program to accept UEF~~ |
| 8 | 12/7/2018 | Adan Rosillo (PG&E) | * Converted EF to UEF values in measure names to match new Federal standards. * Update to new Federal Code language stating UEFs. |

## Measure Summary

Table : Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents details for the replacement of a 50-gallon heat pump water heater (HPWH) with an energy factor (UEF) ≥ 3.09. The base case measure is a 50-gallon electric storage water heater (ESWH) with an UEF = 0.92. The base energy consumption and measure energy consumption values are from SCE’s workpaper, SCE17CC001, Revision 2. |
| **1.1 Measure & Baseline Data** | Measures:   |  |  |  | | --- | --- | --- | | PG&E Measure Code | SCE Product Code | Description | | BW031 | WH-19959 | High Efficiency EnergyStar Heat Pump Water Heater | |
| **1.2 Technical Description** |  |
| Measures | The measure case is a 50-gallon heat pump water heater (HPWH) with an energy factor (UEF) ≥ 3.09. The base case measure is a 50-gallon electric storage water heater (ESWH) with an UEF = 0.92. |
| Code for All Measures | The measures in this work paper are considered small water heaters. A small water heater can be defined as an ESWH with an input of 12 kW or less, or a HPWH rated at 24 amps or less. The following codes apply to the measures in this work paper:  Title 20 (2016) [508]  Section 1605.1(f)(2) provides minimum Energy Factor requirements for ESWHs and HPWHs.  Title 24 (2016) [496]  Section 110.1 Mandatory Requirements for Appliances.  Federal Standards – Code of Federal Regulations [393]  The Code of Federal Regulations, 10 CFR 430.32(d) provides requirements for ESWHs but not HPWHs. Title 20 follows the federal code. |
| Requirements | •“Instantaneous” and “tank less” water heaters do not qualify.  •No fuel Switching.  •The measure case heat pump water heater must have an UEF of 3.09 or greater.  •The water heater storage capacity must be 50 gallons or greater.  •Only residential-style electric storage water heaters qualify for this rebate. A list of qualifying residential water heaters is at: www.sce.com/appliances. Qualifying models are from the Energy Star product list, which requires a minimum UEF of 3.09. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | Replace on Burnout (ROB) |
| Delivery Mechanisms | Down-Stream Incentive |
| **1.4.1 DEER Data** |  |
| Net-to-Gross Ratio | Com-Default>2yrs |
| Effective and Remaining Useful Life | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** | | WtrHt-HtPmp | Heat Pump Water Heater | Res | SHW | 10 | 3.3 | |
| **Section 2. Calculation Methodology1** | DEER 2017 |
| Energy Savings/Peak Demand Reduction – All Measures | **DEER and READi Tool Outputs**   |  |  |  | | --- | --- | --- | | **Measure Code** | **Measure Name** | **READI Data** | | SCE: WH-19959  PG&E: BW031 | UEF ≥ 3.09 50 Gallon Heat Pump Water Heater replacing 50 Gallon Electric Storage Water Heater, UEF = 0.92  (RE-WtrHt-SmlStrg-HP-lte12kW-rep50G-3p24EF) |  | |
| **Section 3. Load Shapes** | PGE:Residential:21 = Res. Wtr. Heating |
| **Section 4. Costs** | The Gross Measure Cost is obtained from costs documented by SCE work paper “SCE17WH001 Revision 2 – Heat Pump Water Heater.docx” Section 4- Cost. |
| **Section 4.1 Base and Measure Costs2** | IMC = Measure Cost – Base Cost=$1,339.25 - $685.46 = $653.79 |
| Base Cost | Base case costs are from 2010-2012 WO017 [475]: $685.46 for an ESWH with EF = 0.92. The material costs for “Small Electric Storage Water Heater 50 Gal; EF = 0.92; Recov Eff = 0.98” were used instead of costs for a 50-gal ESWH of EF = .904 |
| BW031 | $ 685.46 |
| Measure Cost | Heat Pump Water Heaters of 3.24 EF or greater are not included in 2010-2012 WO017 [475]. Measure case costs were taken from online retailers: $1,339.25 for an HPWH with EF = 3.24. The material costs for a “Heat pump water heater, 50 gallons, 4.0 kw, 3.24 EF, 240 volt” are used. Note, the baseline water heater electrical connection requirements - 25 amps and 240 volt per National Electric Code. Therefore, ROB labor cost is the same for base & measure. |
| BW031 | $1,339.25 |

***Notes:***

1. ***Energy savings calculation methodology for heat pump water heater or any water heaters with a very low testing draw pattern was not covered on the March 2018 Water Heater Disposition and was not address by the EAR team.***
2. ***Base and measure costs for heat pumps water heaters were not covered under the EAR team analysis of the most recent USDOE requirement for Uniform Energy Factor (UEF), this paper uses the previous cost for EF rather.***