**WORKPAPER DISPOSITION FOR**

**Water Fixtures**

**California Public Utilities Commission, Energy Division**

February 22, 2013

Refer to Table 1 for a list of currently submitted IOU workpapers that cover domestic hot water fixture measures.

Table 1 – Faucet Aerators and Showerheads

|  |  |  |
| --- | --- | --- |
| **Workpaper ID** | **Workpaper Title** | **Date** |
| **SCG** |  |  |
| SCGWP100303A | Low-Flow Showerheads | 08/31/2012 |
| SCGWP100303B | Temperature-Initiated Shower Flow Restriction Valve with and without an Integrated Low-Flow Showerhead | 08/31/2012 |
| WPSCGREWH120618A | Faucet Aerators for Bathroom/Kitchen Sinks in Residential Buildings | 06/18/2012 |
| SCGWP100309A | Therm Savings Kit | 08/12/2012 |
| **SDG&E** |  |  |
| WPSDGEREWH1000 | Temperature-Initiated Shower Flow Restriction Valve with and without an Integrated Low-Flow Showerhead | 06/15/2012 |
| WPSDGEREWH1012 | Faucet Aerators for Bathroom/Kitchen Sinks in Residential Buildings | 06/27/2012 |
| WPSDGEREWH1061A | Low-Flow Showerheads | 06/06/2012 |
| WPSDGEREWH1063 | Therm Savings Kit | 06/15/2012 |
| **SCE** |  |  |
| SCE13WP004 | Faucet Aerator and Low Flow Showerhead | 06/19/2012 |
| **PG&E** |  |  |
| PGE3PDHW116 | Faucet Aerators | 06/1/2012 |
| PGE3PDHW117 | Low Flow Showerheads | 08/29/2012 |
| PGECODHW113 | Low Flow Showerheads and Thermostatic Shower Restriction Valve (1.6 gpm) | 06/18/2012 |

**Workpaper Disposition:**

**Phase 1 2010-2012 Review Summary:**

Energy Division reviewed these measures during the Phase 1 review period for the 2010-2012 cycle. The following revisions were required at that time:

1. Use water heater recovery efficiency instead of energy factor for calculating the water heating energy use
2. Revise total DHW consumption to reflect RASS UECs
3. Remove installation rate adjustments from the calculation of energy savings. Installation rates are gross savings adjustments that are applied separately to claims. E3 calculators now include separate entry fields for installation rates.
4. Add a gross savings adjustment for flow restriction valves to consider that some may be installed in bath tubs where not all water use is for the shower.

**2013-2014 Disposition Summary**

Energy Division staff recommends the following revisions:

1. Savings values shall be uniform across all IOUs. Energy Division staff have reviewed all workpapers and developed a uniform set of savings values that are applicable to all IOUs. Energy savings are determined by multiplying the basis savings value by the climate zone multiplier. The climate zone multiplier adjusts total energy savings due to variations across climate zones of typical ground (or mains) water temperatures.
2. Baseline DHW consumption shall be based on DEER assumptions. DEER assumptions are taken from U.S. Department of Energy BuildAmerica research and energy modeling guidelines. Generally, total DHW consumption is about 25 gallons per day for sinks and 28 gallons per day for showers.
3. Savings for kitchen faucet aerators are much higher than lavatory aerators. Therefore these savings may only be claimed for direct install measures or as part of the Thermsaver kit measures.
4. Gross savings adjustments shall be based on the following:
   1. For Thermsavings Kit measures, installation rates shall be weighted average across all technologies
   2. Showerheads from READI
   3. Aerators from READI
   4. Flow restrictor valves and showerheads with flow restrictors shall have an additional gross savings adjustment of 0.80 in consideration that some devices will be installed in bathtubs where not all water use is for the shower.

**Summary of Revisions to Energy Savings Values**

The assumptions used by the utilities for the calculation are different. The values used by SCE to calculate the savings come from the DEER 2005 database. These values were removed from the database for 2011. PGE values are from the first published documentation for DEER 2011, however, the Commission did not adopt these values as part of the final, frozen DEER database. Energy Division staff has used the instantaneous measured flow rates from SCG and SDG&E field research, provided with the Thermsaver Kit workpaper, to estimate pre- and post- flow rates. The SCG/SDG&E research also uses self-report data to estimate the total water usage for faucet aerators and showerheads, however, the estimated daily water usage from this research is more than twice the usage used in DEER for faucets and about 60% higher than DEER for showerheads. DEER values for daily hot water use by end use are developed from the NREL and the Building America House Simulation Protocols[[1]](#footnote-1), but assumed that the daily water consumption of Single Family houses is the same as for Multi Family houses, however, DEER assumes single family homes have three bedrooms and multi-family dwelling units have two, which will result in lower daily water usage for multi-family dwellings.

1. Savings Estimation Summary

Energy Division staff have develop “basis savings values” for DHW fixtures. Staff developed the basis savings values by using the SCE/SDG&E values from the Thermsavings Kit workpapers and reducing them by the ratio of the DEER daily hot water use to the daily hot water use assumed in the workpapers. Basis values are then multiplied by climate zone adjustment factors to determine climate zone specific results. Table 2 provides gas basis savings and Table 3 provides electric basis savings and compares them to proposed values from SCG, SDG&E and PG&E. SCE proposed different savings values for each climate zone and therefore could not be included in tables 2 and 3 for comparison. SCE savings values are include in Table 4 for reference.

Climate Zone multipliers were developed from the DEER dishwasher measures. Within a single vintage of a single building type, the difference in gas savings across climate zones are due exclusively to the variation in ground (or mains) temperature in the weather data. Multipliers were developed by dividing each climate zone’s gas savings by the median of gas savings across all climate zones. Climate zone multipliers are provided in Table 5.

Refer to the embedded workbook, “20132014DHWFixturesMeasures.xlsx”, for the complete development of the revised basis values as well as the complete table of savings values for all IOU, building type, climate zone and DHW fuel source.

Table 2- Basis Gas savings



Table 3 – Basis Electricity savings



Table 4 - SCE claimed savings (weather sensitive)



Table 5 - Adjustment factors

|  |  |
| --- | --- |
| Climate Zone | Adjustment Factor |
| CZ01 | 1.08 |
| CZ02 | 1.08 |
| CZ03 | 1.06 |
| CZ04 | 1.02 |
| CZ05 | 1.05 |
| CZ06 | 0.99 |
| CZ07 | 0.97 |
| CZ08 | 0.94 |
| CZ09 | 0.96 |
| CZ10 | 0.95 |
| CZ11 | 0.99 |
| CZ12 | 1.02 |
| CZ13 | 0.95 |
| CZ14 | 1.01 |
| CZ15 | 0.80 |
| CZ16 | 1.13 |

1. Faucet Aerators

Savings calculations are based on data provided with the Thermsaver Kit workpapers. Savings from the workpapers were reduced by the ratio of the DEER daily DHW use to the daily DHW use proposed in the workpapers. Workpaper calculations are for a 1 gpm faucet aerator. Savings for the 1 gpm aerator were normalized to develop a savings “per delta gpm” which was then used to create scaled results for 0.5 gpm and 1.5 gpm aerators.

1. Showerheads

Savings calculations are based on data provided with the Thermsaver Kit workpapers. Savings from the workpapers were reduced by the ratio of the DEER daily DHW use to the daily DHW use proposed in the workpapers.

1. Flow Restriction Valves

Savings calculations are based on data provided with the Thermsaver Kit workpapers. Savings from the workpapers were reduced by the ratio of the DEER daily DHW use to the daily DHW use proposed in the workpapers.

1. Low Flow Showerheads and Thermostatic Restriction Valve

Energy savings estimates for the thermostatic restriction valve alone are acceptable. Energy savings of the showerhead-plus-valve combination shall be the sum of the savings for the valve alone and the savings for the showerhead as revised by staff.

1. Peak Demand Impact for Electric Water Heating

The peak demand factor used in every workpapers is 0.22 W/kWh. Staff reviewed similar workpapers for the 2010-2012 cycle and determined that using this demand is more than twice the demand impact if that factor is calculated using DEER residential DHW usage profile[[2]](#footnote-2). Staff has recalculated the demand impacts to consider that, when using the DEER DHW usage profile, about 11% of the daily DHW energy consumption occurs during the peak period.

**Revisions to Net-To-Gross**

DEER includes explicit NTG values of 0.70 for showerheads and 0.59 for faucet aerators when the implementation method is direct install. All other implementations shall use the default NTG of 0.55. The attached workbook, “20132014DHWFixturesMeasures.xlsx”, includes a complete summary of all approved measures along with DEER NTG references.

**Revisions to Installation Rates**

Installation rates for showerheads and faucet aerators were investigated as part of the 2006-2008 program cycle evaluations. However, research was limited to specific programs and utilities. Therefore, installation rates shall be those listed in READI for “All” utilities. Additionally, installation rates flow restrictor valves and showerheads with flow restrictor valves shall be reduced by an additional 20% to account for the likelihood that some of these valves will be installed in shower+bathtub combinations. Staff revised installation rates for Thermsaver Kit measures following the SCG/SDG&E calculation methods, substituting the revised energy savings values for each device included in the kit. The attached workbook, “20132014DHWFixturesMeasures.xlsx”, includes a complete summary of all approved measures along with installation rate references.

**Reference(s):**

 

1. Building America House Simulation Protocols, Energy Efficiency & Renewable Energy, Table 9 , p12 [↑](#footnote-ref-1)
2. “Non-DEER Measure Review Template, PGECODHW113 – Low Flow Showerhead and Thermostatic Shower Restriction Valve”, PGECODHW113\_ShowerHead\_Comments.doc, April 27, 2010 [↑](#footnote-ref-2)