**WORKPAPER DISPOSITION FOR**

**On-Demand Pump Control for Central Domestic Hot Water Systems**

**California Public Utilities Commission, Energy Division**

**June 20, 2013 (Revised)**

**Revision Notes, June 20, 2013:** SCE’s submitted workpaper included savings values for three water heating sources: natural gas, electric-resistance and heat. The staff disposition included recommended savings values for all climate zones and IOUs. However, the original staff disposition had the following errors:

* Savings values for systems with heat pump water heaters were not included.
* Savings values for systems with electric resistance water heaters included only the pumping energy savings, and did not include the savings from reduced water heater operation.

After SCE pointed out the errors noted above, Commission staff reviewed the calculations for heat pump water heaters. Commission staff requested that SCE revise the heat pump water heating savings to be based on an average COP rather than the recovery efficiency of 0.98. A recovery efficiency of 0.98 is an acceptable value used for electric resistance water heating, but not heat pumps. Commission and IOU staff held a conference call on June 19, 2013. During this call, a consensus was reached to revise the savings calculations for heat pump water heaters to use an average COP of 2.5. Staff revised the calculation workbook to include corrected savings values for systems with electric resistance and heat pump waters heaters.

Refer to Table 1 for a list of currently submitted IOU workpapers that cover On-Demand Pump.

Table 1 – On-Demand Pump Control for Central Domestic Hot Water Systems

|  |  |  |
| --- | --- | --- |
| **Workpaper ID** | **Workpaper Title** | **Date Submitted** |
| **SCG** |  |  |
| WPSCGODE091116 | On-Demand Pump Control for Central Domestic Hot Water Systems | 01/21/2010 |
| **SDG&E** |  |  |
| WPSDGENRWH1201 | On-Demand Pump Control for Central Domestic Hot Water Systems | 06/15/2012 |
| **SCE** |  |  |
| SCE13WP002 | Demand Control for Centralized Water Heater Recirculation Pump | 04/09/2012 |

**Workpaper Disposition:**

**2013-2014 Disposition Summary**

Energy Division staff recommends the following revisions:

1. Savings shall be uniform across all IOUs and shall be based on the SCE workpaper. Savings values shall be based on the number of dwelling units rather than on a whole building. This will elevate savings for larger buildings and reduce savings for smaller buildings.
2. Hard-to-reach NTG values are not allowed. Instead the residential default value of 0.55 shall be used.

**IOU Energy Savings Review**

SCE:

The savings claimed by SCE come from a CASE proposal[[1]](#footnote-1) and PIER project conducted by the Heschong Mahone Group (HMG). The work incorporated calculated impacts that are reasonably close to the measured impacts (less than 3% difference). Calculations are done for two different multifamily buildings of 44 and 88 units. Savings claimed by SCE are presented, according to the CASE study, under two categories: “Demand Control Recirculation Pump Gas Water Heater Less Than ½ HP” and “Demand Control Recirculation Pump Gas Water Heater Less Than ½ HP”.

Table - SCE Claimed Energy Savings



One of the major issues is that on-demand pump manufacturer are currently only manufacturing pumps that are less powerful than ½ HP. Thus, the comparison with existing installations (recirculation loops) is difficult.

SCG/SDGE:

The savings claimed by SCG are based on monitoring report from the Benningfield Group[[2]](#footnote-2). Savings presented in the work-paper come from a small batch of monitored systems (35 sites). There is a wide range of savings number and a high standard deviation (619 therms or as much as 60% of the total savings). Savings are proposed for two categories: “Storage tank < 250 gal” and “Storage tank > 250 gal”. Also, the proposed savings are not weather dependant.

Table - SCG/SDGE Claimed Energy Savings



Staff believes that weather-dependent calculation should be implemented and that the SCE workpaper is a more appropriate source for savings estimates.

**Savings Estimation Summary**

Energy Division staff believes the SCE workpaper and sources are the most appropriate sources for the savings calculations. In order to be consistent with DEER, savings values should be revised to be “per dwelling unit” served by the DHW system. Following the modeling approach in the CASE proposal, savings values should be categorized based on the size of building served: “Low-Rise” (up to three stories) or “High-Rise” (from three stories and up). Revised savings values are provided in the embedded workbook “On\_Demand\_Pump\_Review\_20June2013.xlsx”.

**Revisions to NTG**

Energy Division staff recommends a NTG of 0.55, which is the residential default for measures that have been in programs greater than 2 years using any delivery mechanism. Workpapers appear to propose using the value the default value for direct install measures in hard-to-reach markets. Staff does not believe this is an appropriate NTG for this measure, given that it has now been incorporated into Title 24.

**Reference(s):**



1. Measure Information Template – Multifamily Central DHW and Solar Water Heating, September 2011 [↑](#footnote-ref-1)
2. PY 2009 Monitoring Report: Demand Control For Multifamily Central Domestic Hot Water, April 6, 2010, Benningfield Group [↑](#footnote-ref-2)