Work Paper SCE17CC018

**Revision 0**

**Short Form**

**Southern California Edison**

**Under Counter Type Commercial Dishwashers**

**Introduction**

This short form workpaper (WP) documents the values adopted from SCG’s WP entitled “Under Counter Type Commercial Dishwashers” (WPSCGNRCC180529A Rev00). SCE adopts all the values in WPSCGNRCC180529A Rev00 – “Under Counter Type Commercial Dishwashers”, with the following exceptions.

1. SCE adopts the same EUL and RUL year values as SCG, but changes the EUL ID from “Appl-DW-UnderCounter” to “Appl-EFFDW”.
2. In addition to delivery mechanisms included in WPSCGNRCC180529A Rev00, SCE also includes Upstream Programs: Up-Stream Incentive.
3. Only SCE climate zones are included.
4. Modified MAT, Delivery Type, and Measure Impact Type per Resolution E-4952.
5. Added clarification on eligibility requirements.

# Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 12/20/2018 | Lake Casco/TRC | * Transferred savings values to SCE Calculation template for the 2019 program year. * Maintained the same EUL and RUL year value, but updated the EUL ID to Appl-EFFDW. * Added Upstream Programs: Up-Stream Incentive delivery mechanism. * Only SCE Climate zones are adopted. |
|  | 12/21/2018 | Jesse Manao/SCE | * Modified MAT, Delivery Type, and Measure Impact Type on Calculation Template. |

**Measure Summary**

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form work paper documents the inputs for the Energy Efficient Undercounter Commercial Dishwashers measure. The savings values are based on SCG’s workpaper WPSCGNRCC180529A Rev00 – “Under Counter Type Commercial Dishwashers” document.  Of the many types of commercial dishwashers available, including door-type and conveyor-types, undercounter units accounted for 43% of the market share by sales volume. Undercounter dishwashers are mostly found in bars and restaurants with bars, and are mainly used for washing glassware. High efficiency commercial dishwashers reduce water heating requirements while maintaining cleaning performance by reducing heat losses, improving mechanical soil removal, and/or increasing component efficiencies. |
| **1.1 Measure & Baseline** | Measure: Tier 1 (Energy Star V2) and Tier 2 (15%< Energy Star V2), High and Low Temperature Commercial Undercounter Dishwashers  Industry Standard Practice:  Minimum Energy Star specification (V1.2) averaged with High Temperature Undercounter Commercial Dishwasher monitored data  Please refer to Attachment #1 Calculation Template for additional information on codes and baseline condition. |
| **1.2 Technical Description** |  |
| **Measures** | FS-20783 (SCG code: Msr001): Commercial Undercounter Dishwasher, High Temperature, Tier 1  FS-20784 (SCG code: Msr002): Commercial Undercounter Dishwasher, High Temperature, Tier 2  FS-20786 (SCG code: Msr003): Commercial Undercounter Dishwasher, Low Temperature, Tier 1  FS-20787 (SCG code: Msr004): Commercial Undercounter Dishwasher, Low Temperature, Tier 2 |
| **Code for All Measures** | This measure is not governed by either state or federal codes and standards.  The ENERGY STAR V2 Test Method for Commercial Dishwashers (Commercial Dishwasher Program Requirements Version 2.0) uses the ASTM F1696-09 Standard Test Method for Energy Performance Single-Rack, Door-Type Commercial Dishwashing Machines to estimate the energy and water consumption of both the base and measure case.  The revised ASTM F1696-15 test method includes washing energy consumption tests methodology for undercounter dishwashers and will be referenced in future ENERGY STAR standards. The F1696-15 test methodology includes energy consumption per rack while washing racks of glasses.  Refer to Section 1.4.2 of WPSCGNRCC180529A Rev00 for more details. |
| **Requirements** | Eligibility Requirements:   * Low or High temperature undercounter dishwashers and glasswashers that meet the Gallons/rack and Idle Energy Rate (kW) shown in Table 1 of WPSCGNRCC180529A Rev00. * Used or rebuilt equipment is not eligible. * Customers must provide proof that the equipment meets SCG workpapers Table 1 requirements for gallons per rack and idle energy rate. * In addition to SCG requirements, residential or laboratory applications are not eligible.   Implementation and installation requirements:  Measures presented in this Workpaper apply to SCE climate zones and all commercial building types. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Measure Application Type** | Deviation. Based on CPUC Resolution E-4952, this measure’s Measure Application Type is changed from Replace on Burnout (ROB) and New Construction (NEW) to Normal Replacement (NR) and New Construction (NC) |
| **Delivery Mechanisms** | Financial Support: Down-Stream Incentive – Deemed  Mid-Stream Programs: Mid-Stream Incentive  Up-Stream Programs: Up-Stream Incentive |
| **1.4.1 DEER Data** |  |
| **Net-Gross-Ratio** | NTGR ID: All-Default<=2yrs  NTGR = 0.7 |
| **Effective and Remaining Useful Life** | Deviation from SCG Workpaper EUL\_ID Appl-EFFDW, EUL = 12 years, RUL = 4 years  Note: SCG uses Appl-DW-UnderCounter (EUL = 12 years, RUL = 4 years) however, to better align with READi, SCE adopts EUL ID: Appl-EFFDW (DEER EUL = 11 years, RUL = 3.7 years). The EUL value has been adjusted (EUL = 12 years, RUL = 4 years) per SCGs supporting statement on the EUL value for foodservice measures. |
| **Section 2. Calculation Methodology** |  |
| **Energy savings/Peak Demand Reduction – All Measures** | Electric and gas energy savings are calculated based on assumptions of reduced water heating requirements. Gallons used per dishwasher rack and idle water heating energy rates (kW) are obtained from Energy Star requirements. Quantity of racks per day is assumed based on FSTC studies from a number of restaurants. Energy consumption requirements for base and measure cases are based on average temperature increases of ground water (per CZ) to low temperature water (140°F) and high temperature water (180°F). The energy consumption of electric and gas water heaters and electric dishwasher booster heaters were weighted based on CEC market data. Details on the energy savings calculations can be found in Section 2 of WPSCGNRCC180529A Rev00.  Peak demand calculations were calculated based on the End-use Water Demand profile for restaurants from the CPUC. A coincidence factor was applied to the average daily energy consumption (kWh) based on the load profile and differences in peak demand were calculated.  Savings impacts are climate zone dependent, but do not vary based on building type.  Refer to Section 2 of WPSCGNRCC180529A Rev00 for more details. |
| **Section 3. Load Shapes** | DHW HtPmp |
| **Section 4. Costs** | Base and measure case costing were obtained from online retailers based on seven of the most popular undercounter dishwasher manufacturers. |
| **Section 4.1 Base and Measure Costs** | Please refer to Attachment #1 Calculation Templates for detailed baseline and measure costs. |

**Savings and Calculation Methodology**No changes to the savings or costs are adopted for this short form.

**Savings Calculation Workbook**

1. SCE17CC018.0 A1 - Calculation Template