Short Form Work Paper PGECOLTG163

**Revision 8**

**Pacific Gas & Electric**

**LED CANDELABRA Replacements**

**Introduction**

This short form workpaper documents the values adopted from SCE’s workpaper entitled “SCE17LG129.2” for LED Candelabra lamps. SCE17LG129.2 adopted the measures from DEER 2019 and updated the cost with online web scraping which was the cost collection methodology used in PGE workpaper PGECOLTG163\_R7.

SCE adopts all the DEER 2019 values, with the following exceptions:

1. Cost collection methodology was based on PGE workpaper PGECOLTG163 R7, and SCE updated the prices to current 2018 values and additional costing samples added in wattage ranges that lacked sufficient sampling.
2. For measure case wattage ranges not included in DEER 2019, base case wattage ranges were determined using wattage reduction ratios (WRR) from DEER 2019 and 2018 Screw-In Lamp Savings Methods Disposition.
3. New DEER LED NTG value is used for all measures – All-Ltg-LED-WRR.
4. MultiFamily Dwelling Area (MFm) uses the same 541 operating hours as the Residential Single Family (SFm).

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 12/22/16 | Arvind Subramanya (TRC) | 1. Calculation templates were developed based on PGE’s template “PGECOLTG163 R7-9-11-2015F ” incorporating the changes described above. |
| 1 | 5/1/2018 | Lake Casco (TRC) | The following updates were made based on the CPUC 2018 Screw-In Lamp Savings Method Disposition dated March 1, 2018.   1. Calculation templates were developed based on PGE’s template “PGECOLTG163\_R7-9-11-2015F”. Calculations and costs were updated based on new WRR values from the disposition. 2. Updated NTG to be “All-Ltg-ScrwInLED” based on “2018ScrewInLampSavingsMethods-1March2018” disposition |
| 2 | 10/12/18 | Stephen Brett Reno (TRC) | 1. Updated savings methodology and WRR to reflect DEER 2019. 2. Updated costs for 2019 program year. 3. Updated all measures to new DEER NTG value for all LED using WRR methodology. 4. Included additional solution codes to match DEER measure wattages. |
| 3 | 12/26/2018 | Randy Kwok (PG&E) | Adopted SC’s workpaper SCE17LG129.2 (DEER2019 savings values and cost update by web scraping) |

**Measure Differences Summary**

Table 1: Measure Differences Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts and cost-effectiveness values for LED Candelabra Lighting. Savings calculation methodology was taken directly from DEER 2019, while costing methodology and eligibility requirements were taken from PGECOLTG163 R7. Only differences are explained here. |
| **1.1 Measure & Baseline** | Refer to attached file “PGECOLTG163 R8 LED Candelabra.xlsx” for the list of measure codes and baseline condition. |
| **1.2 Technical Description** |  |
| **Measures** | Refer to attached file “PGECOLTG163 R8 LED Candelabra.xlsx” for detail measure descriptions. |
| **Code for All Measures** | |  |  | | --- | --- | | SCE Code | PG&E Code | | LT-20581 | LT473 | | LT-20580 | LT474 | | LT-20582 | LT475 | | LT-20583 | LT476 | | LT-20584 | LT477 | | LT-20585 | LT478 | |  |  | |
| **Requirements** | * The customer must be a residential or commercial PGE electric customer.   Note: Other program level restrictions and guidelines exist for this work paper. Please see the **Programs Restrictions and Guidelines** section of PGECOLTG163 R7 for more details. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| **Installation Type** | No difference |
| **Delivery Mechanisms** | Residential Mobile Home - Double-Wide and Residential Multi-family:  Financial Support: Direct Install  Financial Support: Down-Stream Incentive - Deemed  Residential Single Family:  Up-Stream Programs: Up-Stream Incentive  Financial Support: Direct Install  Financial Support: Down-Stream Incentive - Deemed  Non-Residential:  Financial Support – Direct Install  Partnership – Direct Install  Financial Support: Down-Stream Incentive – Deemed  Financial Support: Down-Stream Incentive – Deemed – OBF  Partnership: Down-Stream Incentive – Deemed  Partnership: Down-Stream Incentive – Deemed – OBF  Mid-Stream Programs: Mid-Stream Incentive  Up-Stream Programs: Up-Stream Incentive |
| **1.4.1 DEER Data** |  |
| **Net-Gross-Ratio** | All-Ltg-LED-WRR |
| **Effective and Remaining Useful Life** | ILtg-Res-LED-15000hr  ILtg-Com-LED-15000hr |
| **Section 2. Calculation Methodology** |  |
| **Energy savings/Peak Demand Reduction – All Measures** | Energy savings are taken directly from DEER 2019 or calculated using DEER WRR methodology. The operating hours and interactive effects for all impacts were taken from the most applicable and updated DEER data. These interactive effects and operating hours were used to calculate energy savings for PG&E specific climate zones. |
| **Section 3. Load Shapes** | DEER:Indoor\_CFL\_Ltg |
| **Section 4. Costs** |  |
| **Section 4.1 Base and Measure Costs** | Costing calculation methodology was taken from PGECOLTG163 R7. Refer to SCE17LG129.2 A2 – Cost Calculations.xls for detailed baseline and measure costs. |

**Savings and Calculation Methodology**

Costing methodology for SCE17LG129.2 is based on PGE workpaper PGECOLTG163 R7 - LED Candelabra, which used prices obtained through web scraping. These prices were updated to 2018 values, and additional costing samples added in wattage ranges that lacked sufficient sampling.

Measure case costs were based on LED lamps, while base case costs were based on a blend of LED, CFL, and Incandescent lamp costs obtained from the 2018 DEER Lamp disposition. LED lamp costs were calculated by applying a linear best fit line based on average cost per watt. Baseline CFL costs were updated based on a linear best fit line for the average lamp cost per incandescent wattage equivalent. The incandescent lamp costs were found not to have a good correlation, so costs were calculated by taking binned averages of various wattage groups.

See attached file SCE17LG129.2 A2 – Cost Calculations.xls for details on the cost data.

Savings impacts for most measures were taken from DEER 2019. For non-DEER measures, savings impacts for most measures were taken from DEER 2019. For non-DEER measures, savings impacts used approved WRR values from the 2018 LED lamp disposition and were revised based on the changes in the space types and corresponding operating hours. Below table shows the space type classifications, schedule, and operating hours:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sector** | **Building Type** | **Space Type** | **Schedule** | **Operating Hours** |
| Residential | Residential Mobile Home - Double-Wide and Residential Multi-family | | Interior General - CFL Other - Res (541) | 541 |
| Residential Single Family | | Interior General - CFL Other - Res (541) | 541 |
| Non-Residential | All Commercial Building Types | | Interior General - CFL Other - Com (Varies) | Varies |

The schedules and operating hours noted above were found in the READI 2.5.1.

Above space type with corresponding operating hours were used in the calculation template to calculate energy impacts. The overall calculation methodology has not changed from the methodology found in PGECOLTG163 R7 - LED Candelabra.

**Savings Calculation Workbook**

1. PGECOLTG163 R8 LED Candelabra.xlsx
2. SCE17LG129.2 A2 – Cost Calculations.xls