Short Form Work Paper WPSDGENRLG0106

**Revision 5**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Integral LED Lamps**

**June 30, 2017**

# SDG&E Integral LED Lamps

## Introduction

This short form workpaper (WP) documents the updates addressing the May 26, 2017 screw-in lighting disposition. The updates include creating new measure codes that are based on EISA bins and CEC spec for A-lamps. The bins also define new LPW requirement and delta watt methodology for A-lamps. Changes to the measure and baseline costs for A-lamps are also included. For reflector lamps, there were updates to both savings and base costs. SDG&E adopts PG&E’s PGECOLTG165 R4 LED A-lamps, base costs but utilize its own MSRPs costs from its contracted manufacturer/distributor for both A-lamps and reflectors.

## Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 02/17/2012 | Charles Harmstead/SDGE | Original work paper adapted from SCE work paper WPSCNRLF0106 -1. For SDGE climate zones and DEER V 3.02 Interactive effects |
| 1 | 6/25/2012 | Charles Harmstead/SDGE | Revised NTGR to DEER 2011. Revised Wattage Savings per CPUC ED direction. Added attachment defining revised incremental costs |
| 2 | 01/30/2014 | Phillip Hasley/Hasley Consulting | Updated to new Template.  -Added PAR-20, Globe, Candelabra and R-30 lamps  -Revised measure savings calculation methodology per CPUC ED Disposition  -Updated EUL per CPUC ED Disposition |
| 3 | 06/25/2014 | Phillip Hasley/Hasley Consulting | -Updated energy and demand savings calculations using the DEER 2014 Lighting HVAC Interactive Effects workbook [D] and updated measure wattages based on May 30, 2014 lighting disposition for all applicable integral LED installation applications.  -Updated GSIA ID and Load Shape ID  -Updated EUL discussion to reference EUL IDs provided by the CPUC |
| 4 | 12/29/2016 | Kelvin Valenzuela/SDG&E & Mark McNulty Consulting | -Updated integral LED lamp impacts from READI.  -Updated integral LED lamp impacts with supporting documentation, where data is not available in READI  -Updated costs |
| 5 | 6/30/2017 | Kelvin Valenzuela/SDGE | -Updated for May 26, 2017 screw-in lighting disposition.  -Created new measure codes, savings, and costs to account for EISA bin and CEC Specification  -Adjusted savings and baseline costs for “reflector” lamps based on revised WRR  -SDG&E used actual MSRP costs from contracted manufacturer/distributor to create new measure costs  -Updated NTG values |

## Measure Summary

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper (WP) documents the updates addressing the May 26, 2017 screw-in lighting disposition. The updates include creating new measure codes that are based on EISA bins and CEC spec for A-lamps. The bins also define new LPW requirement and delta watt methodology for A-lamps. Changes to the measure and baseline costs for A-lamps are also included. For reflector lamps, there were updates to both savings and base costs. SDG&E adopts PG&E’s PGECOLTG165 R4 LED A-lamps, base costs but utilize its own MSRPs costs from its contracted manufacturer/distributor for both A-lamps and reflectors. |
| **1.1 Measure & Baseline Data** | See Excel workbook entitled “WPSDGENRLG0106-Rev05\_workbook” for SDG&E sourced documentation. |
| **1.2 Technical Description** |  |
| Measures | A-lamps, PARs, R/BR; MR16, Candelabra, and Globe types were unchanged. |
| Code for All Measures | Halogen Incandescent or CFL A-lamp |
| Requirements | **A-Lamp requirements as of July 1, 2017:**   * Must replace an incandescent, incandescent halogen, or CFL A-lamp * Must be on the ENERGY STAR qualified product list and be listed with the Department of Energy Lighting Facts Program. * Close to or meets full CEC Spec by meeting the following requirements: * Luminous Efficacy ≥ 68 Lumens per Watt till 12/31/2017 * Reported CCT of 2200K, 2500K, 2700K, 3000K, 3500K, 4000/4100K, 5000K, or 6500K * Combined Efficacy Score (efficacy in LPW + 2.3 × CRI) ≥ 282\* (“best in lamp class and channel”)\*\* * CRI ≥ 82 and individual color scores for R1-R8 ≥72 * R9 > 0 * Omnidirectional light distribution meeting ENERGY STAR version 2.0 requirement * Chromaticity and color consistency meeting requirements of Table 1 of Annex B of ANSI C78.377-2015 * Rated life ≥ 15,000 hours * Power Factor ≥ 0.7 * Standby Power ≤ 0.2 Watts. Lamps without integral controls shall not draw power in the off mode. * If Manufacturer claims dimmability or incandescent equivalence, the product must meet the applicable California Quality Specification requirements for Product Packaging, flicker and noise * Must either be on THE ENERGY STAR Qualified Products List (QPL), or have begun ENERGY STAR Rated Life testing, and continue in testing until the product is accepted for the QPL. * Must be listed on the QPL within 9 months of the applicable IOU's allocation begin/confirmation date. Must be listed on the Department of Energy LED Lighting Facts Product List within 9 months of the applicable IOU's allocation begin/confirmation date. * Meets ENERGY STAR Plus lamp specifications, plus at least: * Luminous Efficacy ≥ 70 Lumens per Watt for CRI ≥ 90 * Luminous Efficacy ≥ 80 Lumens per Watt for CRI < 90 * Combined Efficacy Score (efficacy in LPW + 2.3 × CRI) ≥ 282\* (“best in lamp class and channel”)\* \* * CRI ≥ 82 and individual color scores for R1-R8 ≥72 * Chromaticity and color consistency meeting requirements of Table 1 of Annex B of ANSI C78.377-2015 * Power Factor ≥ 0.7 * Standby Power ≤ 0.2 Watts. * If Manufacturer claims dimmability or incandescent equivalence, the product must meet the applicable California Quality Specification requirements for Product Packaging, flicker and noise * Must either be on THE ENERGY STAR Qualified Products List (QPL), or have begun ENERGY STAR Rated Life testing, and continue in testing until the product is accepted for the QPL. * Must be listed on the QPL within 9 months of the applicable IOU's allocation begin/confirmation date. * Must be listed on the Department of Energy LED Lighting Facts Product List within 9 months of the applicable IOU's allocation begin/confirmation date.   \* For Rebate Programs effective 1/1/2018, efficacy minimum is 80 LPW and combined efficacy score of 297.  \*\*Best in lamp class and channel - Utility managers will choose the products that are “best in class”. What represents “best in class” will change depending on the specific product and channel. Furthermore, channels with more choices of energy efficient lighting (i.e. large home improvement stores) will be held to a higher standard than other categories with fewer options (i.e. mom and pop hardware stores).  **R/BR requirements as of July 1, 2017**   * Must replace an incandescent or CFL R/BR lamp * Must be on the ENERGY STAR qualified product list and be listed with the Department of Energy Lighting Facts Program * Close to or meets full CEC Spec by having at least: * CA beam shape requirements * CCT of 2700K or 3000K * CRI>=90 * R9>0 (“best in lamp class and channel”)\* * Dimmable * Must either be on THE ENERGY STAR Qualified Products List (QPL), or have begun ENERGY STAR Rated * Life testing, and continue in testing until the product is accepted for the QPL. * Must be listed on the QPL within 9 months of the applicable IOU's allocation begin/confirmation * date. * Must be listed on the Department of Energy LED Lighting Facts Product List within 9 months of the applicable IOU's allocation begin/confirmation date.   Meets ENERGY STAR Plus lamp specifications, plus at least:   * CA beam shape requirements * CCT of 2700K or 3000K * CRI>=80 (“best in lamp class and channel”) * R9>0 (“best in lamp class and channel”) * Dimmable * Must either be on THE ENERGY STAR Qualified Products List (QPL), or have begun ENERGY STAR Rated * Life testing, and continue in testing until the product is accepted for the QPL. * Must be listed on the QPL within 9 months of the applicable IOU's allocation begin/confirmation * date. * Must be listed on the Department of Energy LED Lighting Facts Product List within 9 months of the applicable IOU's allocation begin/confirmation date.   \*Best in lamp class and channel - Utility managers will choose the products that are “best in class”. What represents “best in class” will change depending on the specific product and channel. Thus, categories with a greater number of high-CRI products available (i.e. PARs and retrofit kits) will be held to a higher standard than other categories with fewer options (i.e. A-Lamps and BRs). Furthermore, channels with more choices of energy efficient lighting (i.e. large home improvement stores) will be held to a higher  standard than other categories with fewer options (i.e. mom and pop hardware stores). |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | Replace on Burn-out (ROB) |
| Delivery Mechanisms | Upstream Incentives  Downstream Rebate  Direct Install |
| **1.4.1 DEER Data** |  |
| Net-to-Gross Ratio | In SDG&E/SCG bi-weekly call, the Commission Staff provided details to their PEARdb values, including new NTG values reflective of the screw-in disposition. These NTG IDs are used for both A-lamps and reflectors.  NonRes-sAll-mLEDARefl for nonresidential LED A-lamp and screw-in reflector, 0.91  Res-sAll-mLEDARefl for residential LED A-lamp and screw-in reflector, 0.91 |
| Effective and Remaining Useful Life | ILtg-Com-LED-20000hr; Varies based on READI linking  ILtg-Res-LED-20000hr; 16 years |
| **Section 2. Calculation Methodology** | Based on the May 26, 2017 screw-in lighting disposition, this table represents the minimum LPW requirement per EISA bin  **Table 1 – Minimum Efficacy Requirements**   |  |  |  |  | | --- | --- | --- | --- | | **EISA Wattages (W)** | **2017 efficacy (LPW)** | **2018 efficacy (LPW)** | **2019 efficacy (LPW)** | | 40 | 68 | 80 | 95 | | 60 | 80 | 90 | 100 | | 75 | 90 | 90 | 110 | | 100 | 90 | 90 | 110 |   Based on these requirements, the disposition generated revised savings at each new measure definition.  **Table 2 – Approved LED A-Lamp Measure Definitions**   |  |  |  | | --- | --- | --- | | EISA Bin | LPW | ∆Watts | | 40 | 70 | 6.8 | | 80 | 7.6 | | 90 | 8.7 | | 100 | 8.8 | | 60 | 70 | 6.6 | | 80 | 7.8 | | 90 | 9.2 | | 100 | 10.9 | | 110 | 11.0 | | 75 | 70 | 8.9 | | 80 | 10.8 | | 90 | 12.6 | | 100 | 13.5 | | 110 | 15.4 | | 120 | 17.6 | | 100 | 80 | 14.9 | | 90 | 17.2 | | 100 | 19.1 | | 110 | 19.9 | |  |  |  | |
| Energy Savings/Peak Demand Reduction – All Measures | See Excel workbook entitled “WPSDGENRLG0106-Rev05\_workbook” for SDG&E sourced savings documentation. |
| **Section 3. Load Shapes** | Varies – per READI linking |
| **Section 4. Costs** | July 22, 2016 Energy Division Disposition and SDGE defined costs |
| **Section 4.1 Base and Measure Costs** | **A-Lamps**  SDG&E was comparing measure and base cost data from PG&E. The base costs needed to be revised based on the lumens per watt. Per the disposition:   * For lamps greater than or equal to 90 LPW, the baseline is revised to be 75% CFL and 25% halogens. * For lamps less than 90 LPW, the baseline is revised to be 55% CFLs, 20% LEDs, and 25% halogens.   Although the base costs were thoroughly researched, the material costs were not in line with SDG&E’s current MSRPs from its manufactures/distributors. SDG&E was provided guidance that it’s the IOUs discretion on the source and methodology used in developing cost data. Given that the MSRPs were SDG&E’s own, SDG&E elected to utilize the contracted values when comparing to PG&E’s base cost.  **Reflector Lamps (PARs, BR/R)**  The disposition also adjusted the base costs of these lamp types to incorporate 40% CFLs in the gross baseline. DEER Cost IDs were utilized |
|  | Cost IDs are included in the cost table found in “20170630\_WPSDGENRLG0106-Rev05” |
|  | See Excel workbook entitled “WPSDGENRLG0106-Rev05\_workbook” for SDG&E sourced cost documentation. |