Short Form Work Paper WPSDGENRLG0181

**Revision 6**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**LED Outdoor Parking Garage Lighting**

**Implementation IDs: 467523-467530 (Delivery Type = DnDeemed)**

**467531-467538 (Delivery Type = DnDeemDI)**

**467539-467546 (Delivery Type = UpDeemed)**

**June 14, 2019**

# SDG&E Outdoor LED Parking Garage Lighting Short Form Workpaper

## Introduction

This short form workpaper documents the adoption of PG&E’s interim approved LED Outdoor Parking Garage lighting workpaper (PGECOLTG151 Rev09) for calculating ex-ante savings impacts and cost-effectiveness values used for LED outdoor parking garage lighting measures. The delta watt savings and cost values have been adopted from PG&E’s ex-ante data tables and SDG&E has created specific energy impacts and cost records that are unique to SDG&E service territory.

Exceptions and Clarifications

1. SDG&E adopted PG&E labor and material costs and created separate Cost IDs for Measure Cost and Standard Cost.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SDG&E Measure Cost ID | PG&E Measure Code | SDG&E Measured ID  (WPSDGENRLG0181-Rev06-MsrXXX) | Measure Cost | Measure Normal Cost  (includes Labor and Material)  Labor = $187.14/fixture | Incremental Measure Cost (IMC) |
| Gar-LEDFixt-CM-Ext(17w)\_Msr | LT480 | Rev06-Msr001 | $40.24 | $227.38 | $22.87 |
| Gar-LEDFixt-CM-Ext(22w)\_Msr | LT481 | Rev06-Msr002 | $51.04 | $238.18 | $13.32 |
| Gar-LEDFixt-CM-Ext(27w)\_Msr | LT482 | Rev06-Msr003 | $63.80 | $250.94 | $21.90 |
| Gar-LEDFixt-CM-Ext(34w)\_Msr | LT483 | Rev06-Msr004 | $79.50 | $266.64 | $19.27 |
| Gar-LEDFixt-CM-Ext(42w)\_Msr | LT484 | Rev06-Msr005 | $99.13 | $286.27 | $18.61 |
| Gar-LEDFixt-CM-Ext(53w)\_Msr | LT485 | Rev06-Msr006 | $123.67 | $310.81 | $50.20 |
| Gar-LEDFixt-CM-Ext(66w)\_Msr | LT486 | Rev06-Msr007 | $155.07 | $342.21 | $28.29 |
| Gar-LEDFixt-CM-Ext(83w)\_Msr | LT487 | Rev06-Msr008 | $194.33 | $381.47 | $68.92 |
| Note: Norm Units are per fixture | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| SDG&E Standard Base Cost ID | PG&E Measure Code | SDGE Measure ID | Standard Base Labor Cost | Standard Base Material Cost | Standard Base Nominal Cost |
| Gar-LEDFixt-CM-Ext(41w)\_Std | LT480 | Rev06-Msr001 | $187.14 | $17.37 | $204.51 |
| Gar-LEDFixt-CM-Ext(60w)\_Std | LT481 | Rev06-Msr002 | $187.14 | $37.72 | $224.86 |
| Gar-LEDFixt-CM-Ext(64w)\_Std | LT482 | Rev06-Msr003 | $187.14 | $41.90 | $229.04 |
| Gar-LEDFixt-CM-Ext(81w)\_Std | LT483 | Rev06-Msr004 | $187.14 | $60.23 | $247.37 |
| Gar-LEDFixt-CM-Ext(94w)\_Std | LT484 | Rev06-Msr005 | $187.14 | $80.52 | $267.66 |
| Gar-LEDFixt-CM-Ext(114w)\_Std | LT485 | Rev06-Msr006 | $187.14 | $73.47 | $260.61 |
| Gar-LEDFixt-CM-Ext(128w)\_Std | LT486 | Rev06-Msr007 | $187.14 | $126.78 | $313.92 |
| Gar-LEDFixt-CM-Ext(169w)\_Std | LT487 | Rev06-Msr008 | $187.14 | $125.41 | $312.55 |

## Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 11/19/2008 | PG&E | Original work paper (adopted form PG&E Work paper) |
| **1** | **12/03/2009** | Lucie Sidibe / SDG&E | 1. Update NTG to 2011 filing table 2. Update Run Hrs to 4,165 hours (ET Assessment Study) 3. Update Base case/Measure Value 4. SDG&E weighted Saving Calc 5. Completed measure cost using DEER08 as base case data |
| 2 | 6/27/2014 | Judelson Enriquez / RMS | 1. Updated Measures table with product codes and measure requirements, DEER Difference Summary table, Code Summary table, EUL ID table, NTG ID table, GSIA ID table, building type, load shape, and TOU section. 2. Updated costs and tables using SCE costs and approach. 3. Updated measure wattage summary table using May 30 lighting disposition and generated the calculation template. |
| 4 | 1/02/2018 | Eduardo Reynoso/ SDG&E | 1. Workpaper revision 3 was a database error and skipped to revision 4. 2. Adoption of PG&E’s PGECOLTG151 Revision 8 workpaper dated 1/1/2018. 3. Updated the measures requirements to new DLC V4.2 minimum Standards. 4. Generated new MFm building type savings impacts with the assumption that the HOU (3390 hours/year) for outdoor area lighting differ between Res (MFm) and Non-Res. The SDG&E Implementation IDs associated with these are 464214-464225 and 464262-464265. 5. Created new SDG&E Implementations IDs: 464091-464136; 464171-464225; 464262-464265. |
| 5 | 6/02/2018 | Keith Valenzuela/ SDG&E Contractor | 1. Adopted short from workpaper format. 2. Updated based on 2018 Outdoor Lighting Disposition Update Covering Workpaper Resubmission in Response to a 2018 Phase 1 Disposition dated May 7th, 2018. 3. Removed new MFm building type savings impacts with the assumption that the HOU (3390 hours/year) for outdoor area lighting differ between Res (MFm) and Non-Res. The SDG&E Implementation IDs associated with these are 464214-464225 and 464262-464265. |
| 6 | 6/06/2019 | Eduardo Reynoso/ SDG&E | 1. Updated Measure Application Type per CPUC Resolution E-4952/E-4818. 2. Updated measures definitions to align with PG&E’s workpaper revision (PGECOLTG151 Revision 9), for adding TLED lamps in the baseline savings and cost. 3. Removed legacy “sunset” measures ex-ante data records, to align with CPUC lighting disposition (dated May 13, 2019) and Resolution E-4952. 4. Adopted and created new measure definitions based on lumen bins per fixture structure, to align with PG&E’s latest workpaper revision. 5. Created new SDG&E Implementations that align with latest PG&E workpaper measures definitions.   467523-467530 (Delivery Type = DnDeemed)  467531-467538 (Delivery Type = DnDeemDI)  467539-467546 (Delivery Type = UpDeemed)   1. SDG&E workpaper and ex-ante data submission have a start date of 8/1/2019 and expiry date of 12/31/2019, to align with CPUC lighting disposition. |

## Measure Summary

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents adoption of the PG&E LED Outdoor Parking Garage lighting workpaper (PGECOLTG151 Rev09) based on 2019 Outdoor Lighting Disposition titled “Disposition Approving Pacific Gas & Electric’s Commercial LED Parking Garage Workpaper, PGECOLTG151 Rev 9” dated May 13, 2019, released by the CPUC Energy Division. |
| **1.1 Measure & Baseline Data** | Adopted from PG&E workpaper PGECOLTG151 Revision 9.   |  |  |  | | --- | --- | --- | | SDG&E  Implementation ID  (Delivery/Sector) | SDG&E Measure ID  (WPSDGENRLG0181-Rev06-Msr-XXX) | Measure Description | | 467523-467530  (DnDeemed/ NonRes)  467531-467538  (DnDeemDI/  NonRes)  467539-467546  (UpDeemed/ NonRes) | Rev06-Msr001 | LED Parking Garage Luminaire rated from 1800 to 2300 lumens and >= 120 LPW | | Rev06-Msr002 | LED Parking Garage Luminaire rated > 2300 to 2900 lumens and >= 120 LPW | | Rev06-Msr003 | LED Parking Garage Luminaire rated > 2900 to 3600 lumens and >= 120 LPW | | Rev06-Msr004 | LED Parking Garage Luminaire rated > 3600 to 4500 lumens and >= 120 LPW | | Rev06-Msr005 | LED Parking Garage Luminaire rated > 4500 to 5600 lumens and >= 120 LPW | | Rev06-Msr006 | LED Parking Garage Luminaire rated > 5600 to 7000 lumens and >= 120 LPW | | Rev06-Msr007 | LED Parking Garage Luminaire rated > 7000 to 8800 lumens and >= 120 LPW | | Rev06-Msr008 | LED Parking Garage Luminaire rated > 8800 to 11000 lumens and >= 120 LPW | | Note: refers to the SDG&E Ex-ante database submittal for additional detail. | | | | Measure Definition and Standard Baseline Descriptions   |  |  |  | | --- | --- | --- | | SDG&E Measured ID  (WPSDGENRLG0181-Rev06-MsrXXX) | Measure Description | Standard Baseline Description | | Rev06-Msr001 | LED Parking Garage Luminaire rated from 1800 to 2300 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr002 | LED Parking Garage Luminaire rated > 2300 to 2900 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr003 | LED Parking Garage Luminaire rated > 2900 to 3600 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr004 | LED Parking Garage Luminaire rated > 3600 to 4500 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr005 | LED Parking Garage Luminaire rated > 4500 to 5600 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr006 | LED Parking Garage Luminaire rated > 5600 to 7000 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr007 | LED Parking Garage Luminaire rated > 7000 to 8800 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | Rev06-Msr008 | LED Parking Garage Luminaire rated > 8800 to 11000 lumens and >= 120 LPW | 30% LED, 30% TLED, 20% LF, and 20% MH | | | | |
| **1.2 Technical Description** | LED products are able to outperform discharge-lamp technologies across Outdoor lighting. The demanding photometric requirements of garage lighting, where fixtures must spread light as widely as possible from low overhead height, is well-suited for the improved optical control of LED products. |
| Requirements | ***Program Restrictions and Guidelines***  To qualify for a rebate, the following requirements must be met:   * Luminaires must be classified and listed under the Outdoor Category with a Primary Use Designation of either Parking Garage Luminaires or Retrofit Kits for Parking Garage Luminaires. * Luminaires must meet the DLC Technical Requirements version in effect at the time of installation and be 120 lumens per watt or higher. * A product cut sheet and installation instructions must be provided.   ***Terms and Conditions***  The customer must be an SDG&E electrical customer served under a commercial/industrial rate schedule.  ***Market Applicability***  These measures are offered via Midstream, Downstream and Direct Install delivery types. |
| Code for All Measures | As stated per PGECOLTG151 Revision 9 workpaper and provided herein below. Codes & Standards Requirements ***Title 20***: These measures do not fall under Title 20 [2016] of the California Energy Regulations. The Metal Halide (MH) fixtures in the base case do fall under Title 20, and the wattages used for savings calculations are based on formulae from Table N-1 on page 283 and section 1605.3(n)(1)(B) on page 318.  ***Title 24:*** Section 110.9 and 130.2 of Title 24 [2016] details the mandatory requirements for lighting control devices and systems, ballasts, and luminaires and outdoor lighting controls and equipment. Power consumption is prescribed through calculations at the site level. Individual fixture optical performance is restricted only in section 130.2. This section describes the number of lumens exiting the fixtures at upward angles and angles near-horizontal, which also depends on the lighting zone.  ***Title 24*:** Section 130.1(c)7B for parking garage controls:  In parking garages, parking areas and loading and unloading areas, general lighting shall be controlled by occupant sensing controls having at least one control step between 20 percent and 50 percent of design lighting power. No more than 500 watts of rated lighting power shall be controlled together as a single zone. A reasonably uniform level of illuminance shall be achieved in accordance with the applicable requirements in TABLE 130.1-A. The occupant sensing controls shall be capable of automatically turning the lighting fully ON only in the separately controlled space and shall be automatically activated from all designed paths of egress. Interior areas of parking garages are classified as indoor lighting for compliance with Section 130.1(c)7B. Parking areas on the roof of a parking structure are classified as outdoor hardscape and shall comply with the applicable provisions in Section 130.2.  ***Federal Standards:*** Department of Energy (DOE) regulates Metal Halide outdoor lamps via a Metal Halide Light Fixture standard enforced starting February 10, 2017. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | |  |  | | --- | --- | | Measure Application Type (MeasAppType) | Normal Replacement (NR) | |
| Delivery Mechanisms | * DnDeemed - Downstream Rebate – Deemed * DnDeeemDI - Downstream Direct Install – Deemed * UpDeeemed – Upstream Deemed (Used for SDG&E Mid-stream Lighting Distributor Program)   Notes   1. SDG&E Business Energy Solution (BES) program contracts with third party implementers for the installation of these measures. The customer participation includes a copay and financial incentive buy-down. The delivery type has been determined to be “PreRebDown” due to customer copay to third party implementer. Traditionally this program is eligible for Direct Install delivery method absent a customer copay option. 2. SDG&E Mid-Stream Lighting Programs (3223L, 3233L and 3239L) has contracted with local Lighting Distributors to provide a discounted luminaire (incentive to others) for providing customer site address and customer utility account. The end-use customer to benefit from a discounted luminaire given that customer information is being collected. The Delivery Type has been determined to be a Mid-Stream “UpDeemed” solution for the given case mentioned. |
| **1.4.1 DEER Data** |  |
| GSIA | |  |  |  | | --- | --- | --- | | GSIA ID | GSIA Value | Sector | | Def-GSIA | 1.0 | NonRes | |
| Net-to-Gross Ratio | |  |  |  | | --- | --- | --- | | NTG ID | NTG Value | Sector | | Com-Out-Ltg-LEDFixt | 0.91 | NonRes | |
| Effective and Remaining Useful Life | EUL/RUL   |  |  |  | | --- | --- | --- | | EUL ID | EUL Value | Sector | | Oltg-Com-LED-50000hr | 12 | NonRes | |
| **Section 2. Calculation Methodology** |  |
| Energy Savings/Peak Demand Reduction – All Measures | As stated in the PG&E Outdoor Area and Street Lighting workpaper (PGECOLTG151 Revision 9) Section 2.0 pages 9-17.   * No Peak savings associated with outdoor lighting * Refer to SDG&E Ex-ante database for savings impacts |
| **Section 3. Load Shapes** | SDG:01-ALC-AllCommercial-ExtLight |
| **Section 4. Costs** |  |
| **Section 4.1 Modeled Costs** |  |
| Base Cost | SDG&E adopted PG&E’s standard base cost value and created the following standard base Cost ID:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | SDG&E Standard Base Cost ID | SDGE Measure ID | Standard Base Labor Cost | Standard Base Material Cost | Standard Base Nominal Cost | | Gar-LEDFixt-CM-Ext(41w)\_Std | Rev06-Msr001 | $187.14 | $17.37 | $204.51 | | Gar-LEDFixt-CM-Ext(60w)\_Std | Rev06-Msr002 | $187.14 | $37.72 | $224.86 | | Gar-LEDFixt-CM-Ext(64w)\_Std | Rev06-Msr003 | $187.14 | $41.90 | $229.04 | | Gar-LEDFixt-CM-Ext(81w)\_Std | Rev06-Msr004 | $187.14 | $60.23 | $247.37 | | Gar-LEDFixt-CM-Ext(94w)\_Std | Rev06-Msr005 | $187.14 | $80.52 | $267.66 | | Gar-LEDFixt-CM-Ext(114w)\_Std | Rev06-Msr006 | $187.14 | $73.47 | $260.61 | | Gar-LEDFixt-CM-Ext(128w)\_Std | Rev06-Msr007 | $187.14 | $126.78 | $313.92 | | Gar-LEDFixt-CM-Ext(169w)\_Std | Rev06-Msr008 | $187.14 | $125.41 | $312.55 | | Note: Norm Units are per fixture | | | | | |
| Measure Cost | SDG&E created new Measured Cost IDs based on adopting costs values from PGE workpaper (PGECOLTG178 Rev6)   |  |  |  |  |  | | --- | --- | --- | --- | --- | | SDG&E Measure Cost ID | SDG&E Measure ID  (WPSDGENRLG0181-Rev06-MsrXXX) | Measure Cost | Measure Normal Cost  (includes Labor and Material)  Labor = $187.14/fixture | IMC | | Gar-LEDFixt-CM-Ext(17w)\_Msr | Rev06-Msr001 | $40.24 | $227.38 | $22.87 | | Gar-LEDFixt-CM-Ext(22w)\_Msr | Rev06-Msr002 | $51.04 | $238.18 | $13.32 | | Gar-LEDFixt-CM-Ext(27w)\_Msr | Rev06-Msr003 | $63.80 | $250.94 | $21.90 | | Gar-LEDFixt-CM-Ext(34w)\_Msr | Rev06-Msr004 | $79.50 | $266.64 | $19.27 | | Gar-LEDFixt-CM-Ext(42w)\_Msr | Rev06-Msr005 | $99.13 | $286.27 | $18.61 | | Gar-LEDFixt-CM-Ext(53w)\_Msr | Rev06-Msr006 | $123.67 | $310.81 | $50.20 | | Gar-LEDFixt-CM-Ext(66w)\_Msr | Rev06-Msr007 | $155.07 | $342.21 | $28.29 | | Gar-LEDFixt-CM-Ext(83w)\_Msr | Rev06-Msr008 | $194.33 | $381.47 | $68.92 | | Note: Norm Units are per fixture | | | | | |