Work Paper SCE17LG119

**Revision 1**

**Southern California Edison**

**Residential LED Exterior Fixtures**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | Refer to Excel Calculation Attachment for Solution Codes |
| **Measure Description** | Residential LED Exterior Fixtures |
| **Base Case Description** | CFL/Halogen Fixtures using A19 screw-in lamps or integrated modules |
| **Units** | Per fixture |
| **Energy Savings** | Refer to Excel Calculation Attachment |
| **Full Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Incremental Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Effective Useful Life** | OLtg-Res-LED-50000hr and OLtg-Res-LED-50000hr-Cmn : 16 years EUL, 5.33 years RUL |
| **Measure Installation Type** | Replace on Burnout (ROB) |
| **Net-to-Gross Ratio** | All-Ltg-LED-WRR = 0.91 |
| **Important Comments** | This work paper has a complementary Ex Ante Database data set that will be provided in a separate submission to the California Public Utilities Commission (CPUC). |

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 11/1/16 | Don Ly | * New template for 2017 program year * WP effective from 1/1/2017 * Revised based on original SCE13LG119 * Updated WRR per 2016 Lighting Disposition * Applied same methodology as PGECOLTG139 to align costs statewide |
| 1 | 10/17/18 | Stephen Brett Reno (TRC) | * Updated savings methodology and WRR to reflect DEER 2019. * Updated costs to reflect 2018 values. Research performed in Q4 2018. * Updated all measures to new DEER NTG value for all LED using WRR methodology. |

# Commission Staff and Cal TF Comments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev** | **Party** | **Submittal Date** | **Comment Date** | **Comments** | **WP Developer Response** |
| 0 | CS |  |  |  |  |
| 0 | Cal TF |  |  |  |  |

Cal TF website: <http://www.caltf.org/>

# Section 1. General Measure & Baseline Data

## 1.1 Measure Description & Background

This work paper details the replacement of Residential exterior CFL/Halogen light fixtures using A19 lamps with exterior LED fixtures ranging from 8 to 41 Watts. The list of measures is shown in tables below. There are also Dwelling area and Common area measures which are in the calculation template [Attachment 1].

**Base, Standard, and Measure Cases**

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | Residential LED exterior fixture |
| Existing Condition | N/A |
| Code/Standard | N/A |
| Industry Standard Practice | WRR as provided by the READi v2.5.1 PEAR database |

For this workpaper, the term Residential LED Exterior Fixtures is used to describe all the exterior fixture products that are to be installed via direct install method utilizing authorized SCE contractors. The fixtures include Wall Mounted (porch/patio), Ceiling Mounted, and Post Mounted fixtures. Table below shows some common area wattages. For all solution codes and wattages, please refer to [Attachment 1].

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | LT-53295 |  | 8 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-64511 |  | 9 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-80865 |  | 10 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-95082 |  | 11 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-65709 |  | 12 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-53830 |  | 13 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-62909 |  | 14 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-64091 |  | 15 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-68031 |  | 16 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-92930 |  | 17 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-68234 |  | 18 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-79044 |  | 19 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-73170 |  | 20 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-90794 |  | 21 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-87921 |  | 22 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-59818 |  | 23 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-80849 |  | 24 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-54477 |  | 25 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-96871 |  | 26 Watt Exterior Fixture (Common Area) LED |
|  |  | LT-93132 |  | 27 Watt Exterior Fixture (Common Area) LED |

To qualify for incentives, the residential LED exterior fixture must be on the Energy Star Certified Light Fixtures Qualified Products List (QPL) [A]. Any fixtures requiring the use of A19 lamps must use LEDs and also be on the Energy Star’s QPL. Energy Star fixtures using A19 lamps must have GU-24 sockets. The base case fixture must have a standard E26 base.

This measure applies to all Residential building types including Single Family, Multi-family, and Mobile Home – Double-Wide in all SCE Climate Zones.

## 1.2 Technical Description

Wall Mounted Fixtures are typically used for illumination of porches, patios, walkways, and breezeways. Ceiling Mounted Fixtures are mounted on the surface of the ceiling as opposed to recessed downlights, in which the fixture installs flush to the ceiling. Post Mounted Fixtures are installed on top of poles next to walkways and in open spaces.

All three LED fixtures described typically use two to four A19 lamps with a GU-24 socket or contain integrated LED modules instead of an A19 GU-24 lamp. These are hard wired fixtures and about 30 minutes are required to install.

## 1.3 Installation Types and Delivery Mechanisms

The delivery method that is available for these measures is:

* Financial Support – Direct Install
* Financial Support – Downstream Deemed

The program/install type for the above measures is:

* Replace on Burnout (ROB)

**Installation Type Descriptions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Replace on Burnout (ROB) | Above Code or Standard | N/A | EUL | N/A |

A delivery mechanism is a delivery method paired with an incentive method. Delivery mechanisms are used by programs to obtain program participation and energy savings.

**Delivery Method Descriptions**

|  |  |
| --- | --- |
| **Delivery Method** | **Description** |
| Financial Support | The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects. |

**Incentive Method Descriptions**

|  |  |
| --- | --- |
| **Incentive Method** | **Description** |
| Direct Install | The program implements energy efficiency measures for qualifying customers, at no cost to the customer. |
| Down-Stream Incentive | The customer installs qualifying energy efficient equipment and submits an incentive application to the utility program. Upon application approval, the utility program pays an incentive to the customer. Such an incentive may be deemed or customized. |

## 1.4 Measure Parameters

### 1.4.1 DEER Data

Although the fixture savings in this work paper are based on A19 lamps with a 2.42 WRR, the LED A19 lamps listed in the READI tool do not provide 1 Watt increments up to the wattage range needed and also does not provide the proper EUL for a lighting fixture.

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Workpaper?** |
| Modified DEER methodology | No |
| Scaled DEER measure | Yes |
| DEER Base Case | Yes |
| DEER Measure Case | Yes |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | No |
| DEER Version | READi v2.5.1 |
| Reason for Deviation from DEER | DEER contains this measure. |
| DEER Measure IDs Used | Please refer to ExAnte submission for appropriate READi Measure ID’s. |

**Net-to-Gross Ratio**

The NTG values were obtained using the DEER READI tool. The relevant NTG values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NTGR ID** | **Description** | **Sector** | **BldgType** | **Measure Delivery** | **NTGR** |
| All-Ltg-LED-WRR | All LED Lamps and Fixtures using the WRR savings calculation methodology. | Any | Any | Any | 0.91 |

**Spillage Rate**

Spillage rates are not tracked in work papers; they are tracked in an external document which will be supplied to the Commission Staff.

**Installation Rate**

The IR values were obtained using the DEER READI tool. The relevant IR values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **GSIA ID** | **Description** | **Sector** | **BldgType** | **ProgDelivID** | **GSIAValue** |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1 |

**Effective and Remaining Useful Life**

The EUL and RUL values were obtained using the DEER READI tool. DEER defines the RUL as 1/3 of the EUL value. The RUL value is only applicable to the first baseline period for an RET measure with an applicable code baseline. The relevant EUL and RUL values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** |
| OLtg-Res-LED-50000hr | LED Fixture - Outdoor- Residential | Res | Lighting | 16 | 5.33 |
| OLtg-Res-LED-50000hr-Cmn | LED Fixture - Outdoor- Residential Common Area | Res | Lighting | 16 | 5.33 |

### 1.4.2 Codes and Standards Analysis

Although code exists, this work paper uses recommended wattage reduction ratios from the Energy Division’s READi v2.5.1 PEAR databse to calculate the base case wattage. Therefore codes do not apply.

## 1.5 EM&V, Market Potential, and Other Studies – Base Case and Measure Case Information

N/A

## 1.6 Data Quality and Future Data Needs

N/A

# Section 2. Calculation Methodology

The methodology of the wattages to be used for energy savings is based on the LED wattage being offered and the Wattage Reduction Ratio (WRR) per the READi v2.5.1 PEAR database measure definitions. For ROB calculations see below.

The 1st baseline energy estimates with WRR of 2.42 in climate zone 6 for 8 watt fixture is calculated as follows:



The demand reduction estimates are calculated as follows:



.00023

A complete list of energy savings and demand reduction for other measures in different building types and climate zones can be found in the attachment [Attachment 1].

# Section 3. Load Shapes

The ideal load shape for net benefits estimates would represent the difference between the base case and measure case. The closest load shapes that are applicable to the measures in this work paper are listed in the table below.

Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **Load Shape** | **E3 Alternate Building Type** |
| Residential Single Family | Outdoor Lt | Misc.\_Commercial |
| Residential Multi-family | Outdoor Lt | Misc.\_Commercial |
| Residential Mobile Home - Double-Wide | Outdoor Lt | Misc.\_Commercial |

# Section 4. Costs

## 4.1 Base Case Cost

Base case costs were based on a blend of LED, CFL, and Halogen fixture costs. LED, CFL, and Halogen fixture costs were calculated by applying a linear formula based on average $/Watt. The technique of web scraping (aka web harvesting, web crawling, web data extraction) was used to gather pricing information and was performed in Q4 2018 [Attachment 2]. Labor costs estimate a 30 minute install time; a labor rate of $67.88/hr from the READI Tool (R-OL-DP) is used to estimate a cost of $33.94 per unit. Table below shows samples of two Common Area wattages. For more information, please see [Attachment 1] for more information.

**Base Case Costs**

|  |  |  |
| --- | --- | --- |
| **Measure** | **Base Equipment Cost** | **Base Labor Cost** |
| LT-53295 | $18.11 | $33.94 |
| LT-64511 | $19.38 | $33.94 |

## 4.2 Measure Case Cost

Measure case costs were based on LED fixtures and the technique of web scraping (aka web harvesting, web crawling, web data extraction) was used to gather pricing information and was performed in Q4 2018 [Attachment 2]. Labor costs estimate a 30 minute install time; a labor rate of $67.88/hr from the READI Tool (R-OL-DP) is used to estimate a cost of $33.94 per unit. Table below shows samples of two Common Area wattages. For more information, please see [Attachment 1] for more information.

**Measure Case Costs**

|  |  |  |
| --- | --- | --- |
| **Measure** | **Measure Equipment Cost** | **Measure Labor Cost** |
| LT-53295 | $44.30 | $33.94 |
| LT-64511 | $45.47 | $33.94 |

## 4.3 Full and Incremental Measure Cost

**Full and Incremental Measure Cost Equations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| ROB | (MEC + MLC) – (BEC + BLC) | (MEC + MLC) – (BEC + BLC) | N/A |

MEC = Measure Equipment Cost; MLC = Measure Labor Cost

BEC = Base Case Equipment Cost; BLC = Base Case Labor Cost

**Full and Incremental Costs – ROB Install Type**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| LT-50205 | $26.19 | $26.19 | N/A |
| LT-50609 | $26.09 | $26.09 | N/A |

# Attachments

1. SCE17LG119.1 A1 - Calculation templates
2. SCR17LG119.1 A2 - Cost Calculations

# References

References\_11152017\_131456.xlsx

[A] <http://www.energystar.gov/productfinder/download/certified-light-fixtures/>