Work Paper SCE17LG085

**Revision 0**

**Southern California Edison**

**Interior Compact Fluorescent Fixture**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | See Section 1. |
| **Measure Description** | Compact fluorescent (CFL) fixtures |
| **Base Case Description** | Common/Dwelling measures: Incandescent fixtures |
| **Units** | Fixture |
| **Energy Savings** | Refer to Excel Calculation Attachment 1. |
| **Full Measure Cost ($/unit)** | Refer to Excel Calculation Attachment 2. |
| **Incremental Measure Cost ($/unit)** | Refer to Excel Calculation Attachment 2. |
| **Effective Useful Life** | ILtg-CFLfix-Res: 16 years  ILtg-CFLfix-ResCmnArea: 15 years |
| **Measure Installation Type** | Replace on Burnout (ROB) |
| **Net-to-Gross Ratio** | Res-Default>2: 0.55  Res-Default-HTR-di: 0.85 |
| **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 | 11/2/2016 | Theodore D’Williams/TRC | * This work paper is a copy of SCE13LG085.4 * New calculation template for 2017 program year * Early Retirement (RET) was removed as an installation type * Labor cost revised based on RSMeans 2016 * Savings were updated based on DEER 2017 Assumptions |

# Commission Staff and Cal TF Comments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev** | **Party** | **Submittal Date** | **Comment Date** | **Comments** | **WP Developer Response** |
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Cal TF website: <http://www.caltf.org/>

# Section 1. General Measure & Baseline Data

## 1.1 Measure Description & Background

Base, Standard, and Measure Cases

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | Interior CFL Fixture |
| Existing Condition | Incandescent fixtures (Total Watts = 3.53 x Msr Watts) |
| Code/Standard | Incandescent fixtures (Total Watts = 3.53 x Msr Watts) |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | LT-79504 |  | 16 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-19423 |  | 22 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-68432 |  | 23 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-80989 |  | 25 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-97876 |  | 26 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-39075 |  | 27 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-81657 |  | 30 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-23209 |  | 32 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-59876 |  | 36 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-87943 |  | 39 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-49660 |  | 40 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-49593 |  | 44 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-67654 |  | 46 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-85876 |  | 52 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-19143 |  | 54 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-34841 |  | 55 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-38978 |  | 64 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-56473 |  | 69 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-78567 |  | 72 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-90776 |  | 92 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-39256 |  | 16 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-93432 |  | 22 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-50765 |  | 23 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-40994 |  | 25 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-89854 |  | 26 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-24867 |  | 27 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-73649 |  | 30 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-59687 |  | 32 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-45765 |  | 36 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-79523 |  | 39 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-35476 |  | 40 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-62735 |  | 44 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-50587 |  | 46 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-78765 |  | 52 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-90987 |  | 54 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-27559 |  | 55 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-72843 |  | 64 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-45343 |  | 69 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-65832 |  | 72 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |
|  |  | LT-87453 |  | 92 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts |

**Eligibility Requirements**

* The Common and Dwelling Area measures are applicable to the Residential Multi-family and Residential Mobile Home - Double-Wide building types.

## 1.2 Technical Description

The measure case CFL GU24 fixtures will have lumen output that is comparable to the fixtures being replaced.

## 1.3 Installation Types and Delivery Mechanisms

ROB

* Financial Support: Down-Stream Incentive – Deemed
* Financial Support: Direct Install

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

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Work paper?** |
| Modified DEER methodology | No |
| Scaled DEER measure | No |
| DEER Base Case | Yes |
| DEER Measure Case | Yes |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | No |
| DEER Version | DEER 2017, READI v.2.4.7 |
| Reason for Deviation from DEER | N/A |
| DEER Measure IDs Used | e.g. R-In-CFLfixt-16w(16w)-dWP40 |

**Net-to-Gross Ratio**

The NTG values in the Table below were obtained using the DEER READI tool v.2.4.7.

Net-to-Gross Ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NTGR ID** | **Description** | **Sector** | **BldgType** | **Measure Delivery** | **NTGR** |
| Res-Default-HTR-di | All other EEM with no evaluated NTGR; direct install hard-to-reach only. | Res | Any | DirInstall | 0.85 |
| Res-Default>2 | All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years | Res | Any | Any | 0.55 |

Note: Direct install measures that are not hard-to-reach will use the default NTG value.

This work paper includes measures that are offered via direct install activities into hard-to-reach (HTR) customer homes. “Final Resolution E-4700”, dated December 18, 2014, defines specific criteria to classify customer homes as HTR. The “Required Corrections to Measure Level Input Parameters Identified by Commission Staff per D.14-10-046 Order Paragraph 16”, dated November 3, 2014, includes additional clarification for the geographic criteria.

SCE’s Multi-Family Energy Efficiency Rebate (MFEER) program addresses the ongoing concern with “split incentives”, where the residents are not the owners of the property, so they lack incentive to improve their energy usage. Similarly, the property owners do not live on-site and pay higher utility expenses due to inefficient appliances, thus lack any incentive to upgrade. The MFEER is designed to drive this customer segment toward participation by offering property owners a variety of energy efficiency measures and services. The MFEER program will offer and track measure installations in both common and dwelling areas of multifamily complexes and common areas of mobile home parks and condominiums. Measures offered via direct install activities in both common and dwelling areas of multifamily complexes and common areas of mobile home parks and condominiums will receive the HTR NTG. Other measures in the MFEER program will receive default NTG (NTGR\_ID: Res-Default>2), unless otherwise specified in DEER.

This work paper includes measures that are offered via direct install activities into hard-to-reach (HTR) customer facilities. “Final Resolution E-4700”, dated December 18, 2014, defines specific criteria to classify customer facilities as HTR and also states that two criteria are sufficient to identify HTR customers if one of the criteria met is the geographic criteria.

SCE’s Commercial Direct Install program delivers free and low cost energy efficiency hardware retrofits through installation contractors to reduce peak demand and energy savings for small and medium commercial customers. The barriers for customer participation include limited capital resources, lack of expertise and understanding of the understanding of the benefits of energy efficiency, a suspicion of the “free offer” and its legitimacy, and language and cultural barriers. The program also addresses the ongoing concern with “split incentives”, where the customer is not the owner of the property, and therefore, lack incentive to improve their energy usage. SCE’s Commercial Direct Install program will track the following three (3) customer data points to identify direct install activities in HTR customer facilities. If geography and business size criteria are satisfied, SCE will identify the customer as HTR. If geography and language criteria are satisfied, SCE will identify the customer as HTR. Other measures in the Commercial Direct Install program will receive default NTG (NTGR\_ID: Com-Default>2), unless otherwise specified in DEER.

o **Business Size** – Customer must have less than ten employees

o **Language** – Customer’s primary language spoken is not English

o **Geography** – Businesses in areas other than the United States Office of Management and Budget (OMB) Combined Statistical Areas (CSA) of the San Francisco Bay Area, the Greater Los Angeles Area and the Greater Sacramento Area or the OBM metropolitan statistical areas or San Diego County

The “Required Corrections to Measure Level Input Parameters Identified by Commission Staff per D.14-10-046 Order Paragraph 16”, dated November 3, 2014, includes additional clarification for the geographic criteria:

“Notes on OMB CSA designations:

The OMB has designated a 12-county CSA titled the San Jose-San Francisco-Oakland, CA Combined Statistical Area which includes the nine counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma which border the San Francisco Bay plus the three counties of San Joaquin, Santa Cruz, and San Benito that are economically tied to the nine counties that that border the San Francisco Bay.”

The OMB definition of this CSA includes Los Angeles, Orange, San Bernardino, Riverside and Ventura counties.

The OMB definition of this CSA includes Sacramento, Yolo, El Dorado, Placer, Sutter, Yuba, and Nevada counties.”

**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 in the Table below were obtained using the DEER READI tool v.2.4.7.

Gross Savings and Installation Adjustment

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **GSIA ID** | **Description** | **Sector** | **BldgType** | **ProgDelivID** | **GSIAValue** |
| MFm-IntCF-All | Interior Compact Fluorescent fixture; Annual Installation Rate; Multi-family | Res | Mfm | NonUpStrm | 0.798 |

**Effective and Remaining Useful Life**

The EUL and RUL values the table below was obtained using the DEER READI tool v.2.4.7. DEER defines the RUL as 1/3 of the EUL value.

Effective Useful Life

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** |
| ILtg-CFLfix-Res | CFL Fixtures - Indoor - Residential | Res | Lighting | 16 | 5.33 |
| ILtg-CFLfix-ResCmnArea | CFL Fixtures - Indoor - Residential Common Area | Res | Lighting | 15 | 5 |

### 1.4.2 Codes and Standards Analysis

This measure is not addressed in the Title 20 2015 Appliance Efficiency Regulations [493].

In Section 141.0(b)2I i and ii of California’s Title 24 2016 Non-Residential Building Energy Efficiency Standards [496], the Alteration codes and standards language states:

**Entire Luminaire Alterations.** Entire luminaire alterations shall meet the following requirements:

* 1. For each enclosed space, alterations that consist of either (a) removing and reinstalling a total of 10 percent or more of the existing luminaires; or (b) replacing or adding entire luminaires; or (c) adding, removing, or replacing walls or ceilings along with any redesign of the lighting system, shall meet the lighting power allowance in Section 140.6, and the altered luminaires shall meet the applicable requirements in Table 141.0-E; or
  2. For alterations where existing luminaires are replaced with new luminaires, and that do not include adding, removing, or replacing walls or ceilings along with redesign of the lighting system, the replacement luminaires in each office, retail, and hotel occupancy shall have at least 50 percent, and in all other occupancies at least 35 percent, lower rated power at full light output compared to the existing luminaires being replaced, and shall meet the requirements of Sections 130.1(a)1, 2, and 3, 130.1(c)1A through C, 130.1(c)2, 130.1(c)3, 130.1(c)4, 130.1(c)5, 130.1(c)6A, and for parking garages 130.1(c)7B.

**EXCEPTION 1 to Section 141.0(b)2I.** Alteration of portable luminaires, luminaires affixed to moveable partitions, or lighting excluded as specified in Section 140.6(a)3.

**EXCEPTION 2 to Section 141.0(b)2I.** In an enclosed space where two or fewer luminaires are replaced or reinstalled.

**EXCEPTION 3 to Section 141.0(b)2I.** Alterations that would directly cause the disturbance of asbestos, unless the alterations are made in conjunction with asbestos abatement.

**EXCEPTION 4 to Section 141.0(b)2I.** Acceptance testing requirements of Section 130.4 are not required for alterations where lighting controls are added to control 20 or fewer luminaires.

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 24 (2016) | 2016 Non-Residential, high-rise residential and hotel/motel buildings Building Energy Efficiency Standards, Section 141.0(b) | January 1, 2017 |
| Title 20 (2015) | N/A | N/A |

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

No other studies were used in the development of this work paper.

## 1.6 Data Quality and Future Data Needs

The data used for this work paper come directly from DEER2017, DEER READI tool, version 2.4.7.

# Section 2. Calculation Methodology

The savings for all the measures are calculated using the WRR value of 3.53 taken from READI v2.4.7 for the DEER measures indicated in the table below. All measure wattages and WRR values are taken directly from DEER 2017 and the appropriate Interactive Effects and Demand Factors are applied to calculate savings.

**Energy Savings and Demand Reduction**

Examples of savings calculations for a 27W common area fixture, climate zone 06, using HOU from DEER READI tool v.2.4.7 is provided below:

MultiFamily Building Type (Common Area)

See the calculation template (Attachment 1) for all results.

The following are the DEER measure assumptions were used for calculating rest of the savings values.

|  |  |  |
| --- | --- | --- |
| **Solution Code** | **Measure Name** | **DEER MeasureID** |
| LT-79504 | 16 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-16w(16w)-dWP40 |
| LT-19423 | 22 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-22w(22w)-dWP55 |
| LT-68432 | 23 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-23w(23w)-dWP58 |
| LT-80989 | 25 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-25w(25w)-dWP63 |
| LT-97876 | 26 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-26w(26w)-dWP65 |
| LT-39075 | 27 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-27w(27w)-dWP68 |
| LT-81657 | 30 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-30w(30w)-dWP75 |
| LT-23209 | 32 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-32w(32w)-dWP80 |
| LT-59876 | 36 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-36w(36w)-dWP91 |
| LT-87943 | 39 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-39w(39w)-dWP98 |
| LT-49660 | 40 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-40w(40w)-dWP101 |
| LT-49593 | 44 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-44w(44w)-dWP111 |
| LT-67654 | 46 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-46w(46w)-dWP116 |
| LT-85876 | 52 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-52w(52w)-dWP131 |
| LT-19143 | 54 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-54w(54w)-dWP136 |
| LT-34841 | 55 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-55w(55w)-dWP139 |
| LT-38978 | 64 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-64w(64w)-dWP161 |
| LT-56473 | 69 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-69w(69w)-dWP174 |
| LT-78567 | 72 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-72w(72w)-dWP182 |
| LT-90776 | 92 Watt Interior Fixture (Dwelling Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-In-CFLfixt-92w(92w)-dWP232 |
| LT-39256 | 16 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-16w(16w)-dWP40 |
| LT-93432 | 22 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-22w(22w)-dWP55 |
| LT-50765 | 23 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-23w(23w)-dWP58 |
| LT-40994 | 25 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-25w(25w)-dWP63 |
| LT-89854 | 26 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-26w(26w)-dWP65 |
| LT-24867 | 27 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-27w(27w)-dWP68 |
| LT-73649 | 30 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-30w(30w)-dWP75 |
| LT-59687 | 32 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-32w(32w)-dWP80 |
| LT-45765 | 36 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-36w(36w)-dWP91 |
| LT-79523 | 39 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-39w(39w)-dWP98 |
| LT-35476 | 40 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-40w(40w)-dWP101 |
| LT-62735 | 44 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-44w(44w)-dWP111 |
| LT-50587 | 46 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-46w(46w)-dWP116 |
| LT-78765 | 52 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-52w(52w)-dWP131 |
| LT-90987 | 54 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-54w(54w)-dWP136 |
| LT-27559 | 55 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-55w(55w)-dWP139 |
| LT-72843 | 64 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-64w(64w)-dWP161 |
| LT-45343 | 69 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-69w(69w)-dWP174 |
| LT-65832 | 72 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-72w(72w)-dWP182 |
| LT-87453 | 92 Watt Interior Fixture (Common Area) CFL replacing CFL Fixture Base Case, Total Watts = 3.53 x Msr Watts | R-InCmn-CFLfixt-92w(92w)-dWP232 |

# 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 Mobile Home - Double-Wide | DEER:Indoor\_CFL\_Ltg | RES |
| Residential Multi-family | DEER:Indoor\_CFL\_Ltg | RES |

# Section 4. Costs

## 4.1 Base Case Cost

Base case material costs are sourced from online retailers. Costs were collected for various wattages for CFL and Incandescent ceiling flush mount, bathroom wall sconce, and pendant type fixtures. The costs for the different fixture types were averaged to develop the base case material cost. Based on review of current online retailer pricing, the base case material costs used within the work paper were found to be reasonable. A linear regression was created based on the costs identified per interior incandescent and compact fluorescent fixtures over a range of wattages. The linear regression was used to extrapolate the costs for the wattages identified under each of the solution codes included within this workpaper. Using the extrapolated values, the base case costs are calculated based on CFL and incandescent costs being weighted 40% and 60%, respectively as per DEER 2016 (Attachment 2). The RS Means Online Electrical 2016, section 26 51 13 504920 Incandescent fixture, interior, ceiling/wall, surface mounted labor cost is $44.00.

## 4.2 Measure Case Cost

Measure case material costs are sourced from an online retailer and are an average of the CFL ceiling flushmount, bathroom wall sconce, and pendant type fixtures. Based on review of current online retailer pricing, the measure cost material costs used within this work paper were found to be reasonable. Measure cost methodology is identical to that described above in the base case. The labor costs are also the same as in the base case.

## 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 (a sample)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure** | **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| LT-19423 | ROB | $29.24 | $29.24 | N/A |
| LT-23209 | ROB | $38.25 | $38.25 | N/A |
| LT-39075 | ROB | $35.46 | $35.46 | N/A |
| LT-59876 | ROB | $43.22 | $43.22 | N/A |
| LT-68432 | ROB | $30.48 | $30.48 | N/A |
| LT-79504 | ROB | $24.52 | $24.52 | N/A |
| LT-80989 | ROB | $32.97 | $32.97 | N/A |
| LT-81657 | ROB | $35.76 | $35.76 | N/A |
| LT-87943 | ROB | $46.96 | $46.96 | N/A |
| LT-97876 | ROB | $34.21 | $34.21 | N/A |

# Attachments

1. SCE17LG085.0 A1 - Calculation Template\_Final\_Revised\_1\_26\_17.xlsx
2. SCE17LG085.0 A2 – Interior Compact Fluorescent Costs.xlsx

# Reference

1. References\_12122016\_100741.xlsx

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