Work Paper SCE17LG086

**Revision 0**

**Southern California Edison**

**Interior Linear Fluorescent Fixture**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | LT-41199, LT-12866, LT-84912, LT-26100, LT-55943, LT-92448, LT-38287, LT-10232, LT-38754, LT-39676 |
| **Measure Description** | linear fluorescent fixtures (T5, or T5HO) |
| **Base Case Description** | The existing interior lights being replaced must be incandescent, mercury vapor, metal halide or high pressure sodium. |
| **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** | EUL varies by building type. Refer to Section 1.4.1 |
| **Measure Installation Type** | Early Retirement (ER) and Replace on Burnout (ROB)  (RET Pursuant to POE Draft Resolution E-4818) |
| **Net-to-Gross Ratio** | Refer to Section 1.4.1 |
| **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 | 11/18/16 | Chad Sisco/SCE | * Updated SCE17LG086.0 from SCE13LG086.2 * Updated Codes to T24 2016 and T20 2015. * Fixed second baselines and install types |

# 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 | linear fluorescent fixtures (T5, or T5HO) |
| Existing Condition | Existing incandescent, mercury vapor, metal halide, or high pressure sodium interior lighting fixtures |
| Code/Standard | Metal Halide Fixture (Up to 175W)  Pulse Start Metal Halide Fixture (> 175W) |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
| N/A | N/A | LT-41199 | N/A | Up to 64 Watt Interior Fixture T5 Linear Fluorescent replacing less than 100 Watt lamp base case |
| N/A | N/A | LT-12866 | N/A | Up to 128 Watt Interior Fixture T5 Linear Fluorescent replacing 101 - 175 Watt lamp base case |
| N/A | N/A | LT-84912 | N/A | Up to 192 Watt Interior Fixture T5 Linear Fluorescent replacing 176 - 399 Watt lamp base case |
| N/A | N/A | LT-26100 | N/A | Up to 244 Watt (Tier 1) Interior Fixture T5 Linear Fluorescent replacing 400 Watt lamp base case |
| N/A | N/A | LT-55943 | N/A | 245 to 360 Watt (Tier 2) Interior Fixture T5 Linear Fluorescent replacing 400 Watt lamp base case |
| N/A | N/A | LT-92448 | N/A | Up to 600 Watt Interior Fixture T5 Linear Fluorescent replacing greater than 400 Watt lamp base case |
| N/A | N/A | LT-38287 | N/A | Up to 244 Watt Interior Fixture T5 Linear Fluorescent replacing 350 Watt lamp base case |
| N/A | N/A | LT-10232 | N/A | (4) 46in (2) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 400 Watt Mercury Vapor |
| N/A | N/A | LT-28754 | N/A | (6) 46in (3) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 400 Watt Pulse Start HID |
| N/A | N/A | LT-39676 | N/A | (6) 46in (3) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 700 Watt Mercury Vapor |

**Eligibility Requirements**

In all cases, the replacement linear fluorescent fixtures must be a lower wattage than the existing base case and all base cases and measure cases must fall into the wattage classifications shown in Measures and Codes Table shown above.

**Documentation Requirements**

For direct install measures, the program must track the installed and removed equipment to the degree specified in the contracts set up with SCE.

For all fixture replacement measures, if the measure is limited to projects covered by Title 24 Section 141, require the submission of pre and post lighting construction documents that clearly identify all enclosed spaces and which fixtures have been replaced.

## 1.2 Technical Description

This work paper details the replacement of existing incandescent, mercury vapor, standard or pulse-start metal halide, or high pressure sodium interior lighting fixtures with more efficient linear fluorescent fixtures (T5, or T5HO). For New Construction scenarios, the only allowed base case would be Metal halide and Pulse Start Metal halide. To elaborate, when a project is applied using NEW as install method only code baseline defined in section 1.1 will be replaceable with the measure defined in this workpaper.

## 1.3 Installation Types and Delivery Mechanisms

The delivery method is:

**Financial Support – Direct Install**

**Financial Support – Downstream Incentive – Deemed**

**Midstream Programs – Mid-Stream Incentives**

The install type is:

**Replace on Burnout (ROB) and New Construction (NEW/NC)**

ROB measures replace existing equipment with more energy efficient equipment when the existing equipment has failed or passed its useful life. ROB is for all other delivery methods. Solution Codes LT-41199, LT-28754, and LT-12866 are available only via ROB and NEW install type.

**Retrofit (RET)**

Rest of the solution codes are available via RET, ROB, and NEW installation types. RET measures for direct install only.

The **SCE Savings By Design Program** offers incentives on a wide variety of energy-saving design and technologies that encourages design teams and building owners/managers to integrate a higher level of energy efficiency for their new construction and major building renovation projects. As a way to streamline incentivizing energy efficient lighting technologies, SBD offers an “express” way to participate in this opportunity using deemed lighting measures.

The Non Residential Direct Install program quality control ensures correct documentation of existing measure, base case, and specification of the energy efficient product installed.  SCE requires a detailed Product Location Form (PLF) for each project submitted for rebate or incentive.  The PLF is a form which information for measures installed in all building types related to the Non Residential Direct Install program.  The PLF contains the following fields: Service Account Address, Measures Proposed/Installed, Product Make/Model, Install Locations (detailed to define separate spaces/floors, as well as specific locations within the space including but not limited to:  Bathrooms, Hallways, Meeting Rooms, Offices, Warehouse, etc.).

The California Public Utilities Commission is currently evaluating the documentation required to satisfy the Preponderance of Evidence (POE) requirement for measures with RET (to be renamed AR going forward) install type. Draft Resolution E-4818 is currently out for public review and includes specific language for deemed measures in Section 1.5.4. Upon adoption of the Resolution, SCE will modify the data collection activities described above, as needed, to be consistent with the final Resolution requirements.

Customers are solicited to participate primarily through field visits.  Contractors conduct energy consultation and provide recommendation that can help eligible customers use less energy.  If the customer agrees, the Direct Install contractor will help them complete an authorization form and schedule an installation appointment.

SCE can also provide photos to show measure functionality and a sample close up photos to substantiate the measure base case where applicable.  These photos would be part of the required project package.  The project package is identified with the Service Account Number and attached to SCE’s SMART database (SCE Project Tracking System) at each specific project level. The above described information is entered and tracked in the program’s tracking database.  This level of data is provided in the Participation Data that is provided to the CPUC on a quarterly basis.

**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 |
| New Construction (NEW/NC) | Above Code or Standard | N/A | EUL | N/A |
| Retrofit or Early Replacement (RET/ER) | Above Customer Existing | Above Code or Standard | RUL | EUL-RUL |

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. |
| Mid-Stream Programs | *See Mid-Stream Incentive in the Incentive Method Descriptions table.* |
| Partnership | The program implements projects through a partnership between the utility and an institutional, government, or community-based organization. |

**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. |
| Mid-Stream Incentive  Mid-Stream Buy Down | The program gives a financial incentive to a midstream market actor (distributor, vendor, or retailer) to encourage the promotion of efficient measures. Buy Down means that the incentive is required to be passed down to the end-use customer. |

## 1.4 Measure Parameters

### 1.4.1 DEER Data

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Workpaper?** |
| 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 2016, READI v2.3.0 |
| Reason for Deviation from DEER | N/A |
| DEER Measure IDs Used | Yes |

**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** |
| NonRes-sAll-mLFHB-Deemed | Nonresidential Linear Fluorescent: high bay applications; deemed; all delivery mechanisms | NonRes | Any | Deemed | 0.65 |
| NonRes-sAll-mLFHBT5-Deemed | Nonresidential Linear Fluorescent: T5 lamps; high bay applications; deemed; all delivery mechanisms | NonRes | Any | Deemed | 0.65 |
| Com-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | NonRes | Any | DirInstall | 0.85 |
| NonRes-sAll-mLFDL-Deemed | Nonresidential Linear Fluorescent: delamping; deemed; all delivery mechanisms except upstream | NonRes | Any | Deemed/NonUpstream | 0.65 |
| NonRes-sAll-mLFOth-Deemed | Nonresidential Linear Fluorescent: measures not listed elsewhere; all delivery mechanisms | NonRes | Any | Deemed | 0.6 |

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 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 NTG values listed in NTG Table above.

* Business Size – Customer must have less than ten employees
* Language – Customer’s primary language spoken is not English
* 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 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** |
| Com-LF-All | Non-Res Linear Fluorescent fixture; Annual Installation Rate | Any | Any | Any | 0.934 |

**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)** |
| ILtg-T5 | Non-Residential | Indoor Lighting | Linear Fluorescents | EUL varies by building type  EUL = Rated Life of Ballast (70,000 hours) / Annual usage for building type (usage provided by DEER) OR  15 years (whichever is less). | RUL value is a flat 1/3 of the EUL value |

### 1.4.2 Codes and Standards Analysis

Title 24 2016 [496] defines an alteration as “any change to a building's water-heating system, space-conditioning system, lighting system, or envelope that is not an addition. Alteration is also any change that is regulated by Part 6 to an outdoor lighting system that is not an addition. Alteration is also any change that is regulated by Part 6 to signs located either indoors or outdoors. Alteration is also any change that is regulated by Part 6 to a covered process that is not an addition.” [496]

In Title 24 2016 Building Energy Efficiency Standards [496], Section 141.0(b)2J 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.

Title 20 2015 Appliance Efficiency Regulations [493] include an Energy Efficiency Standard for Metal Halide Luminaires. Probe-start ballasts metal halide luminaires rated at least partially within the range of 150 to 500 watts are not eligible. Additionally, metal halide luminaires that are not probe-start ballasts must comply with Section 1605.3(n)(2)(A) and 1605.3(n)(2)(B) as applicable.

Effective July 14th, 2012, multiple T12 lamp types will be impacted by the new US Department of Energy standards set for general service fluorescent lamps. Accordingly, T12 fixtures are being phased out as an eligible baseline lighting technology for the purpose of calculating energy savings for lighting retrofit projects. In accordance with this requirement, all T12 fixtures are not eligible as Base Case for this measure.

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 24 (2016) | 2016 Building Energy Efficiency Standards for Residential and Non-Residential Buildings, Section 141.0(b)2I | January 1, 2017 |
| Title 20 (2015) | Table K-5 Standards for Medium Base Compact Fluorescent Lamps | January 1, 2015 |

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

The DEER READI tool and the WO17 study [475] were consulted for the values used in this workpaper, and there are no applicable non-DEER studies associated with this workpaper.

## 1.6 Data Quality and Future Data Needs

The savings and other values such as NTG, EUL, and GSIA values for this workpaper are downloaded from the DEER READI tool, and the Work Order 17 – the Ex Ante Measure Cost Study is utilized for the costs.

# Section 2. Calculation Methodology

These results have not been modified and are being included in the workpaper for reference.

The following table indicates which measures are taken directly from or created with the DEER READI tool.

READI Data Used

|  |  |  |
| --- | --- | --- |
| **Measure Code** | **Measure Name** | **READI Data** |
| LT-41199 | Up to 64 Watt Interior Fixture T5 Linear Fluorescent replacing less than 100 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO(62w)-dWP66 |
| LT-12866 | Up to 128 Watt Interior Fixture T5 Linear Fluorescent replacing 101 - 175 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO(117w)-dWP73 |
| LT-84912 | Up to 192 Watt Interior Fixture T5 Linear Fluorescent replacing 176 - 399 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(179w)-dWP116-dWC109 |
| LT-26100 | Up to 244 Watt (Tier 1) Interior Fixture T5 Linear Fluorescent replacing 400 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(234w)-dWP224-dWC166 |
| LT-55943 | 245 to 360 Watt (Tier 2) Interior Fixture T5 Linear Fluorescent replacing 400 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(351w)-dWP107-dWC105 |
| LT-92448 | Up to 600 Watt Interior Fixture T5 Linear Fluorescent replacing greater than 400 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO(585w)-dWP495-dWC233 |
| LT-38287 | Up to 244 Watt Interior Fixture T5 Linear Fluorescent replacing 350 Watt lamp base case | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(234w)-dWP170-dWC166 |
| LT-10232 | (4) 46in (2) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 400 Watt Mercury Vapor | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(234w)-dwP221-dwC131 |
| LT-28754 | (6) 46in (3) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 400 Watt Pulse Start HID | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(351w)-dwP105 |
| LT-39676 | (6) 46in (3) Programmed Start Ballast - Normal Light Output - HO T5 Linear Fluorescent replacing 700 Watt Mercury Vapor | C-In-LFFixt-T5-46in-54w+El-PS-HLO-1(351w)-dwP429-dwC105 |

# 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** |
| Assembly | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Education - Primary School | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Education - Secondary School | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Education - Relocatable Classroom | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Education - Community College | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Education - University | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Grocery | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Health/Medical - Hospital | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Health/Medical - Nursing Home | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Lodging - Hotel | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Lodging - Guest Rooms | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Lodging - Motel | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Manufacturing - Bio/Tech | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Manufacturing - Light Industrial | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Office - Large | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Office - Small | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Restaurant - Fast-Food | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Restaurant - Sit-Down | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Retail - Multistory Large | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Retail - Single-Story Large | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Retail - Small | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Storage - Conditioned | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Storage - Unconditioned | DEER:Indoor\_CFL\_Ltg | NON\_RES |
| Warehouse - Refrigerated | DEER:Indoor\_CFL\_Ltg | NON\_RES |

# Section 4. Costs

## 4.1 Base Case Cost

Base case costs are developed from the 2010-2012 WO017 Ex Ante Measure Cost Study Final Report [475]. For a complete breakdown of base case costs, please refer to Attachment 2.

## 4.2 Measure Case Cost

Measure case costs are developed from the 2010-2012 WO017 Ex Ante Measure Cost Study Final Report [475]. For a complete breakdown of measure case costs, please refer to Attachment 2.

## 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 |
| NEW/NC |
| RET/ER | (MEC + MLC) – (BEC + BLC) | MEC + MLC | (MEC + MLC) – (BEC + BLC) |
| REF | (MEC + MLC) – (BEC + BLC) | MEC + MLC | N/A |
| REA | MEC + MLC | MEC + MLC | N/A |

MEC = Measure Equipment Cost; MLC = Measure Labor Cost

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

For a complete breakdown of full and incremental measure costs, please refer to Attachment 1.

# Attachments

1. SCE17LG086.0 A1 - Calculation Template\_Final.zip
2. SCE17LG086.0 A2 - WO17 Lighting Cost Calculator.xlsx

# References

1. References\_12122016\_100741.xlsx

|  |  |
| --- | --- |
| [475] | 2010-2012 WO017 Ex Ante Measure Cost Study Final Report |
| [493] | 2015 Appliance Efficiency Regulations (Title 20) |
| [496] | 2016 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) |
|  |  |
|  |  |
|  |  |