**Work Paper WPSDGENRLG0999**

**Revision 1**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Master Lighting Lookup Table – Non Residential**

# At a Glance Summary

|  |  |
| --- | --- |
| **Measure Name** | Various lighting fixtures |
| **Savings Impacts Common Units** | watts |
| **Customer Base Case Description** | Existing lamp and ballast |
| **Code Base Case Description** | Dual baseline may be affected by Title 24 for 4’ lamps |
| **Costs Common Units** | Same as Savings Impacts |
| **Building Vintage** | all |
| **Climate Zone** | Varies- See Master Lighting Lookup Table |
| **Measure Equipment Cost ($/unit)** | Varies- See Master Lighting Lookup Table |
| **Measure Incremental Cost ($/unit)** | Varies- See Master Lighting Lookup Table |
| **Measure Installed Cost ($/unit)** | Varies- See Master Lighting Lookup Table |
| **Measure Load Shape** | Varies |
| **Effective Useful Life (EUL) in years** | Varies- See Master Lighting Lookup Table. |
| **Program Type** | Retrofit (RET) and Direct Install |
| **Time of use (TOU) AC Adjustment** | 0% |
| **Net-to-Gross Ratio** | Varies by Program Type- See specific lighting type work paper |

# Document Revision History

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| --- | --- | --- | --- |
| **Revision** | **Date** | **Description** | **Author** |
| Revision0 | June 25, 2012 | Initial Workpaper. | Mark McNulty (for Peter Ford) (SDGE) |
| Revision1 | Sep. 4, 2012 | Workpaper spreadsheet revised to include missing data | Peter Ford (SDGE) |

**Note:** The information provided in this Work Paper was developed using the best available technical resources at the time this document was prepared.

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# Section 1. General Measure and Baseline Data

## 1.1 Measure Description and Background

This work paper provides the documentation and energy savings calculations for a number of lighting measure that are not included in the 2011 DEER as of June 1, 2012. Many individual work papers, reference this document and supporting tables. The approach is the same for all measures impacted by this work paper. See individual work papers for documentation of base, wattage, measure wattage and the change in wattage. This document refers to a “Master Lighting Lookup Table” that is included in an Excel workbook entitled “AllNRLtg.xls” that is embedded in this document below[[1]](#endnote-1).

**Note: The values contained in this workpaper and the embedded spreadsheets shall supersede any conflicting value contained in any other workpaper.**

***Program Catalog Description***

Various, depending on the lighting measure. See specific Workpapers and Master Lighting Spreadsheet herein for desctiptions

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## 1.2 DEER Differences Analysis

Database for Energy Efficient Resources does not include these measures as the specification of the measure varies in some manner from the measure included in the DEER. The savings calculations follow DEER methodologies and utilize various energy savings parameters that were downloaded from the DEER READI tool on June 3, 2012. These values were included in the table under the “Lighting Summary” sub-directory under “Energy Impacts” directory of the “Support Tables” tab of the READI Tool. See embedded table for DEER 2011 NTG values[[2]](#endnote-2).

## 1.3 Codes and Standards Requirements Analysis

***Title 24:***Under this regulation, the following is required:

Title 24 requires replacement four-foot lamps be T-8.

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1.4Measure Effective Useful Life

The measure life varies based on measure and building type. See SDG&E’s “Master Lighting Lookup Table” for specific values. Note that the remaining useful life (RUL) for linear fluorescent lighting impacted by changes in federal and state standards is equal to 20,000 hours/building hours of operation/3. As an example, a 4-foot T12 fixture being converted to a T8 will have and RUL of 2.1 years, based on the “Com” building type. For screw-in LED lamps, the measure life varies based on the type of LED lamp. The approach follows the recommended EUL values from the Energy Division’s work paper disposition for integral LED Lamp Replacements, dated May 14, 2012. The document is entitled “IntegralLEDWorkpaperDisposition\_120514.docx”

## 1.5 Base Case for Savings Estimates: Existing and Above Code

See individual work paper, for specific wattage ages.

## Hours of operation

See attached READI table entitled “SupportTable\_LtgSummary.xls”.[[3]](#endnote-3)

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## 1.6 Net-to-Gross Ratio for Different Program Strategies

Varies based on the specific measure and delivery mechanism. See individual work paper for applicable NTG values.

# Section 2. Calculation Methods

## 2.1 Energy Savings Estimation Methodologies

The methodology utilized follows the DEER methodology. SDG&E preserved the DEER variable labels for all of the variables included in the “SupportTable\_LtgSummary.xls” file.

## 2.2 Demand Reduction Estimation Methodologies

The methodology utilized follows the DEER methodology. SDG&E preserved the DEER variable labels for all of the variables included in the “SupportTable\_LtgSummary.xls” file.

## 2.3 Gas Energy Saving Estimation

The methodology utilized follows the DEER methodology. SDG&E preserved the DEER variable labels for all of the variables included in the “SupportTable\_LtgSummary.xls” file.

# Section 3. Load Shapes

Load Shapes are an important part of the life-cycle cost analysis of any energy efficiency program portfolio. The net benefits associated with a measure are based on the amount of energy saved and the avoided cost per unit of energy saved. For electricity, the avoided cost varies hourly over an entire year. Thus, the net benefits calculation for a measure requires both the total annual energy savings (kWh) of the measure and the distribution of that savings over the year. The distribution of savings over the year is represented by the measure’s load shape. The measure’s load shape indicates what fraction of annual energy savings occurs in each time period of the year. An hourly load shape indicates what fraction of annual savings occurs for each hour of the year. A time of use (TOU) load shape indicates what fraction occurs within five broad TOU periods, typically defined by a specific utility rate tariff. Formally, a load shape is set of fractions summing to unity, one fraction for each hour or for each TOU period. Multiplying the measure load shape with the hourly avoided cost stream determines the average avoided cost per kWh for use in the life cycle cost analysis that determines a measure’s Total Resource Cost (TRC) benefit.

## 3.1 Base Case Load Shapes

The base case indoor lighting system demand is expected to follow a typical non-residential indoor lighting end use load shape for each market sector as shown in the E3 Calculator.

## 3.2 Measure Load Shapes

For purposes of the net benefits estimates in the E3 Calculator, what is required is the demand load shape that ideally represents the difference between the base equipment and the installed energy efficiency measure. This difference load profile is what is called the Measure Load Shape and would be the preferred load shape for use in the net benefits calculations

The E3 Calculator contains a fixed set of load shapes that are utilized in the cost-effectiveness calculations.

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# Section 4. Base Case and Measure Costs

See individual work paper, for specific measure cost data.

## Attachments

1. Non Residential Master Lighting Spreadsheet

    [↑](#endnote-ref-1)
2. 2011 DEER NTG Table

    [↑](#endnote-ref-2)
3. Support table for hours of operation.

    [↑](#endnote-ref-3)