**Work Paper PGE3PLTG169**

**Case Lighting Time Clock**

**Revision #2**

**Pacific Gas & Electric Company**

**PECI EnergySmart Grocer**

**Case Lighting Time Clock**

**Measure Codes L519**

**PECI EnergySmart Grocer**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Applicable Measure Codes:** | **L519** |
| **Measure Description:** | Time Clock Control of Refrigerated Case Lighting |
| **Energy Impact Common Units:** | Linear foot of display case |
| **Base Case Description:** | Source: DEER 2014 through MASControl V3.00.19  Standard air-cooled multiplex, lights on all hours |
| **Base Case Energy Consumption:** | Source: DEER 2014 through MASControl V3.00.19  The base case energy consumption varies by climate zone and vintage. |
| **Measure Energy Consumption:** | Source: DEER 2014 through MASControl V3.00.19  The energy efficient measure energy consumption varies by climate zone and vintage. |
| **Energy Savings (Base Case – Measure)** | Source: DEER 2014 through MASControl V3.00.19  The energy savings from the implementation of this energy efficiency measure varies by climate zone and vintage. |
| **Costs Common Units:** | Linear foot of display case |
| **Base Case Equipment Cost ($/unit):** | Source: DEER 2008  $0.00 |
| **Measure Equipment Cost ($/unit):** | Source DEER 2008  $3.44 |
| **Labor Cost ($/unit)** | Source: DEER 2008  $2.84 |
| **Full Measure Cost ($/unit):** | Source: DEER 2008  $6.28 |
| **Effective Useful Life (years):** | Source: DEER 2014  8 years |
| **Measure Application Type:** | Retrofit Addition (REA) |
| **Net-to-Gross Ratios:** | Source: DEER 2011  0.60 |
| **Important Comments:** |  |

# Work Paper Approvals

The following Manager(s) approved this workpaper through the PG&E Electronic Data Routing System under Routing Requisition # \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |
| --- |
|  |
| **Grant Brohard**  Manager, Technical Product Support |
| **Carolyn Weiner**  Principal, CES Products and Programs |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision #** | **Date** | **Section by Section Description of Revisions** | **Author (Company)** |
| **Revision 0** | 08/12/2010 | Original work paper | Dennis Krieger  (PECI Engineering) |
| **Revision 1** | 5/25/2012 | Updated to PG&E 2013-2014 format  Update cost data to reflect DEER 2008  Update EUL to reflect DEER 2008 | Emily Rosenbloom  (PECI Engineering) |
| **Revision 2** | 6/18/2014 | Update 2014 weather files. Format update per PG&E guidelines | Jason Ochs, PECI  Ioana Anghel, PECI  Tai Voong, PG&E |

# Table of Contents

[At-a-Glance Summary ii](#_Toc390872366)

[Work Paper Approvals iii](#_Toc390872367)

[Document Revision History iv](#_Toc390872368)

[Table of Contents v](#_Toc390872369)

[List of Tables vi](#_Toc390872370)

[Section 1. General Measure & Baseline Data 1](#_Toc390872371)

[1.1 Product Measure Description & Background 1](#_Toc390872372)

[1.2 Product Technical Description 1](#_Toc390872373)

[1.3 Measure Application Type 1](#_Toc390872374)

[1.4 Product Base Case and Measure Case Data 2](#_Toc390872375)

[1.4.1 DEER Base Case and Measure Case Information 2](#_Toc390872376)

[1.4.2 Codes & Standards Requirements Base Case and Measure Information 3](#_Toc390872377)

[1.4.3 EM&V, Market Potential, and Other Studies – Base Case and Measure Case Information 3](#_Toc390872378)

[1.4.4 Assumptions and Calculations from other sources—Base and Measure Cases 4](#_Toc390872379)

[1.4.5 Time-of-Use Adjustment Factor 4](#_Toc390872380)

[Section 2. Calculation Methods 4](#_Toc390872381)

[Section 3. Load Shapes 4](#_Toc390872382)

[Section 4. Base Case & Measure Costs 4](#_Toc390872383)

[4.1 Base Case(s) Costs 4](#_Toc390872384)

[4.2 Measure Case Costs 5](#_Toc390872385)

[4.3 Full Measure Costs 5](#_Toc390872386)

[4.3.1 Full Measure Cost 5](#_Toc390872387)

[4.3.2 Full Measure Costs 5](#_Toc390872388)

[References 7](#_Toc390872389)

# List of Tables

[Table 1 Measure Application Type 1](#_Toc390871462)

[Table 2 DEER Net-to-Gross Ratios 3](#_Toc390871463)

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# Section 1. General Measure & Baseline Data

This workpaper details DEER 2014 measure D03-227 for installing a time clock to turning off refrigerated display case lights when the grocery store is closed.

## 1.1 Product Measure Description & Background

***Program Restrictions and Guidelines***

***Terms and Conditions:***

**Requirements:**

* Must install a time clock that controls on/off schedule of uncontrolled case lighting equipment
* Lights must be turned off for a minimum of 6 hours a day

**Exclusion:**

* Not applicable for case lighting that is already controlled by an occupancy sensor

***Market Applicability:*** This is a retrofit measure that is applicable to existing refrigerated display case in the grocery sector in a downstream rebate program. The rebate encourages the grocer to add this technology to make their existing equipment more energy efficient.

This paper contains savings for the grocery building type, 5 building vintage categories and 15 California climate zones.

## 1.2 Product Technical Description

This DEER measure uses a time clock control to turn off the refrigerated case lighting on an existing refrigerated display case while the grocery store is closed. The measure assumes that the time clock shuts off the lights between midnight and 6 a.m.

## 1.3 Measure Application Type

The delivery method for this measure is downstream prescriptive rebate.

The DEER Measure Cost Data Users Guide found on www.deeresources.com under DEER2011 Database Format hyperlink, DEER2011 for 13-14, spreadsheet SPTdata\_format-V0.97.xls, defines the terms as follows:

Table 1 Measure Application Type[[1]](#endnote-1)

*Identifies the measure application type in the Measure Implementation table in DEER2011.*

|  |  |  |
| --- | --- | --- |
| **Code** | **Description** | **Comment** |
| REA | Retrofit Add On | *Single baseline (above pre-existing), full measure costs required* |

This technology is added to perfectly functional equipment to control operating hours.

## 1.4 Product Base Case and Measure Case Data

### 1.4.1 DEER Base Case and Measure Case Information

The 2014 DEER measure through MASControl v3.00.19 data include: demand, electric and interactive gas energy savings. [[2]](#endnote-2) DEER 2014 data includes: equipment unit costs, equipment incremental costs, equipment useful life and Net to Gross.

**Delta Wattage Assumption (ΔW):**

The EUL electric savings were downloaded from DEER using MASControl version v.300.19, they match the intended measures.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Electric Savings Watts** | **Deer units** | **DEER Version** | **Impact IDs** |
| GRO | 75 | Z01 | 0.0000 | LEN-FT | 2014 | D03-227 |
| GRO | 75 | Z02 | 0.0000 | LEN-FT | 2014 | D03-227 |
| GRO | 75 | Z03 | 0.0000 | LEN-FT | 2014 | D03-227 |

**Therms Savings Assumption (ΔTh)**

EUL Gas Savings **(ΔTh):** The gas savings were downloaded from DEER using MASControl version v.300.19; they match the intended measures and express interactive effects only.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact IDs** |
| **Yes / No** |
| GRO | 75 | Z01 | Yes | -0.44969 | LEN-FT | 2014 | D03-227 |
| GRO | 75 | Z02 | Yes | -0.39110 | LEN-FT | 2014 | D03-227 |
| GRO | 75 | Z03 | Yes | -0.41733 | LEN-FT | 2014 | D03-227 |

**Base Case Costs and Measure Case Costs**

The Base Case, Measure Case and Full Measure costs were downloaded from DEER directly; they match the intended measures for climate zones and building types and ages.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Costs ($)** | | |  |  |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Base Case** | **Measure Case** | **FMC** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | $0.00 | $6.28 | $6.28 | DEER 2014 | D03-227 |

**Net to Gross Value:**

**From DEER 2011 4.01**

Table 2 DEER Net-to-Gross Ratios

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **DEER Spreadsheet** | |
| Program Approach | NTG | File name | Cell Number |
| EnergySmart Grocer | 0.60 | DEER2011\_NTGR\_2012-05-16 | T56 |

**Effective Useful Life / Remaining Useful Life:**

The Effective Useful Life estimates were downloaded from DEER directly, they match the intended measures for climate zones and building types and ages.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **EUL (yrs)** | **RUL (yrs)** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | 8 | N/A | DEER 2014 | D03-227 |

**In service rate:**

The in service rate is not listed in DEER 2011 for measure D03-227. PECI estimates the ISR for D03-227 to be 1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **In service rate** | **DEER Version** | **Impact IDs** |
| GRO | ALL | ALL | 1 | N/A | D03-227 |

### 1.4.2 Codes & Standards Requirements Base Case and Measure Information

The measure in this work paper is not governed by either state or federal codes and standards.

***Title 20:*** This measure does not fall under Title 20 of the California Energy Regulations. Title 20, Section 1601, p. 1; covers new appliances sold or offered for sale in California, but since this is a retrofit addition measure it is not covered by Title 20.

***Title 24:*** This measure does not fall under Title 24 of the California Energy Regulations. There are no code changes required for retrofits T24 p.32 Section 100.0(a)2. Time clock control of refrigerated case lighting is required on new cases according to T24 p. 151 Section 120.6(b)3.

***Federal Standards:*** This measure does not fall under Federal DOE or EPA Energy Regulations. Under this regulation, the following is required

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

There are no M&V or other studies which apply to these measures. Information on the base and measure case is found in the other sub-sections of 1.4.

### 1.4.4 Assumptions and Calculations from other sources—Base and Measure Cases

There are no further data or calculations provided for the support of the measures in this workpaper.

### 1.4.5 Time-of-Use Adjustment Factor

We are required by CPUC decision 06-06-063 dated June 29, 2006 to apply time-of-use (TOU) adjustment factors on residential A/C and commercial A/C (packaged and split-system direct-expansion cooling) measures only. Since this is not an A/C measure, the TOU adjustment factor is 0. Additionally, if a measure is assigned a DEER14 load shape, i.e. the load shape starts with “DEER:” the TOU assigned to that measure should also be zero.

# Section 2. Calculation Methods

The saving for this measure is from DEER 2005 2.01. The information can be identified in the database as measures D03-227.

# Section 3. Load Shapes

The PG&E E3 Calculator “Measure Electric End Use Shape” for both the base case load shape and measure load shape is Commercial Refrigeration.

# Section 4. Base Case & Measure Costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Measure Life Basis** | **First Baseline Period Full Measure Cost (RUL)** | **Second Baseline Period Full Measure Cost (EUL – RUL)** |
| ***REA (retrofit add on)*** | EUL | Calculated as Full Measure Cost | N/A |

## 4.1 Base Case(s) Costs

The following Measure Application Type is appropriate to this measure. The Base Case Costs are:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application**  **Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Base Case Cost** |
| L519 | REA | Existing | $0 | $0 | $0 | $0 |

*All costs are noted as $ per measure unit*

## 4.2 Measure Case Costs

The following Measure Application Type is appropriate to this measure. The Measure Case Costs are:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application**  **Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Measure Case Cost** |
| L519 | REA | Existing | $3.44 | $2.84 | $0 | $6.28 |

*All costs are noted as $ per measure unit*

## 4.3 Full Measure Costs

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Full Measure Cost**  **(RUL Period/First Baseline)** | **Full Measure Cost**  **(EUL-RUL Period/ Second Baseline)** | **Full Measure Cost** |
| REA | Measure Equipment Cost  – Base Case Equipment Cost | N/A | Measure Equipment Cost  – Base Case Equipment Cost |

### 4.3.1 Full Measure Cost

This Measure Application Type is Retrofit Add On for the First baseline period only the Full Measure Cost (FMC) is represented by the equation below:

FMC = Measure Equipment Cost + Measure Labor Cost

FMC = $ 3.44 per ln/ft + $2.84 per lnft = $ 6.28per lnft

\*Note: Various complicated price fluctuations are not addressed in these equations, such as future costs due to inflation in labor, future costs due to deflation in material cost, and other variables that cannot be accurately described at this time.

### 4.3.2 Full Measure Costs

Full Measure Cost is the premium cost to install an energy efficient measure over a standard efficiency measure or code baseline measure. While IMC has a straightforward definition depending on the Measure Application type, the equation does vary.

This Measure Application Type is Retrofit Add On the Full Measure Cost (FMC) is represented by the appropriate equation below as there exists no base case with which to compare the measure to:

FMC = (Measure Equipment Cost + Measure Labor Cost) – (Base Case Equipment Cost + Base Case Labor Cost)

Using this equation, the Full Measure cost for the measure in this workpaper is $6.28 per linear foot.

FMC *=* ($ 3.44 per ln/ft + $2.84 per ln/ft) – ($0.00 + $0.00) = $ 6.28per ln/ft

**Summary Table for Section 4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure ID** | **Measure Application Type** | **Base Case Total Cost** | **Measure Case Total Cost** | **Full Measure Case Cost** | **Full Measure Cost** |
| L519 | REA | $0 | $6.28 | $3.44 per ln/ft + $2.84 per ln/ft =  $ 6.28 | $6.28 |

# References

1. The DEER Measure Cost Data Users Guide found on [www.deeresources.com](http://www.deeresources.com) under DEER2011 Database Format hyperlink, DEER2011 for 13-14, spreadsheet SPTdata\_format-V0.97.xls. [↑](#endnote-ref-1)
2. 2004-2005 Database for Energy Efficiency Resources, Version 2.01, October 26, 2005, EEM D03-227 <http://eega.cpus.ca.gov/deer>. [↑](#endnote-ref-2)