**Work Paper PGE3PLTG168**

**Vending Machine Controller –**

**Uncooled**

**Revision 1**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Vending Machine**

**Controller - Uncooled**

# Measure Code R98

**At-a-Glance Summary**

|  |  |
| --- | --- |
| **Applicable Measure Codes:** | R98 |
| **Measure Description:** | Installation of controls on unrefrigerated vending machines dispensing non-perishable snacks. The controller must include an occupancy sensor that turns off the lights when the area is unoccupied for 15 minutes or longer. |
| **Energy Impact Common Units:** | Controller. |
| **Base Case Description:** | No controls present on existing vending machine. Base Case assumes nothing would happen without program. Source: DEER 2014. |
| **Base Case Energy Consumption:** | Normal energy consumption associated with non-cooled vending machine with no controls. Source: DEER 2014. |
| **Measure Energy Consumption:** | Controls reduce lighting energy consumption during unoccupied periods. Source: DEER 2014. |
| **Energy Savings**  **(Base Case – Measure):** | Varies from DEER 2011. |
| **Costs Common Units:** | Controller. |
| **Base Case Equipment Cost ($/unit):** | $0. Measure is an add-on and involves direct installation /retrofit, so not applicable. Source: DEER 2005. |
| **Measure Equipment Cost ($/unit):** | $106.92 per controller. Source: Ecology Action. |
| **Gross Measure Cost ($/unit)** | $144.42 ($106.92 equipment plus $37.50 labor) per controller. Source: Ecology Action. |
| **Measure Incremental Cost ($/unit):** | $144.42 ($106.92 equipment plus $37.50 labor) per controller. Source: Ecology Action. |
| **Effective Useful Life (years):** | 5 years. Source: DEER 2014. |
| **Measure Application Type:** | Retrofit Add-on (REA) |
| **Net-to-Gross Ratios:** | 0.85 NTG for Lighting Controls, Direct Install delivery channel. Source: DEER 2011. |
| **Important Comments:** |  |

**PGE3PLTG168 Vending Machine Controller - Uncooled R1**

PG&E is using the SCE work paper Work Paper SCE15CS005 ex-ante values for PG&E measure code R98. The ex-ante values are located in file name: *SCE data for PGE3PLTG168 Vending Machine Controller - Uncooled R1.xlsm*

The measure mapping is as follows:

PG&E Measure code R98 = SCE code LT-85945

**Work Paper SCE15CS005**

**Revision 0**

**Southern California Edison Company**

**Beverage Merchandise Controller**

# At-a-Glance Summary

|  |  |
| --- | --- |
| ****Applicable Measure Codes:**** | RF-75217, LT-85945, RF-48900, RF-56733, RF-65065, RF-70008 |
| **Measure Description:** | An occupancy sensor based control for reducing lighting and refrigeration consumption of vending machines and beverage merchandise coolers |
| **Base Case Description:** | No controls in place. |
| **Energy Impact Common Units:** | Per sensor. |
| **Energy Savings :** | Refer to Excel Calculation Attachment |
| **Gross Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Measure Incremental Cost ($/unit):** | Refer to Excel Calculation Attachment |
| **Effective Useful Life (years):** | 5 years, Plug-VendCtrler |
| **Measure Application Type:** | Retrofit Add-on (REA) |
| **Net-to-Gross Ratios:** | Refer to Table 3 |
| **Important Comments:** | None |

# Document Revision History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Workpaper and Revision # | Tech. Revision | MM/DD/YY | Author/Affiliation | Summary of Changes |
| SCE15CS005.0 | Yes | 3/20/2014 | Brian V. O’Keefe/SCE | -New template for 2015 program year. |

# Section 1. General Measure & Baseline Data

## 1.1 Measure Description & Background

This work paper details the installation of a new beverage merchandise controller (BMC) on existing beverage merchandise coolers containing nonperishable goods. It describes demand reduction, energy impacts, and costs to implement the measure.

The beverage cooler is a commercial reach-in refrigerator, with transparent doors, and a self-contained condensing unit. The beverage cooler maintains product temperatures for non-perishable goods.

Vending machine controls that turn compressors and/or lighting off during periods of non-use are also included.

The measure case is a self-contained beverage merchandise cooler retrofitted with a BMC. The base case of the measure is an existing self-contained beverage merchandise cooler that does not have a BMC

Table 1 Measure Names

|  |  |
| --- | --- |
| Solution Code | Measure name |
| RF-48900 | Double Door Beverage Merchandise Cooler Control |
| RF-56733 | One Door Beverage Merchandise Cooler Control |
| RF-65065 | One Door Under Counter Beverage Merchandise Cooler Control |
| RF-70008 | Triple Door Beverage Merchandise Cooler Control |
| RF-75217 | Cold Vending Machine Controls |
| LT-85945 | Snack Vending Machine Controls |

To be qualified for the measure, the beverage cooler shall

* Have either glass sliding doors or glass pull-open doors
* Have a self-contained condensing unit
* Be used to maintain temperatures for non-perishable products

To be qualified for the measure, the BMC shall

* Shut down the beverage cooler when occupancy/traffic drops below a certain threshold
* Periodically power the cooler back on at a maximum increment of every 4 hours to reasonably maintain product temperatures
* Be rated for 120 VAC applications

In order to qualify for RF-75217, the Express program has the following requirements:

* The refrigerated vending machines must contain only non-perishable bottled and canned beverages. If a vending machine is being installed, the equipment must be Energy Star qualified.
* The controller must turn off the lights and the compressor when the surrounding area is unoccupied for 15 minutes to 1 hour, or if there is no sales traffic for a given period of time.
* Control logic must periodically power up the machine at regular intervals to maintain product temperature and provide compressor protection. Refurbished vending machines that include this option are eligible.

## 1.2 Technical Description

A BMC is a device with a passive infrared occupancy sensor, a duplex receptacle, and a power cord for connecting the device to 120V power. The energy savings are achieved by shutdown of the cooler when there are no occupants present. During the unoccupied periods, the controller measures ambient air temperature outside of the case and periodically turns on the cooler to maintain preset product temperatures. The controller does not interrupt cooling cycles when shutting down the cooler.

## 1.3 Measure Application Type

Note: See Appendix A for a comparison of the application types used by and incorporated into SCE systems versus the application types available in the newest revision of DEER 2014. Appendix A will serve as a translation between the outputs of this workpaper and application types used by READi.

The delivery mechanism for this measure is: Financial Support - Direct Install and Financial Support – Downstream Deemed.

The program type/install type is Retrofit Add-On (REA).

## 1.4 Measure and Base Case Cost Effectiveness Data

### 1.4.1 DEER Measure and Base Case Analysis

Table 2 DEER Difference Summary

|  |  |
| --- | --- |
| DEER Difference Summary Table | |
| Modified DEER Methodology | No – DEER Operating hours utilized as a basis |
| Scaled DEER Measure | No |
| DEER Building Prototypes Used | No |
| Deviation from DEER | DEER 2011 dropped the DEER 2005 measures used as a basis, D03-912 and D03-913. |
| DEER Version | N/A |
| DEER Run ID and Measure Name (Sample) | N/A |

**Net to Gross**

The NTG value was obtained from the “DEER2011\_NTGR\_2012-05-16.xls” on the DEER website as required by Version 5 of the California Public Utilities Commission (CPUC) Energy Efficiency Policy Manual [351]. The relevant NTGR for this measure is shown in Table 3 below.

Table 3 Net-to-Gross Ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NTGR\_ID\* | Description\* | Sector\* | BldgType\* | ProgDelivID | NTG\* |
| Com-Default-HTG-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Com | Any | DirInstall | 0.85 |
| Com-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Com | Any | All | 0.6 |
| Res-Default>2 | All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years | Res | Any | All | 0.55 |
| Res-Default-HTG-di | All other EEM with no evaluated NTGR; direct install hard-to-reach only. | Res | Any | DirInstall | 0.85 |

\*Denotes that the column is taken from the DEER NTG Table.

**Installation Rate**

The installation rate (IR) is identified in the calculation attachment. This value is obtained from the support table available in READi. Currently there is no versioning on the installation rate table. To address appropriate selection of the installation rate the date of the workpaper will serve as the last date checked for updated IR values. The installation rate varies by end use, sector, technology, application, and delivery method. The relevant IR values for this measure are shown in Table 4**Error! Reference source not found.** below.

Table 4 Installation Rate

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| GSIA\_ID\* | Description\* | Sector\* | BldgType\* | ProgDelivID | GSIAValue\* |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1.0 |

**Spillage Rate**

Spillage rate will also be applied to measures however the values will not be tracked in the workpapers. The spillage rate will be tracked in an external table to be supplied to the Energy Division.

**READi Technology Fields**

To support the development of the ED ex ante tables, select fields from the ex ante database will be identified in the workpaper. For a full set of values associated with the measures in the workpaper refer the Excel calculation template. (In the event that the READi IDs do not support the technology in this workpaper simply indicate “Non-DEER”.)

Table 5 READi Tech IDs

|  |  |
| --- | --- |
| READi Field Name | Values included in this workpaper |
| Measue Case UseCategory | Commercial Refrigeration, Lighting\* |
| Measure Case UseSubCats | Refrigerated Storage, Indoor Retail Display Lighting\* |
| Measure Case TechGroups | Refrigerated Storage, Lighting - Hard-wired fixtures\* |
| Measure Case TechTypes | Non-DEER Category, Infrared Sensor\* |
| Base Case TechGroups | Refrigerated Storage, Lighting - Hard-wired fixtures\* |
| Base Case TechTypes | Non-DEER Category, Non-DEER Category\* |

\*The second set of READI Tech IDs apply to solution code LT-85945 only.

### 1.4.2 Codes and Standards Analysis

This specific measure of adding controls on both vending machines and beverage merchandise coolers is not regulated under 2010 California Appliance Efficiency Regulations (Title 20) [277] or the Code of Federal Regulations Title 10[393]. Both CA Title 20 and CFR Title 10 do contain standards for daily energy use for both types of equipment as well as Title 20 including a requirement for vending machines to have manufacturer-equipped hardware/software capable of automated low-power mode operation. However, this does not apply to the beverage coolers targeted for this measure.

For beverage merchandise coolers the maximum daily energy consumption set up by the federal requirements in CFR Title 10 Part 431 Subpart C §431.66 (b) are identical to the requirements in CA Title 20 Table A-9. For purposes of the calculations in Section 2, CA Title 20 is referenced.

For the canned vending machines, the maximum daily energy consumption requirements differ between CFR Title 10 Part 431 Subpart Q §431.296 and CA Title 20 Table A-10. The CA Title 20 standard uses an equation based on 12oz. can capacity while the federal code uses an equation based on cooled volume. An initial engineering estimate is that the federal code is more conservative than the Title 20 however this measure is intended as a retrofit add-on for units sold in CA prior to Title 20 requiring controlled states for these machines, January 1, 2006. Therefore, for the purposes of the calculations in Section 2, the CA Title 20 equations will be used.

Table 6 Code Summary

|  |  |  |
| --- | --- | --- |
| Code | Applicable Code Reference | Effective Dates |
| Title 20 (2012) | Table A-9 Maximum daily energy consumption (kWh) for equipment with transparent doors: Reach-in cabinets that  are refrigerators | January 1, 2007 |
| Title 20 (2012) | Table A-10 Standards for Refrigerated Canned and Bottled Beverage Vending Machines. Energy Design Standard for Refrigerated Canned and Bottled Beverage Vending  Machines | January 1, 2007 |
| CFR Title 10 Part 431 Subpart Q §431.296 | Maximum daily energy consumption (kilowatt hours per day) | August 31, 2012 |
| CFR Title 10 Part 431 Subpart C §431.66 (b) | Maximum daily energy consumption (kilowatt hours per day) | January 1, 2012 |

### 1.4.3 Non-DEER Study Review

See Section 2.0 for additional studies referenced.

### 1.4.4 Measure and Base Case Effective Useful Life

DEER14 update documentation provides EUL and RUL information to be used for the 2015 program cycle extension on [www.deeresources.com](http://www.deeresources.com). The DEER documentation “Summary of EUL-RUL Analysis for the April 2008 Update to DEER” provides the RUL value as a flat 1/3 of the EUL value. The RUL value will only be applied to the first baseline period for retrofit measures that have applicable code that will affect the energy savings. In all other installation types and retrofit with no applicable code that affects the energy savings, the RUL is not applicable to either the first or second baseline period.

To obtain the EUL value the DEER14 update documentation, EUL\_Summary\_10-1-08.xls [213], was consulted. Table 7 below identifies the value/methodology used for the measures in this work paper.

Table 7 DEER14 EUL Value/Methodology

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| READi EUL ID | Market | Enduse | Measure | EUL (Years) | RUL (Years) |
| Plug-VendCtrler | Non-Residential | Plug Loads | Vending Machine Controller | 5 | N/A |

# Section 2. Energy Savings & Demand Reduction Calculations

## The energy savings for the measures in this workpaper will be derived from four different calculations.

1. The reduction in lighting use from turning off an interior display light
2. The reduction in lighting use from turning off a backlit display
3. The reduction in refrigeration time for Title 20 defined refrigerated canned and bottled beverage vending machines
4. The reduction in refrigeration time for commercial refrigerators, commercial refrigerator-freezers, and commercial freezers

Table 8 below depicts which measures relay on which of the energy calculations listed above.

Table 8 Measure Calculations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solution Code | Applicable Code Reference | Interior Display Light | Backlit Signage | Vending Machine | Com Refrig/Freezer |
| RF-48900 | Double Door Beverage Merchandise Cooler Control |  |  |  | Yes |
| RF-56733 | One Door Beverage Merchandise Cooler Control |  |  |  | Yes |
| RF-65065 | One Door Under Counter Beverage Merchandise Cooler Control |  |  |  | Yes |
| RF-70008 | Triple Door Beverage Merchandise Cooler Control |  |  |  | Yes |
| RF-75217 | Cold Vending Machine Controls |  | Yes | Yes |  |
| LT-85945 | Snack Vending Machine Controls | Yes |  |  |  |

**Interactive Effects**

Interactive effects will not be applied to the energy savings derived for the measures in the workpaper. The function of occupancy based control of vending machines and beverage cabinets is to turn the equipment off when the building is not occupied. To apply interactive effect savings, the assumption that the HVAC equipment is run the same when facility is closed as it is when it is open would have to be made. The most likely situation would be the interactive effects somewhere between the DEER derived values and none at all. To maintain savings on the conservative side, interactive effects will not be applied.

**Demand Reduction**

As discussed in the older version of DEER, DEER 2005, the 2004-2005 DEER Update Study Final Report [26] on Vending Machine Control (VMC), the VMC is expected to operate primarily during off-peak hours and therefore no demand reduction will occur during the DEER peak period. This statement can be applied to the BMC due to its similar operation and application.

While there will be some savings due to occupancy during the DEER defined peak, there is no substantial evidence available to apply lighting coincident diversity factors to vending and beverage cabinet control. It is determined that the demand reduction by the vending and beverage machine control is Zero.

## (1) Energy savings for the reduction in lighting use from turning off an interior display light

## In uncooled snack vending machines, a display light typically illuminates the products inside the vending machine. For purposes of these calculations the illumination will be assumed to be provided by one 2 foot T8 linear fluorescent lamp, fixture F2ILL at 20 Watts from Appendix B Table of Standard Fixture Wattages and Sample Lighting Table [297].

To estimate the building specific energy savings, the DEER 2014 linear fluorescent lighting effective full load operating hours will be used to represent when the building is occupied. The savings for occupancy based vending control will occur in a load profile complimentary to an 8760 load shape. For example, in a small office the DEER2014 occupancy sensor based lighting effective full load operating hours is 2,250 hours, therefore the time the vending machine control would turn the internal lights off would be 8,760 hours minus 2,550 hours, resulting in 6,510 hours of off time. See Equation 1 below for the general form.

Equation 1

Detailed Calculation results located in calculation template in the Attachment Section.

## (2) Energy savings for the reduction in lighting use from turning off a backlit display

## The logic for the interior display lighting the backlit display will be calculated with the same strategy. The only deviation will be the wattage controlled. According to E Source tech Update TU-96-7 [392] the typical backlit display for a cooled beverage vending machine consists of two 5 foot linear fluorescent lamps. The two options available for this application are T5 and T8 lamps. Using the Table of Standard Fixture Wattages the T5 fixture (F52PL) consumes 78 Watts and the T8 fixture (F52ILL) consumes 72 Watts. For purposes of the calculation, the T8 fixture at 72 watts will be used. Refer to Equation 1 for the general form.

## (3) Energy savings for the reduction in refrigeration time for Title 20 defined refrigerated canned and bottled beverage vending machines

In the 2004-2005 DEER Update Study Final Report [26] on VMC: a maximum of 4 hours of “sleep mode” per day is applied when there are no occupants present in the area of the vending machine. This maximum sleep mode duration is adopted as the usage reduction rate in this work paper.

## The base case energy usage is established by using the CEC Title 20 (T-20) requirements [277] for refrigerated canned and bottled beverage vending machines, Section 1605.3 Table A-10. The maximum daily energy consumption (kWh) is given in Equation 2. According E Source tech Update TU-96-7 the typical vending unit stocks 450 cans, therefore 450 cans will be used in the equations to develop the maximum daily energy consumption.

Equation 2

The 4 hours of “sleep mode” per day will be used to develop a usage reduction rate that can be applied to the base case consumption to develop avoided kWh savings.

Equation 3

To develop the annual kWh savings, the daily energy consumption multiplied across 365 days for an annual kWh usage with the 16.67% reduction rate applied for the avoided usage.

Equation 4

/yr

## 4) Energy savings for the reduction in refrigeration time for commercial refrigerators, commercial refrigerator-freezers, and commercial freezers

Similar to calculations for the beverage vending machines, a “sleep mode” of four hours will be used to estimate avoided usage. The calculation is illustrated in again in Equation 5.

Equation 5

The base case energy usage is established by using the CEC Title 20 (T-20) requirements [277] for glass door reach-in refrigerators, Section 1605.1 Table A-4.

Equation 6

The annual savings are illustrated by Equation 7

Equation 7

The energy savings calculations details for the targeted beverage cooler types are summarized in Table 9.

Table 9 Annual Energy Savings for BMC on Beverage Coolers

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Description | Under Counter | Single Door | Double Door | Triple Door |
| Measure Name | One Door Under Counter Beverage Merchandise Cooler Control | One Door Beverage Merchandise Cooler Control | Double Door Beverage Merchandise Cooler Control | Triple Door Beverage Merchandise Cooler Control |
| Nominal Volume Range (cubic feet) | <15 | 15-29 | 29-49 | >49 |
| Typical Volume (cubic feet) | 10 | 24 | 44 | 72 |
| Base Case Unit Annual Energy Use (kWh/yr) | 1657.10 | 2270.30 | 3146.30 | 4372.70 |
| Usage Reduction Rate (%) | 16.67% | 16.67% | 16.67% | 16.67% |
| Measure Case Energy Savings (kWh/yr) | 276.18 | 378.38 | 524.38 | 728.78 |

It is worth noting that, for beverage coolers with volumes greater than 49 cubic feet, the power source for the built-in compressor can be a 208/240VAC single phase circuit. The BMC described in this workpaper, which is rated for 120VAC applications, may not be used for this application. For energy savings claims for such coolers, a BMC specification will need to be submitted for validation purposes.

## Summary of Energy Savings Calculations

Final Results including light savings for solution code RF-75217 and LT-85945 are located in the attached calculation spreadsheet.

Table 10 Measure Calculation Summary

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Solution Code | Applicable Code Reference | Interior Display Light | Backlit Signage | Vending Machine | Com Refrig/Freezer |
| RF-48900 | Double Door Beverage Merchandise Cooler Control |  |  |  | 276.18 kWh |
| RF-56733 | One Door Beverage Merchandise Cooler Control |  |  |  | 378.38 kWh |
| RF-65065 | One Door Under Counter Beverage Merchandise Cooler Control |  |  |  | 524.38 kWh |
| RF-70008 | Triple Door Beverage Merchandise Cooler Control |  |  |  | 728.78 kWh |
| RF-75217 | Cold Vending Machine Controls |  | 0.072kW x Hours Off per year | 425.26 kWh |  |
| LT-85945 | Snack Vending Machine Controls | 0.02kW x Hours Off per year |  |  |  |

# Section 3. Load Shapes

The difference between the base case load shape and the measure load shape would be the most appropriate load shape; however, only end-use profiles are available. Therefore, the closest load shape chosen for this measure is the Occupancy Sensor load shape. See Table 11 for a list of all Building Types and Load Shapes. See the KEMA report [31] for a more thorough discussion regarding the load shapes for this measure.

Table 11 Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| Building Type | E3 Alt. Building Type | Load Shape |
| Agricultural | Agricultural | Occupancy Sensor |
| Assembly | Misc.\_Commercial | Occupancy Sensor |
| Education - Primary School | K\_thru\_12\_School | Occupancy Sensor |
| Education - Secondary School | K\_thru\_12\_School | Occupancy Sensor |
| Education - Relocatable Classroom | K\_thru\_12\_School | Occupancy Sensor |
| Education - Community College | K\_thru\_12\_School | Occupancy Sensor |
| Education - University | K\_thru\_12\_School | Occupancy Sensor |
| Grocery | Misc.\_Commercial | Occupancy Sensor |
| Food Store | Misc.\_Commercial | Occupancy Sensor |
| Health/Medical - Hospital | Misc.\_Commercial | Occupancy Sensor |
| Health/Medical - Nursing Home | Misc.\_Commercial | Occupancy Sensor |
| Health/Medical - Clinic | Misc.\_Commercial | Occupancy Sensor |
| Lodging - Hotel | Hotel\_Motel | Occupancy Sensor |
| Lodging - Guest Rooms | Hotel\_Motel | Occupancy Sensor |
| Lodging - Motel | Hotel\_Motel | Occupancy Sensor |
| Manufacturing - Bio/Tech | Industrial | Occupancy Sensor |
| Manufacturing - Light Industrial | Industrial | Occupancy Sensor |
| Industrial | Industrial | Occupancy Sensor |
| Misc - Commercial | Misc.\_Commercial | Occupancy Sensor |
| Office – Large | Large\_Office | Occupancy Sensor |
| Office – Small | Small\_Office | Occupancy Sensor |
| Restaurant - Fast-Food | Misc.\_Commercial | Occupancy Sensor |
| Restaurant - Sit-Down | Misc.\_Commercial | Occupancy Sensor |
| Retail - Multistory Large | Large\_Retail\_Store | Occupancy Sensor |
| Retail – Single-Story Large | Large\_Retail\_Store | Occupancy Sensor |
| Retail – Small | Small\_Retail\_Store | Occupancy Sensor |
| Storage - Conditioned | Misc.\_Commercial | Occupancy Sensor |
| Storage - Unconditioned | Misc.\_Commercial | Occupancy Sensor |
| Transportation - Communication – Utilities | Trans\_Comm\_Util | Occupancy Sensor |
| Warehouse - Refrigerated | Misc.\_Commercial | Occupancy Sensor |
| Residential Multi-family | Misc.\_Commercial | Occupancy Sensor |
| Residential Mobile Home - Double-Wide | Misc.\_Commercial | Occupancy Sensor |

# Section 4. Base Case & Measure Costs

## 4.1 Base Case Cost

The base case is the existing vending machines and beverage coolers without a control device. Since the existing equipment is being retrofitted with an additional piece of equipment the base case scenario is no action on part of the customer. Therefore, the base case cost is $0.00.

## 4.2 Measure Case Cost

The most up-to-date cost for DEER, Revised DEER Measure Cost Summary (05\_30\_2008) Revised (06\_02\_2008).xls, was referenced for cost. The data contained a measure titled “Turn off fixture lights when store closed” however the installed cost, including equipment and labor, totaled $6.27 per linear foot. Considering the unit definition and the low cost, this cost was not used in this workpaper because the intended purpose of that cost appears to be more suited to refrigerated cases rather than standalone vending and merchandise cases.

The same source did contain a lighting time clock, cost case ID D08-NE-ILtg-TmClck, with an installed cost of $102.78. The time clock could be viewed as a similar technology based on a timer rather than an occupancy sensor. This value was compared to the DEER 2005 costs for runIDs D03-912 (Vending Machine Controller – Cold Drink) and D03-913 (Vending Machine Controller – Uncooled Snack) at $215.50 and $108.00 respectively. Based on the cost and data available, the DEER 2005 cost data appears to the most reasonable. The costing assignments can be seen in Table 12.

Table 12 Measure Cost

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Solution Code | Measure Name | DEER Cost Case ID/  DEER05 ID | Measure Case Description | Measure Equipment Cost | Measure Labor Cost | Gross Measure Cost\* |
| RF-48900 | Double Door Beverage Merchandise Cooler Control | D03-912/  CALC00AVVEN01 | Cold Drink Vending Machine | $180.00 | $35.50 | $215.50 |
| RF-56733 | One Door Beverage Merchandise Cooler Control | D03-912/  CALC00AVVEN01 | Cold Drink Vending Machine | $180.00 | $35.50 | $215.50 |
| RF-65065 | One Door Under Counter Beverage Merchandise Cooler Control | D03-912/  CALC00AVVEN01 | Cold Drink Vending Machine | $180.00 | $35.50 | $215.50 |
| RF-70008 | Triple Door Beverage Merchandise Cooler Control | D03-912/  CALC00AVVEN01 | Cold Drink Vending Machine | $180.00 | $35.50 | $215.50 |
| RF-75217 | Cold Vending Machine Controls | D03-912/  CALC00AVVEN01 | Cold Drink Vending Machine | $180.00 | $35.50 | $215.50 |
| LT-85945 | Snack Vending Machine Controls | D03-913/  CALC00AVVEN02 | Uncooled Snack Machine | $75.00 | $33.00 | $108.00 |

## 4.3 Gross and Incremental Measure Cost

### 4.3.1 Gross Measure Cost

For retrofit add on measures the gross measure cost used in the first baseline is the full installed cost. The cost is illustrated in Table 12.

### 4.3.2 Incremental Measure Cost

For retrofit add on measures the incremental measure cost the full installed cost since there is no assumed base case. The cost is illustrated in Table 12.

# Attachments

1. SEC PGE3PLTG168 Vending Machine Controller - Uncooled R1.xlsm

# Appendix A – SCE/ED Application Types

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| SCE Program Type | ED Application Type | 1st Baseline Savings | 2nd Baseline Savings | 1st Baseline Cost | 2nd Baseline Cost | 1st Baseline Life | 2nd Baseline Life |
| New | New Construction (Nc) | Above Code/Standard | N/A | Incremental Cost | N/A | EUL | 0 |
| Replace on Burnout (ROB) | Replace on Burnout (Rob)/Normal Replacement (NR) | Above Code/Standard | N/A | Incremental Cost | N/A | EUL | 0 |
| Retrofit (RET) | Early Replacement (ER) | Above Cust. Existing | Above Code/Standard | Full Cost | Incremental Cost | RUL | EUL-RUL |
| Retrofit – First Baseline Only (REF) | Early Replacement RUL (ErRul) | Above Cust. Existing | N/A | Full Cost | N/A | EUL | 0 |
| Retrofit Add-on (REA) | N/A | Above Cust. Existing | N/A | Full Cost | N/A | EUL | 0 |

# References

References\_03262014\_125206.xlsx

[26]

[31]

[213]

[277]

[297]

[351]

[392]

[393]