Work Paper SCE17CS005

**Revision 1**

**Southern California Edison**

**Beverage Merchandise Controller**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **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 |
| **Units** | Sensor |
| **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** | Plug-VendCtrler: 5 years |
| **Measure Installation Type** | Retrofit Add-on (REA) |
| **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 | 10/21/16 | Siobhan McCabe (TRC) | * This work paper is an update of SCE13CS005.2 * New template update for 2017 program year * Updated manufacturers’ costs * Updated SCE savings to calculation template version 6.7.1 * All (16) California Climate Zones added to calculation template |
| 1 | 07/23/18 | Joseph Ling (AESC) | * Updated CFR Title 10 requirements * Updated calculations to reflect new requirements effective Jan 2019 for RF-75217 * Updated manufacturers’ costs * Updated to calculation template 6.7.5 |

# Commission Staff and Cal TF Comments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev** | **Party** | **Submittal Date** | **Comment Date** | **Comments** | **WP Developer Response** |
|  |  |  |  |  |  |

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 | 1. Self-contained beverage merchandise cooler with an occupancy sensor-based beverage merchandise controller (BMC) 2. Self-contained vending machine with an occupancy sensor-based vending machine controller (VMC). |
| Existing Condition | 1. Beverage merchandise cooler without BMC 2. Vending machine without VMC |
| Code/Standard | N/A |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | 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 |

**Eligibility Requirements**

Building types:

* All measures are eligible for all non-residential building types.
* The vending machine measures are also eligible for the Residential Multi-family and Residential Mobile Home - Double-Wide building types.

Existing beverage merchandise coolers must:

* 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

BMCs must:

* Shut down the beverage merchandise 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

For cold vending machines and VMCs (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 beverage merchandise cooler is a commercial reach-in refrigerator with transparent doors and a self-contained condensing unit. The beverage merchandise cooler maintains product temperatures for non-perishable goods. It typically has lighting to illuminate the product.

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.

A vending machine is similar to beverage merchandise cooler but dispenses product through a coin or bill-operated interface. Snack vending machines are typically not refrigerated. Vending machine controllers shut down compressors and/or lighting during periods of non-use.

## 1.3 Installation Types and Delivery Mechanisms

The delivery mechanisms are:

* + Financial Support - Direct Install
  + Financial Support – Downstream Deemed
  + Financial Support – Downstream Deemed – Partnership
  + Financial Support - Direct Install – Partnership
  + Financial Support – Downstream Deemed - OBF

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

**Installation Type Descriptions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Retrofit Add-on (REA) | Above Customer Existing | 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. |
| 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. |
| On-bill Finance – Loan (OBF) | The program offers financing for the cost of an efficient measure as part of the utility bill. This can be an add-on option to an existing program or can serve as an organizing principle for its own program. |

## 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 | No |
| DEER Measure Case | No |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | No |
| DEER Version | DEER 2017, READI v2.4.7 |
| Reason for Deviation from DEER | DEER2017 does not contain these measures. |
| DEER Measure IDs Used | N/A |

**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** |
| 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 |

**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** |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1 |

**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)** |
| Plug-VendCtrler | Vending Machine Controller | Com | Vending | 5 | 1.7 |

### 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 2018 California Appliance Efficiency Regulations (Title 20) [515] 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, these requirements do 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-4. For purposes of the calculations in Section 2, CA Title 20 is referenced.

For canned vending machines the maximum daily energy consumption set up by the federal requirements in CFR Title 10 Part 431 Subpart Q §431.296 (b) are identical to the requirements in CA Title 20 Table A-10, for machines manufactured on or before August 31, 2012.

However, CA Title 20 does not yet contain language to account for new energy consumption requirements dictated by CFR Title 10 effective January 8, 2019. These requirements are more stringent than Class A requirements currently in place by Title 20. For the purposes of the calculation in Section 2, CFR Title 10 is referenced as these requirements will be in place by the time of the effective work paper date.

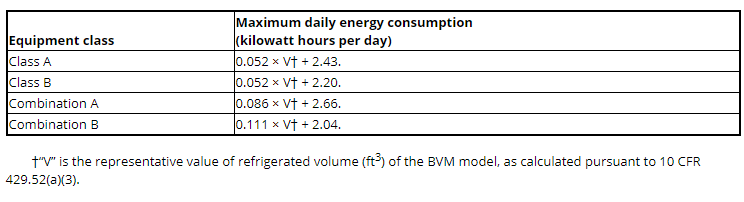
Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 20 (2018) | Table A-4 Maximum daily energy consumption (kWh) for refrigerators with transparent doors designed for pull-down applications | January 1, 2018 |
| Title 20 (2018) | Table A-10 Standards for Refrigerated Canned and Bottled Beverage Vending Machines Manufactured On or After August 31, 2012 | August 31, 2018 |
| Title 10 (2018) | Table (b) §431.296 Energy conservation standards and their effective dates. | January 8, 2019 |

Table 1: Conservation Standards for Beverage Vending Machine Manufactured On or After August 31, 2012

## 

Table 2: Conservation Standards for Beverage Vending Machine Manufactured On or After January 8, 2019



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

### 1.5.1 2004-2005 DEER Update Study Final Report [26]

The 2004-2005 DEER report documented the assumptions used in the development of DEER 2005 measures. It was used to reference typical operating characteristics of vending machine controllers, as well as their maximum sleep time duration.

## 1.6 Data Quality and Future Data Needs

N/A

# Section 2. Calculation Methodology

## 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

The table below depicts which measures rely on which of the energy calculations listed above.

Measure Calculations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Solution Code** | **Measure** | **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 ensure conservative savings estimates, interactive effects will not be applied.

**Demand Reduction**

As discussed in 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 specific energy savings, the DEER2017 linear fluorescent lighting effective full load operating hours will be used to represent when the unit is assumed to be enabled. 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 DEER2017 occupancy sensor based lighting effective full load operating hours is 1,760 hours, therefore the time the vending machine control would turn the internal lights off would be 8,760 hours minus 1,760 hours, resulting in 7,000 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 as the interior display light. 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 of the savings calculation.

## (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 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 Title 10 CFR requirements for refrigerated canned and bottled beverage vending machines, §431.296 Energy conservation standards and their effective dates. Requirements are provided for:

* Class A: A refrigerated bottled or canned beverage vending machine that is not a combination vending machine and in which 25 percent or more of the surface area on the front side of the beverage vending machine is transparent.
* Class B: A refrigerated bottled or canned beverage vending machine that is not considered to be Class A and is not a combination vending machine.
* Combination A: A combination vending machine where 25 percent or more of the surface area on the front side of the beverage vending machine is transparent.
* Combination B: a combination vending machine that is not considered to be Combination A.

## Class B was chosen because its requirements are more stringent, and there is no available study on the types of vending machines available to obtain a detailed breakdown between Class A and Class B type vending machines. The maximum daily energy consumption (kWh) is given in Equation 2. The Federal Energy Management Program (FEMP) used a 21 refrigerated volume when calculating efficiency vending machine savings [494], so this value is used for the work paper.

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 [493] 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 the table below.

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 | 378.46 | 524.49 | 728.93 |

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 are located in the attached calculation spreadsheet.

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 |  |  |  | 524.49 kWh |
| RF-56733 | One Door Beverage Merchandise Cooler Control |  |  |  | 378.46 kWh |
| RF-65065 | One Door Under Counter Beverage Merchandise Cooler Control |  |  |  | 276.18 kWh |
| RF-70008 | Triple Door Beverage Merchandise Cooler Control |  |  |  | 728.93 kWh |
| RF-75217 | Cold Vending Machine Controls |  | 0.072kW \* Hours Off per year | 200.26 kWh |  |
| LT-85945 | Snack Vending Machine Controls | 0.02kW \* Hours Off per year |  |  |  |

# 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 | Occupancy Sensor | Misc.\_Commercial |
| Education - Primary School | Occupancy Sensor | K\_thru\_12\_School |
| Education - Secondary School | Occupancy Sensor | K\_thru\_12\_School |
| Education - Relocatable Classroom | Occupancy Sensor | K\_thru\_12\_School |
| Education - Community College | Occupancy Sensor | K\_thru\_12\_School |
| Education – University | Occupancy Sensor | K\_thru\_12\_School |
| Grocery | Occupancy Sensor | Misc.\_Commercial |
| Health/Medical - Hospital | Occupancy Sensor | Misc.\_Commercial |
| Health/Medical - Nursing Home | Occupancy Sensor | Misc.\_Commercial |
| Lodging - Hotel | Occupancy Sensor | Hotel\_Motel |
| Lodging - Guest Rooms | Occupancy Sensor | Hotel\_Motel |
| Lodging - Motel | Occupancy Sensor | Hotel\_Motel |
| Manufacturing - Bio/Tech | Occupancy Sensor | Industrial |
| Manufacturing - Light Industrial | Occupancy Sensor | Industrial |
| Office – Large | Occupancy Sensor | Large\_Office |
| Office – Small | Occupancy Sensor | Small\_Office |
| Restaurant - Fast-Food | Occupancy Sensor | Misc.\_Commercial |
| Restaurant - Sit-Down | Occupancy Sensor | Misc.\_Commercial |
| Retail - Multistory Large | Occupancy Sensor | Large\_Retail\_Store |
| Retail - Single-Story Large | Occupancy Sensor | Large\_Retail\_Store |
| Retail – Small | Occupancy Sensor | Small\_Retail\_Store |
| Storage – Conditioned | Occupancy Sensor | Misc.\_Commercial |
| Storage – Unconditioned | Occupancy Sensor | Misc.\_Commercial |
| Warehouse – Refrigerated | Occupancy Sensor | Misc.\_Commercial |
| Residential Multi-family | Occupancy Sensor | Misc.\_Commercial |
| Residential Mobile Home - Double-Wide | Occupancy Sensor | Misc.\_Commercial |

# Section 4. Costs

## 4.1 Base Case Cost

The base case cost is $0 because these measures are voluntary retrofits to existing equipment.

## 4.2 Measure Case Cost

The measure case equipment costs are the retail costs of control units (controller, occupancy sensor, and mounting equipment), from a major manufacturer. These costs are documented in the attached cost calculation and are collected in July 2018. The estimated time required to mount the sensor and plug in the controller is 1 hour, at the DEER2017 labor rate “NR-MISC” of $67.88/hr.

An exhaustive online search was conducted to find products that met the requirements of this work paper. The market for these measures is narrow and the singular manufacturer is Energy Miser. Bert makes a comparable energy saving product, but it is a load manager rather than an automatic control. Thus, the pricing for these measures is based on the Energy Miser products.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Code** | **Applicable Code Reference** | **Equipment Cost** | **Labor Cost** | **Unit** |
| RF-48900 | Double Door Beverage Merchandise Cooler Control | $173.15 | $67.88 | Sensor |
| 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 | $191.49 | Sensor |
| LT-85945 | Snack Vending Machine Controls | $164.89 | Sensor |

## 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** |
| 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

**Full and Incremental Costs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Code** | **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| RF-48900 | REA | $241.03 | $241.03 | N/A |
| RF-56733 | REA |
| RF-65065 | REA |
| RF-70008 | REA |
| RF-75217 | REA | $259.37 | $259.37 | N/A |
| LT-85945 | REA | $232.77 | $232.77 | N/A |

# Attachments

1. SCE17CS005.1 A1 - Beverage Merchandise Controller Calcs.xlsx
2. SCE17CS005.1 A2 - Beverage Merchandise Controller Cost Calcs.xlsx
3. SCE17CS005.1 A3 - Calculation Templates.zip

# References

References\_07112018\_101102

[26]

[297]

[392]

[393]

[515]

[494]