Work Paper SCE13CC014

**Revision 1**

**Southern California Edison Company**

**Commercial Hand Wrap Machines**

# At-a-Glance Summary

|  |  |
| --- | --- |
| ****Solution and Measure Codes:**** | FS-77556 |
| **Measure Description:** | On-demand commercial electric hand wrap machine |
| **Base Case Description:** | Always-on commercial electric hand wrap machine |
| **Units:** | Unit |
| **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:** | FoodHandWrap: 10 years |
| **Measure Application Type:** | Replace on Burnout (ROB) |
| **Net-to-Gross Ratio:** | ET-Default: 0.85 |
| **Important Comments:** | **This work paper document does not contain a data set in conformance with the 4/1/2014 Ex Ante Database Specification provided by the California Public Utilities Commission (CPUC) Commission Staff (CS); SCE will provide that data set separately.** |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Revision # | Revision Date | Author (Affiliation) | Summary of Changes |
| SCE13CC014.0 | 1/19/2015 | Jason Wang (SCE) | New work paper based on ET study. |
| SCE13CC014.1 | 5/6/2015 | Jason Wang (SCE) | Resubmitting work paper in response to CPUC Preliminary Review. No values are changed in this revision. |

# Section 1: General Measure & Baseline Data

## 1.1 Measure Description & Background

### This work paper details the replacement of always-on commercial electric hand wrap machines with on-demand commercial electric hand wrap machines.

Table 1: Measures and Codes

|  |  |  |
| --- | --- | --- |
| Solution Code | Measure Code | Measure Name |
| FS-77556 | FXXX | On-demand Hand Wrap Machine replacing Always-on Hand Wrap Machine |

**Eligibility Requirements**

* Measure case hand wrap machine must use either a mechanical or optical control system.
* All climate zones are eligible.
* Grocery, Food Store, and Misc. Commercial building types are eligible.

**Implementation Requirements**

* The hand wrap machine should be installed by a manufacturer-recommended service technician.

## 1.2 Technical Description

Food items such as meat and cheese are often placed in trays and wrapped in plastic film before being put on display. This protects the food from airborne organisms and dust, allows customers to view the product, and provides a surface for pasting information labels. A hand wrap machine consists of a heating bar and a heating platform, rated at approximately 50 W and 0.55 kW, respectively. The heating bar is used to cut the wrapping film as it comes in contact with the heating bar. The heating platform is used to heat up the wrapping film. When the wrapping film is heated, the film sticks to the package and seals the product. With conventional (always-on) hand wrap machines, both heating elements are kept at a constant temperature of 280 °F.

An on-demand hand wrap machine is similar to a conventional one, but it has a more powerful heating platform (rated at approximately 2 kW) which is switched on/off by a controller. By default, the heating platform is OFF. The two types of controllers are:

* A mechanical system where pressure must be applied down onto the heating platform. Applying pressure to the heating platform engages a switch, which activates the 2 kW heating platform until the switch is disengaged, or for a maximum of 3 seconds.
* An optical system which uses an optical eye to detect that an item is being sealed. The optical eye is placed in the front center of the heating platform. When a package is set on the heating platform, light is reflected into the eye, which activates the heating platform until the item is removed, or for a maximum of 3 seconds.

  
Figure 1: Always-on (left) and On-demand (right) hand wrap machines



Figure 2: Hand wrapping

## 1.3 Application Types and Delivery Mechanisms

See Appendices A and B for definitions of application types and delivery mechanisms.

The delivery method is Financial Support - Down-Stream Incentive – Deemed.

The install type is ROB (Replace-on-Burnout).

## 1.4 Measure and Base Case Cost Effectiveness Data

### 1.4.1 DEER Measure and Base Case Analysis

DEER 2015 does not contain measures for hand wrap machines.

Table 2: DEER Difference Summary

|  |  |
| --- | --- |
| DEER Difference Summary Table | |
| Referenced versions of DEER and READI | DEER 2015, READI v2.1.0 |
| Summary of deviation from DEER | DEER does not contain this measure. |
| DEER measures scaled? | No |
| DEER eQUEST prototypes used? | No |
| DEER operating hours used? | No |

**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.

Table 3: Net-to-Gross Ratio

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| NTGR ID | Description | Sector | BldgType | ProgDelivID | NTG |
| ET-Default | Emerging Technologies approved by ED through work paper review | Any | Any | Any | 0.85 |

**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.

Table 4: Installation Rate

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| GSIA ID | Description | Sector | BldgType | ProgDelivID | GSIAValue |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1 |

**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.

**Technology Fields**

The Technology Fields were obtained from the Ex Ante Database Specification. The relevant Use Category, Use Sub-category, Technology Group, and Technology Type values for the measures in this work paper are in the table below.

Table 5: Technology Fields

|  |  |
| --- | --- |
| Classification | Value |
| Measure Case UseCategory | Food Service |
| Measure Case UseSubCats | Packaging |
| Measure Case TechGroups | Food Service |
| Measure Case TechTypes | Hand Wrap Machine |
| Base Case TechGroups | Food Service |
| Base Case TechTypes | Hand Wrap Machine |

**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.

The University of California has a Useful Life Schedule that indicate a 10-year life for packaging machines (Attachment 4). Therefore, hand wrap machines are assumed to have a EUL of 10 years.

Table 6: EUL and RUL

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EUL ID | Description | Sector | UseCategory | EUL (Years) | RUL (Years) |
| FoodHandWrap | Hand Wrap Machine | Com | FoodServ | 10 | 3.3 |

### 1.4.2 Codes and Standards Analysis

**Title 24 (2013) [355]:** These measures do not fall under Title 24 of the California Energy Regulations.

**Title 20 (2014) [422]:** The Title 20 Appliance Efficiency Regulations have a category for cooking appliances, but hand wrap machines are not included.

### ASTM Standards: There are not ASTM standards for hand wrap machines.

**Federal Standards:** These measures do not fall under Federal DOE or EPA Energy Regulations.

Table 7: Code Summary

|  |  |  |
| --- | --- | --- |
| Code | Applicable Code Reference | Effective Dates |
| N/A | N/A | N/A |

### 1.4.3 Non-DEER Study Review

Emerging Products study ET13SCE1190 “Vacuum-Sealing and Packaging Machines for Food Service Applications Field Test” [483] was used as the source of savings for this work paper.

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# Section 2: Calculation Methodology

## 2.1 Electric Energy Savings Estimation Methodologies

Measure savings are the result of eliminating standby losses. Using on-demand controls prevents the heating platform from being maintained at an elevated temperature when not in use. Although an on-demand hand wrap machine has a more powerful heating element than an always-on machine (2 kW compared to 0.55 kW), its total hours of operation are much less. Typical operating hours are 20 hours/day for always-on machines. Since hand wrap machines are not frequently used, there is substantial savings potential.

The Emerging Products study involved field tests with four major supermarket chains found throughout SCE’s service territory. Monitoring was performed at a total of 10 supermarkets, in the bakery, deli and meat departments. Both baseline and measure case hand wrap machines were monitored for six weeks, at a 10 second interval. Table 8 shows the results for each chain, and for all chains averaged. For each chain, first an average is taken for all bakery and deli departments, and then another average is taken for all meat departments. Then these two are averaged together. This is done because stores are expected to buy one machine for the bakery and deli, and one for the meat department.

Table 8 Hand Wrap Machine Savings Calculations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Chain 1 | Chain 2 | Chain 3 | Chain 4 | Average |
| Baseline Annual Usage (kWh) | 2,310.55 | 1,809.70 | 1,697.20 | 1,983.14 |  |
| Measure Annual Usage (kWh) | 411.64 | 395.10 | 452.30 | 361.21 |  |
| **Annual Savings per unit (kWh)** | 1,898.91 | 1,414.60 | 1,323.90 | 1,621.93 | **1,564.83** |
| Baseline Peak kW | 0.26716 | 0.22722 | 0.19166 | 0.22906 |  |
| Measure Peak kW | 0.05378 | 0.04266 | 0.05930 | 0.04332 |  |
| **Peak kW savings** | 0.21338 | 0.18456 | 0.14214 | 0.18574 | **0.18146** |

See Attachment 2 for all calculations. See Attachment 1 for a complete list of savings.

## 2.2. Demand Reduction Estimation Methodologies

The Peak kW measurements in Table 8 are from the DEER peak period of 2–5 PM, so no coincidence factors are applied. The demand reduction is 0.18146 kW.

# 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.

Table 9: Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| Building Type | Load Shape | E3 Alt. Building Type |
| Grocery | DEER:Indoor\_Non-CFL\_Ltg | NON\_RES |
| Food Store | DEER:Indoor\_Non-CFL\_Ltg | NON\_RES |
| Misc - Commercial | DEER:Indoor\_Non-CFL\_Ltg | NON\_RES |

# Section 4: Base Case & Measure Costs

## 4.1 Base Case Cost

Equipment prices for this work paper were compiled from a number of sources including quotes, equipment sales representatives, and manufacturer sources. Manufacturer published list prices were discounted by an industry standard 50% to determine final cost. Since equipment pricing in the food service industry is closely held information and prices vary widely according to buying volume and other factors, the sources for prices cannot be listed explicitly.

The cost of the baseline always-on hand wrap machine is $350, from the ET study [483].

Installation of a hand wrap machine involves removing the existing machine and plugging in the new machine. Therefore the labor is estimated at 0.5 hours, and using the default non-residential DEER 2008 labor rate of $67.88/hr yields a labor cost of $33.94. The labor cost is assumed to be the same in the base and measure cases.

## 4.2 Measure Case Cost

The measure case costs are also from the sources mentioned in Section 4.1.

The cost of the measure case on-demand hand wrap machine is $550, from the ET study [483].

## 4.3 Gross and Incremental Measure Cost

### 4.3.1 Gross Measure Cost (GMC)

For ROB measures, assuming the labor cost is the same in base and measure cases, the gross measure cost is determined using the following equation:

*Gross Measure Cost = Measure Case Material Cost – Base Case Material Cost*

Table 10 shows the calculation of gross measure cost:

Table 10 Gross and Incremental Measure Cost

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Measure | Baseline Equipment Cost | Measure Equipment Cost | Labor Cost | Gross and Incremental Measure Cost |
| Hand Wrap Machine | $350 | $550 | $33.94 | $200 |

### 4.3.2 Incremental Measure Cost (IMC)

The incremental cost is the same as the gross measure cost and is shown in Table 10.

# Attachments

1. 

1. 
2. 

1. 

# References



[355]

[422]

[483]

# Appendix A: Application Types

This table compares the application types in SCE’s systems with those in DEER.

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

# Appendix B: Delivery Mechanisms

A delivery mechanism is a delivery method paired with an incentive method. SCE’s delivery methods include:

* Appliance Turn-in and Recycling
* Audit/Information
* Commissioning
* Financial Support
* Innovative Design
* Midstream Programs
* Partnership
* Upstream Programs

The following table describes the incentive methods.

|  |  |
| --- | --- |
| Incentive Method | Description |
| Direct Install | The utility program performs an assessment of the customer’s facility, provides recommendations, and implements energy efficiency measures for free. |
| Down-Stream Incentive - Deemed | 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. |
| Exchange - Replacement | The utility program holds events where customers can trade functional equipment for similar but more energy efficient equipment, free of charge. |
| Giveaway | The utility program provides customers with energy efficient equipment for free. |
| Mid-Stream Incentive | The utility program offers buydowns and incentives to third parties (typically retailers, distributors, and contractors), who then stock, promote, lower prices on, and/or sell energy efficient equipment. Contractors install energy efficiency equipment, sometimes using specified quality procedures, at the customer’s property. |
| On-bill Finance - loan | Customers can finance energy efficiency projects at 0% interest and repay the loan through their monthly utility bill. |
| Testing Services / Other | The utility program performs free testing services or assessments of the customer’s facility and provides information and recommendations for potential energy efficiency measures. |
| Up-Stream Buy Down, Up-Stream Incentive | The utility program offers buydowns and incentives to vendors (typically manufacturers and distributors), who then manufacture, stock, promote, lower prices on, and/or sell energy efficient equipment. There is some overlap between the mid-stream and up-stream approaches. |