Short Form Work Paper WPSDGENRCC0018

**Revision 1**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Insulated Holding**

**Cabinet -Electric**

**Measure Codes:**

**402001 (ROB)**

**402003 (ROB)**

**464297 (NC)**

**464298 (NC)**

**March 30, 2018**

# SDG&E Insulated Holding Cabinet -Electric

## Introduction

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “Insulated Holding Cabinet - Electric” (PGECOFST105 R5 Insulated Holding Cabinet MD.docx). SDG&E adopts all of the values in PGECOFST105 R5 Insulated Holding Cabinet – Electric, with no exceptions.

## Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 6/26/2012 | Peter Ford, SDG&E | Adopted PG&E workpaper from Fisher-Nickel dated 12/11/07. Corrected NTG to DEER 2011. Format and reference changes. |
| 1 | **03/30/2018** | **Eduardo Reynoso, SDG&E** | **The changes are as follows:**   * **Updated workpaper format to short form workpaper.** * **Retired SDG&E legacy Implementation ID** 402002, Food Service -Hot Food Holding Cabinet-Three-Quarter Size. * **SDGE legacy implementations 402001 (Full Size) and 402003(Half Size) are adopted from PGE workpaper** PGECOFST105 Rev5 **measures-F110(Full Size) and F111(Half Size) as stated in July 2016 workpaper.** * **Created two new Implementations 464297 and 464298 for NC (New Construction) measure application type.** |
|  |  |  |  |

## At-a-Glance Summary

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measure ID** | **Implementation ID** | **Measure Description for Conveyor Oven Type** | **MeasApp Type** | **Savings (KWh)** | **Savings**  **(KW)** | **IMC** |
| Measure 1 | 402001 | Food Service - Hot Food Holding Cabinet-Full-Size (>=15 cuft) with Idle Energy Rate ≤ 20 watts per ft3 | ROB | 3928 | 0.645 | $ 2,336.00 |
| 464297 | NC |
| Measure 2 | 402003 | Food Service - Hot Food Holding Cabinet-Half-Size (<15 cuft) with Idle Energy Rate ≤ 20 watts per ft3 | ROB | 1916 | 0.315 | $ 381.00 |
| 464298 | NC |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure ID** | **Implementation ID** | **Measure Cost ID** | **Measure Cost $** | **Standard Measure Cost ID** | **Standard Cost $** |
| Measure 1 | 402001 | SDG\_FoodServ-Cook-HoldCab-FullSz-Msr | $5,914.00 | SDG\_FoodServ-Cook-HoldCab-FullSz-Base | $3,578.00 |
| 464297 |
| Measure 2 | 402003 | SDG\_FoodServ-Cook-HoldCab-HalfSz-Msr | $2,644.00 | SDG\_FoodServ-Cook-HoldCab-HalfSz-Base | $2,263.00 |
| 464298 |

Measure Summary

Table : Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts and cost-effectiveness values for Electric Holding Cabinet. The base energy consumption and measure energy consumption values are from PG&E’s workpaper, PGECOFST105, Revision 5 for Insulated Holding Cabinet- Electric.  **Market Applicability**  This measure is applicable to any commercial cooking application, including (but not limited to) casual dining and quick service restaurants, hotels, motels, schools, colleges and recreational facilities. This measure is offered as Replace on Burnout (ROB) or New Construction (NC). |
| **1.1 Measure & Baseline Data** | Refer to Section 2.0 Calculations Methodology herein below and as cited per PGE workpaper PGECOFST105 Revision 5.   |  |  |  |  | | --- | --- | --- | --- | | **Measure ID** | **Implementation ID** | **Measures Description** | **Standard / Baseline** | | Measure 1 | 402001 | Food Service - Hot Food Holding Cabinet-Full-Size (>=15 cuft) with Idle Energy Rate ≤ 20 watts per ft3 | Food Service - Hot Food Holding Cabinet-Full-Size (>=15 cuft) with Idle Energy Rate above 20 watts per ft3 | | 464297 | | Measure 2 | 402003 | Food Service - Hot Food Holding Cabinet-Half-Size (<15 cuft) with Idle Energy rate ≤ 20 watts per ft3 | Food Service - Hot Food Holding Cabinet-Half-Size (<15 cuft) with Idle Energy rate above 20 watts per ft3 | | 464298 | |
| **1.2 Technical Description** |  |
| Measures | Commercial Holding cabinets   |  |  |  |  | | --- | --- | --- | --- | | **Measure ID** | **Cabinet Type** | **Volume** | **Idle Energy Rate**\* | | Measure 1 | Full Size | ≥ 15 ft.3 | ≤ 20 watts per ft3 | | Measure 2 | Half Size | < 15 ft.3 | ≤ 20 watts per ft3 |   \*Based on the heavy-load test in ASTM F2140 |
| Code for All Measures | As cited per PGE workpaper PGECOFST105 Revision 5  These measures are not governed by either state or federal codes and standards.  ASTM Standard Test Method for theInsulated Holding Cabinets (F2140) is applicable for estimating energy use. It was used to estimate the energy consumption of the base case and measure equipment. |
| Requirements | Refer to Measures information located herein above and  must be listed in the California Energy Commission database or listed on [www.fishnick.com/saveenergy/rebates](http://www.fishnick.com/saveenergy/rebates). |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | Replace on Burn-out (ROB) and New Construction (NC). |
| Delivery Mechanisms | Downstream Rebate – Deemed  NOTE: Measures are offered in the SDG&E Direct Install program yet require a customer co-pay and are treated as downstream deemed. |
| **1.4.1 DEER Data** |  |
| Net-to-Gross Ratio | Com-Default>2yrs |
| Effective and Remaining Useful Life | Cook-HoldCab  Cook-HoldCab |
| **Section 2. Calculation Methodology** | DEER 2016 |
| Energy Savings/Peak Demand Reduction – All Measures | Insulated Hot Food Holding Cabinet Cost Effectiveness Example - Full Size Holding Cabinets   |  |  |  | | --- | --- | --- | | **Performance** | **Baseline** | **Qualifying Model** | | Cabinet Size (ft³) | 25 | 25 | | Idle Energy Rate by Volume (w/ ft³) | 40 | 11.3 | | Operating Hours per Day (h/day) | 15 | 15 | | Annual Energy Use (kWh) | 5,475 | 1,547 | | Annual Energy Savings (kWh) | - | **3,928** | | Annual Energy Consumption Rate (kW) | 1.00 | 0.283 | | Estimated Demand Reduction (kW) | - | 0.717 | | Actual Demand Reduction with CDF of 0.9 applied (kW) | - | **0.645** | | Estimated Useful Life (EUL)a | 12 | 12 |   a The estimated useful life is based on DEER EUL estimates  Insulated Hot Food Holding Cabinet Cost Effectiveness Example - Half Size Holding Cabinets   |  |  |  | | --- | --- | --- | | **Performance** | **Baseline** | **Qualifying Model** | | Cabinet Size (ft³) | 10 | 10 | | Idle Energy Rate by Volume (w/ ft³) | 40 | 5 | | Operating Hours per Day (h/day) | 15 | 15 | | Annual Energy Use (kWh) | 2,190 | 274 | | Annual Energy Savings (kWh) | - | **1,916** | | Annual Energy Consumption Rate (kW) | 0.4 | 0.05 | | Estimated Demand Reduction (kW) | - | 0.35 | | Actual Demand Reduction with CDF of 0.9 applied (kW) | - | **0.315** | | Estimated Useful Life (EUL)a | 12 | 12 |   a The estimated useful life is based on DEER EUL estimates |
| **Section 3. Load Shapes** | SDG:35-OTI-OtherIndustrial-PROC\_OTH  Annual |
| **Section 4. Costs** |  |
| **Section 4.1 Base and Measure Costs** |  |
| Base Cost | |  |  |  |  | | --- | --- | --- | --- | | **Measure ID** | **Description** | **Baseline Unit List Price** | **Baseline Unit Cost** | | Measure 1 | Full-Size Hot Food Holding Cabinet | $7,156 | $3,578 | | Measure 2 | Half-Size Hot Food Holding Cabinet | $4,527 | $2,263 | |
| Measure Cost | |  |  |  |  | | --- | --- | --- | --- | | **Measure ID** | **Description** | **Energy Efficient Unit List Price** | **Energy Efficient Unit Cost** | | Measure 1 | Full-Size Hot Food Holding Cabinet | $11,828 | $5,914 | | Measure 2 | Half-Size Hot Food Holding Cabinet | $5,289 | $2,644 | |
| Incremental Cost | |  |  |  |  | | --- | --- | --- | --- | | **Measure ID** | **Description** | **Incremental Price Difference** | **Incremental Measure Cost (IMC)** | | Measure 1 | Full-Size Hot Food Holding Cabinet | $4,673 | $2,336 | | Measure 2 | Half-Size Hot Food Holding Cabinet | $762 | $381 | |

1. Supplemental Cost Information

* PGE workpaper PGECOFST105 Revision 5 for Insulated Holding Cabinet - Electric

**Equipment Cost Data for Full Size Electric Holding cabinets Updated 2012**

|  |  |  |  |
| --- | --- | --- | --- |
| Designation | Group | List Price ($) | Cost ($)\* |
| B1 | Baseline | $7,899 | $3,950 |
| B2 | Baseline | $9,232 | $4,616 |
| B3 | Baseline | $4,016 | $2,008 |
| B4 | Baseline | $4,228 | $2,114 |
| B5 | Baseline | $8,710 | $4,355 |
| B6 | Baseline | $4,930 | $2,465 |
| B7 | Baseline | $9,940 | $4,970 |
| B8 | Baseline | $13,805 | $6,903 |
| B9 | Baseline | $13,711 | $6,856 |
| B10 | Baseline | $6,385 | $3,193 |
| B11 | Baseline | $6,438 | $3,219 |
| B12 | Baseline | $6,415 | $3,208 |
| B13 | Baseline | $7,644 | $3,822 |
| B14 | Baseline | $7,816 | $3,908 |
| B15 | Baseline | $8,784 | $4,392 |
| B16 | Baseline | $6,616 | $3,308 |
| B17 | Baseline | $6,753 | $3,377 |
| B18 | Baseline | $6,066 | $3,033 |
| B19 | Baseline | $7,810 | $3,905 |
| B20 | Baseline | $9,508 | $4,754 |
| B21 | Baseline | $3,466 | $1,733 |
| B22 | Baseline | $4,248 | $2,124 |
| B23 | Baseline | $4,472 | $2,236 |
| B24 | Baseline | $6,652 | $3,326 |
| B25 | Baseline | $7,649 | $3,825 |
| B26 | Baseline | $8,323 | $4,162 |
| B27 | Baseline | $4,967 | $2,484 |
| B28 | Baseline | $5,819 | $2,910 |
| B29 | Baseline | $6,009 | $3,005 |
| B30 | Baseline | $10,556 | $5,278 |
| B31 | Baseline | $5,260 | $2,630 |
| B32 | Baseline | $6,231 | $3,116 |
| B33 | Baseline | $7,169 | $3,585 |
| B34 | Baseline | $10,664 | $5,332 |
| B35 | Baseline | $5,649 | $2,825 |
| B36 | Baseline | $3,760 | $1,880 |
| EE1 | Energy Efficient | $6,285 | $3,143 |
| EE2 | Energy Efficient | $4,925 | $2,463 |
| EE3 | Energy Efficient | $4,526 | $2,263 |
| EE4 | Energy Efficient | $8,449 | $4,225 |
| EE5 | Energy Efficient | $5,128 | $2,564 |
| EE6 | Energy Efficient | $12,408 | $6,204 |
| EE7 | Energy Efficient | $8,840 | $4,420 |
| EE8 | Energy Efficient | $13,126 | $6,563 |
| EE9 | Energy Efficient | $16,990 | $8,495 |
| EE10 | Energy Efficient | $12,792 | $6,396 |
| EE11 | Energy Efficient | $13,652 | $6,826 |
| EE12 | Energy Efficient | $8,152 | $4,076 |
| EE13 | Energy Efficient | $8,076 | $4,038 |
| EE14 | Energy Efficient | $6,144 | $3,072 |
| EE15 | Energy Efficient | $5,632 | $2,816 |
| EE16 | Energy Efficient | $8,800 | $4,400 |
| EE17 | Energy Efficient | $12,032 | $6,016 |
| EE18 | Energy Efficient | $8,152 | $4,076 |
| EE19 | Energy Efficient | $5,893 | $2,947 |
| EE20 | Energy Efficient | $6,407 | $3,204 |
| EE21 | Energy Efficient | $8,400 | $4,200 |
| EE22 | Energy Efficient | $6,738 | $3,369 |
| EE23 | Energy Efficient | $7,545 | $3,773 |
| EE24 | Energy Efficient | $8,364 | $4,182 |
| EE25 | Energy Efficient | $6,288 | $3,144 |
| EE26 | Energy Efficient | $7,157 | $3,579 |
| EE27 | Energy Efficient | $7,208 | $3,604 |
| EE28 | Energy Efficient | $8,076 | $4,038 |
| EE29 | Energy Efficient | $7,782 | $3,891 |
| EE30 | Energy Efficient | $8,648 | $4,324 |
| EE31 | Energy Efficient | $9,190 | $4,595 |
| EE32 | Energy Efficient | $10,989 | $5,495 |
| EE33 | Energy Efficient | $9,151 | $4,576 |
| EE34 | Energy Efficient | $11,015 | $5,508 |
| EE35 | Energy Efficient | $13,317 | $6,659 |
| EE36 | Energy Efficient | $13,741 | $6,871 |
| EE37 | Energy Efficient | $16,365 | $8,183 |
| EE38 | Energy Efficient | $18,973 | $9,487 |
| EE39 | Energy Efficient | $23,695 | $11,848 |
| EE40 | Energy Efficient | $11,068 | $5,534 |
| EE41 | Energy Efficient | $15,238 | $7,619 |
| EE42 | Energy Efficient | $20,307 | $10,154 |
| EE43 | Energy Efficient | $7,293 | $3,647 |
| EE44 | Energy Efficient | $9,996 | $4,998 |
| EE45 | Energy Efficient | $6,962 | $3,481 |
| EE46 | Energy Efficient | $9,359 | $4,680 |
| EE47 | Energy Efficient | $10,149 | $5,075 |
| EE48 | Energy Efficient | $14,204 | $7,102 |
| EE49 | Energy Efficient | $9,690 | $4,845 |
| EE50 | Energy Efficient | $12,903 | $6,452 |
| EE51 | Energy Efficient | $10,232 | $5,116 |
| EE52 | Energy Efficient | $10,535 | $5,268 |
| EE53 | Energy Efficient | $12,291 | $6,146 |
| EE54 | Energy Efficient | $12,756 | $6,378 |
| EE55 | Energy Efficient | $14,884 | $7,442 |
| EE56 | Energy Efficient | $15,316 | $7,658 |
| EE57 | Energy Efficient | $18,271 | $9,136 |
| EE58 | Energy Efficient | $18,814 | $9,407 |
| EE59 | Energy Efficient | $21,299 | $10,650 |
| EE60 | Energy Efficient | $22,023 | $11,012 |
| EE61 | Energy Efficient | $26,553 | $13,277 |
| EE62 | Energy Efficient | $27,180 | $13,590 |
| EE63 | Energy Efficient | $12,352 | $6,176 |
| EE64 | Energy Efficient | $17,011 | $8,506 |
| EE65 | Energy Efficient | $23,094 | $11,547 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on list prices from AutoQuotes catalog in 2012

**Equipment Cost Data for Half Size Electric Holding cabinets Updated 2012**

|  |  |  |  |
| --- | --- | --- | --- |
| Designation | Group | List Price ($) | Cost ($)\* |
| B1 | Baseline | $1,866 | $933 |
| B2 | Baseline | $2,466 | $1,233 |
| B3 | Baseline | $4,784 | $2,392 |
| B4 | Baseline | $3,720 | $1,860 |
| B5 | Baseline | $4,340 | $2,170 |
| B6 | Baseline | $5,210 | $2,605 |
| B7 | Baseline | $5,698 | $2,849 |
| B8 | Baseline | $3,950 | $1,975 |
| B9 | Baseline | $3,426 | $1,713 |
| B10 | Baseline | $3,606 | $1,803 |
| B11 | Baseline | $4,898 | $2,449 |
| B12 | Baseline | $4,516 | $2,258 |
| B13 | Baseline | $6,868 | $3,434 |
| B14 | Baseline | $5,288 | $2,644 |
| B15 | Baseline | $5,062 | $2,531 |
| B16 | Baseline | $5,586 | $2,793 |
| B17 | Baseline | $4,684 | $2,342 |
| B18 | Baseline | $4,238 | $2,119 |
| B19 | Baseline | $6,500 | $3,250 |
| B20 | Baseline | $5,600 | $2,800 |
| B21 | Baseline | $4,393 | $2,197 |
| B22 | Baseline | $4,434 | $2,217 |
| B23 | Baseline | $4,434 | $2,217 |
| B24 | Baseline | $4,745 | $2,373 |
| B25 | Baseline | $3,207 | $1,604 |
| B26 | Baseline | $3,740 | $1,870 |
| B27 | Baseline | $5,006 | $2,503 |
| B28 | Baseline | $5,771 | $2,886 |
| B29 | Baseline | $6,089 | $3,045 |
| B30 | Baseline | $3,227 | $1,614 |
| B31 | Baseline | $2,732 | $1,366 |
| B32 | Baseline | $3,889 | $1,945 |
| B33 | Baseline | $2,890 | $1,445 |
| B34 | Baseline | $5,450 | $2,725 |
| B35 | Baseline | $4,210 | $2,105 |
| B36 | Baseline | $6,225 | $3,113 |
| B37 | Baseline | $3,690 | $1,845 |
| B38 | Baseline | $4,730 | $2,365 |
| B39 | Baseline | $5,370 | $2,685 |
| EE1 | Energy Efficient | $3,042 | $1,521 |
| EE2 | Energy Efficient | $5,520 | $2,760 |
| EE3 | Energy Efficient | $7,130 | $3,565 |
| EE4 | Energy Efficient | $5,356 | $2,678 |
| EE5 | Energy Efficient | $5,610 | $2,805 |
| EE6 | Energy Efficient | $6,012 | $3,006 |
| EE7 | Energy Efficient | $4,352 | $2,176 |

\*Estimated purchase price and Incremental Measure Cost (IMC) were based on list prices from AutoQuotes catalog in 2012