Short Form Work Paper WPSDGENRCC0005

**Revision 4**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Commercial Combination Oven-Electric and Gas**

**December 27, 2016**

# SDG&E Commercial Combination Oven-Electric and Gas

## Introduction

This short form workpaper documents (WP) the values adopted from PGE’s WP entitled “Commercial Fryer-Electric and Gas” (PGECOFST100 R6 Commercial Combi Ovens-040816-AZ.docx). SDG&E adopts all of the values in PGECOFST100 R6 Combi Ovens-040816, with the following exceptions:

1. SDG&E use different measure sizes, which creates six implementations versus PGE’s two.

## Document Revision History

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| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 12/11/2007 | David Zabrowski/Fisher-Nickel, inc. | Original work paper -- Commercial Combination Ovens PGECOFST100 R0.doc |
| 1 |  | David Zabrowski/Fisher-Nickel, inc. | -- Commercial Combination Ovens PGECOFST100 R0.doc |
| 2 | 7/17/10 | Lucie Sidibe | Adopted from PGEFST100, Revision 2\*refer to attachment for original work paper  Summary of changes:  1-Work Paper run ID was changed to mirror SDGE cataloging needs.  2-SDGE Measure code was added |
| 3 | 6/15/12 | Max Twogood/SDG&E | Adopted from PGECOFST100 R4 Commercial Combination Oven-updated 06.11.2012.doc dated May 31, 2012. Revised NTGR with DEER 2011. Revised approvers with SDGE management |
| 3.1 | 06/27/2014 | Phillip Hasley/Hasley Consulting | INTERNAL REVISION ONLY – no material changes made  1. Updated to new workpaper format.  2. Generated calculation spreadsheet based on IOU statewide Calculation Template output, with additional columns and non-CZ cost factor adjustments. |
| 4 | 11/29/16 | Kelvin Valenzuela/SDG&E | Updated SDG&E’s Product Codes in latest revision for all sizes. With adoption of PGE’s PGECOFST100 R6 Combi Ovens-040816-AZ.docx, latest different size savings are captured. |

## Measure Summary

Table 1: Measure Summary Table

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | This short form workpaper documents ex-ante load impacts and cost-effectiveness values for Commercial Fryers both electric and gas. The base energy consumption and measure energy consumption values are from PG&E’s workpaper, PGECOFST100R6, Revision 6. |
| **1.1 Measure & Baseline Data** | Measure:  463498 – Electric Combination Oven/Steamer <15 Pans Oven  463499 – Electric Combination Oven/Steamer 15 to 28 Pans  463500 – Electric Combination Oven/Steamer >28 Pans Oven  463501 – Gas Combination Oven/Steamer < 15 Pans Oven  463502 – Gas Combination Oven/Steamer 15 to 28 Pans Oven  463503 – Gas Combination Oven/Steamer >28 Pans Oven |
| **1.2 Technical Description** |  |
| Measures | See Requirements |
| Code for All Measures | **California Title 20**  State of California Title 20 Appliance Efficiency Regulation4 has a category for cooking appliances, but combination ovens are not included.  **California Title 24**  There are no State of California Title 24 Efficiency Regulation requirements for combination ovens.  **Federal**  There are no Federal energy efficiency requirements for Combination Ovens. **American Society for Testing and Materials (ASTM) Standards**  ASTM F2861-10 was used to estimate the energy consumption of base case and measure equipment. |
| Requirements | **463498, 463499, and 463500:** The electric combination oven/steamer must have a tested steam mode cooking energy efficiency of ≥50% and convection mode cooking energy efficiency of ≥70% utilizing American Society for Testing and Materials (ASTM) Standard F2861[[1]](#endnote-1) and meet the idle rate requirements.   |  |  |  |  | | --- | --- | --- | --- | | **Measure Code** | **Combi Oven Type** | **Steam Mode Idle Energy Rate** | **Convection Mode Idle Energy Rate** | | 463498 | Electric Combi <15 pan capacity\* | ≤ 5.0 kW | ≤ 2.0 kW | | 463499 | Electric Combi 15−28 pan capacity\* | ≤ 6.0 kW | ≤ 2.5 kW | | 463500 | Electric Combi >28 pan capacity\* | ≤ 9.0 kW | ≤ 4.0 kW |   **463501, 463502, and 463503:** The gas combination oven/steamer must have a tested steam mode cooking energy efficiency of ≥38% and convection mode cooking energy efficiency of ≥44% utilizing American Society for Testing and Materials (ASTM) Standard F2861, and meet the idle rate requirements.   |  |  |  |  | | --- | --- | --- | --- | | **Measure Code** | **Combi Oven Type** | **Steam Mode Idle Energy Rate** | **Convection Mode Idle Energy Rate** | | 463501 | Gas Combi <15 pan capacity\* | ≤ 15,000 Btu/h | ≤ 8,000 Btu/h | | 463502 | Gas Combi 15−28 pan capacity\* | ≤ 18,000 Btu/h | ≤ 10,000 Btu/h | | 463503 | Gas Combi >28 pan capacity\* | ≤ 28,000 Btu/h | ≤ 16,000 Btu/h |   Used or rebuilt equipment is not eligible. Customers must provide proof that the appliance has a cooking-energy efficiency that meets the requirements. |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | Replace on Burn-out (ROB) |
| 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-ElecCombOven  Cook-GasCombOVen |
| **Section 2. Calculation Methodology** | DEER 2016 |
| Energy Savings/Peak Demand Reduction – All Measures | **Electric Combination Oven/Steamer <15 Pans Oven (PG&E: HA16) (SDG&E: 463498)**  Base Case Energy Consumption: Source: PG&E Calculations – 30,874 kWh/yr; 7.0 kW  Measure Energy Consumption: Source: PG&E Calculations – 19,373 kWh/yr; 4.4 kW  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 11,501 kWh/yr; 2.6 kW x 0.90 (CDF) = 2.34 kW  **Electric Combination Oven/Steamer 15 to 28 Pans (PG&E: F100) (SDG&E: 463499)**  Base Case Energy Consumption: Source: PG&E Calculations – 39,353 kWh/yr; 9.0 kW  Measure Energy Consumption: Source: PG&E Calculations – 24,258 kWh/yr; 5.5 kW  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 15,095 kWh/yr; 3.5 kW x 0.90 (CDF) = 3.15 kW  **Electric Combination Oven/Steamer >28 Pans Oven (PG&E: HA19) (SDG&E: 463500)**  Base Case Energy Consumption: Source: PG&E Calculations – 60,606 kWh/yr; 13.8 kW  Measure Energy Consumption: Source: PG&E Calculations – 38,561 kWh/yr; 8.8 kW  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 22,045 kWh/yr; 5.0 kW x 0.90 (CDF) = 4.5 kW  **Gas Combination Oven/Steamer < 15 Pans Oven (PG&E: HA48) (SDG&E: 463501)**  Base Case Energy Consumption: Source: PG&E Calculations – 1,572 therms/yr  Measure Energy Consumption: Source: PG&E Calculations – 774 therms/yr  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 798 therms/yr  **Gas Combination Oven/Steamer 15 to 28 Pans Oven (PG&E: F101) (SDG&E: 463502)**  Base Case Energy Consumption: Source: PG&E Calculations – 2,087 therms/yr  Measure Energy Consumption: Source: PG&E Calculations – 967 therms/yr  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 1,120 therms/yr  **Gas Combination Oven/Steamer < 28 Pans Oven (PG&E: HA49) (SDG&E: 463503)**  Base Case Energy Consumption: Source: PG&E Calculations – 3,134 therms/yr  Measure Energy Consumption: Source: PG&E Calculations – 1,561 therms/yr  Energy Savings (Base Case – Measure): Source: PG&E Calculations – 1,573 therms/yr |
| **Section 3. Load Shapes** | SDG:35-OTI-OtherIndustrial-PROC\_OTH  WinterOnly |
| **Section 4. Costs** |  |
| **Section 4.1 Base and Measure Costs** |  |
| Base Cost |  |
| 463498 | $9,137 (PG&E HA16) |
| 463499 | $15,024 (PG&E F100) |
| 463500 | $19,610 (PG&E HA19) |
| 463501 | $11,157 (PG&E HA48) |
| 463502 | $16,807 (PG&E F101) |
| 463503 | $22,730 (PG&E HA49) |
| Measure Cost |  |
| 463498 | $10,705 (PG&E HA16) |
| 463499 | $16,608 (PG&E F100) |
| 463500 | $26,658 (PG&E HA19) |
| 463501 | $14,746 (PG&E HA48) |
| 463502 | $20,168 (PG&E F101) |
| 463503 | $30,620 (PG&E HA49) |

1. American Society for Testing and Materials. *Standard Test Method for the Performance of Combination Ovens in Different Modes*. ASTM Designation F2861, in Annual Book of ASTM Standards, West Conshohocken, PA [↑](#endnote-ref-1)