Short Form Work Paper WPSDGEREWH0024

**Revision 0**

**San Diego Gas & Electric**

**Energy Efficiency Engineering**

**Storage Tank Water Heaters**

**December 28, 2017**

## Introduction

This short form workpaper documents the ex-ante load impact and cost-effectiveness values used for Natural Gas Storage Tank Water Heaters.

## Document Revision History

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| --- | --- | --- | --- |
| Revision # | MM/DD/YY | Author/Affiliation | Summary of Changes |
| 0 | 03/20/2014 | Kyle Dunn (MWE2) | * Original Workpaper for release |
| 1 | 12/28/2017 | Joshua Williams (SDGE) | * Created new workpaper ID for latest workpaper update. WPSDGEWH0024 Rev 0 * SDG&E establishes this Short Form Work Paper to coincided with the DEER 2017 update for Residential - Storage Tank Water Heaters. * All measures values included in this workpaper are taken directly from the DEER 2017 READI Tool or were created using the READI Tool. * The 2017 Database for Energy Efficient Resources (DEER2017) v2.4.7 [3] data include: gas energy savings, measure cost, equipment useful life, and net-to-gross for this measure. |

| **Section** | **Value** |
| --- | --- |
| **Summary & Purpose** | The measure creates the opportunity for energy savings by installing high efficiency natural gas storage water heaters in residential households and commercial buildings. This workpaper covers the energy savings through installations of natural gas storage water heaters with storage capacities of 40 gallons, 50 gallons. |
| **1.1 Measure & Baseline Data** | |  |  |  | | --- | --- | --- | | Baseline Measure Characteristics | | | | DEER Measure ID | Delivery Type | Version-Source | | Natural Gas W/H 40Gal EF (0.62) | PreRebDown | DEER2017 | | Natural Gas W/H 50 Gal EF (0.60) | PreRebDown | DEER2017 | |
| **1.2 Technical Description** |  |
| Measures | Energy Savings for the measures included in this workpaper are taken directly from the DEER 2017 READI Tool or were created using the READI Tool. The DEER 2017 update does not have savings for 40 Gallon Water Heaters, with an Energy Factor(EF) of (0.67). SDG&E elects to take a conservative approach and utilized DEER Measure savings for an EF of (0.65).   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Measure Characteristics | | | | | | **Implementation ID.** | **Measure Description** | **DEER Measure ID** | **Delivery Type** | **Version-Source** | | 462497 | Natural Gas W/H 40Gal EF (0.67-0.69) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-40G-0p65EF | PreRebDown | DEER2017 | | 462498 | Natural Gas W/H 40 Gal EF (0.70) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-40G-0p70EF | PreRebDown | DEER2017 | | 464273 | Natural Gas W/H 40 Gal EF (0.82) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-40G-0p82EF | PreRebDown | DEER2017 | | 462500 | Natural Gas W/H 50 Gal EF (0.67-0.69) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-50G-0p67EF | PreRebDown | DEER2017 | | 462501 | Natural Gas W/H 50 Gal EF (0.70) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-50G-0p70EF | PreRebDown | DEER2017 | | 464274 | Natural Gas W/H 50 Gal EF (0.82) | RG-WtrHt-SmlStrg-Gas-lte75kBtuh-50G-0p82EF | PreRebDown | DEER2017 | |
| Code for All Measures | |  |  | | --- | --- | | Code Summary | | | Code | Effective Dates | | DOE Regulations | January 20, 2004 | | Title 20 (2015) | April 16, 2015 |   ***Department of Energy:*** Current federal regulations require that all small gas storage water heaters (<75 kBtu/h) meet the minimum energy factor requirements calculated as 0.67- (0.0019 x Rated Storage Volume in gallons), and small electric storage water heaters meet the minimum requirements calculated as (0.97 – (0.00132 x Rated Storage Volume in gallons).  \*Note: UEF standards will be applied once UEF calculator has been reviewed and approved by Commission Staff. Once approved, SDG&E will update this workpaper to account for their conversion. |
| Requirements | ***Terms and Conditions***   * Efficient natural gas storage water heaters must have an Energy Factor (EF) of 0.67 or greater to qualify for the $100 rebate. Look for the EF rating on the water heater specification sheet or on the packaging box; it does not always appear on the water heater label itself. This rebate is limited to natural gas storage water heaters that are 30 gallons or greater. If qualifying product is replacing an existing unit, the existing unit must be natural gas. [2]   ***Market Applicability***   * This measure is applicable to single-family, multi-family, and double-wide mobile home residential building types. The most significant barrier to water heater retrofit is the existing nature of water heater replacement. Two-thirds of consumers replace their water heaters due to the sudden failure of their existing water heater. When a water heater suddenly fails, most consumers purchase replacements that are the cheapest and most readily available model that are also easy to install. These prevailing attitudes do not encourage consumers to make the extra effort to find more advanced, energy-efficient technologies that are now available on the market [1] |
| **1.3 Installation Type and Delivery Mechanisms** |  |
| Installation Type | * Replace on burnout (ROB) |
| Delivery Mechanisms | * Downstream Rebate – Deemed Rebate |
| **1.4.1 DEER Data** |  |
| Net-to-Gross Ratio | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Net-to-Gross Ratio | | | | | | | **NTGR\_ID\*** | **Description\*** | **Sector\*** | **BldgType\*** | **ProgDelivID** | **NTG\*** | | RES-DEFAULT>2 | Natural Gas Storage Water Heaters >=0.65 EF | Res | Any | Downstream Prescriptive Rebate | 0.55 | |
| GSIA | |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **GSIA** | **Description** | **Sector** | **BldgType** | **ProgDelivID** | **GSIAValue** | | Def-GSIA | Default GSIA | Any | Any | Any | 1 | |
| Effective and Remaining Useful Life | |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Market** | **Enduse** | **Measure** | **EUL (Years)** | **RUL (Years)** | | Residential | WaterHtg\_eq | WtrHt-SmlStrg-Gas-Res | 11 | 3.3 | |
| **Section 2. Calculation Methodology** |  |
| Energy Savings/Peak Demand Reduction – All Measures | Energy Savings for the measures included in this workpaper are taken directly from the DEER 2017 READI Tool or were created using the READI Tool. These results have not been modified and are included on the embedded calculation spreadsheet. |
| **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. |
| **Section 4. Costs** |  |
| **Section 4.1 Modeled Costs** | Cost calculations adopted from DEER2016 (\*Note: There are no DEER 2017 cost updates). The DEER2016 update does not have cost for 50 Gallon Water Heaters, with an Energy Factor(EF) of (0.82). SDG&E elects to take a conservative approach and utilized DEER Measure cost for and EF of (0.82) from a 40 gallon. The costs although from a 40 gallon heater, has higher costs that accounts for the extra material (i.e. insulation), which is more reflective for the 50 gallon with the same EF. |
| Base Cost – | |  |  | | --- | --- | | Base Cost | | | **Base Measure Cost ID** | **Base Equipment Cost** | | Stor\_EF-Gas-040gal-0.62EF | $646.00 | | Stor\_EF-Gas-050gal-0.600EF | $696.00 | |
| Measure Cost – | |  |  |  |  | | --- | --- | --- | --- | | Measure Cost | | | | | **Implementation ID** | **Measure Name** | **Measure Cost ID** | **Measure Equipment Cost** | | 462497 | Natural Gas W/H 40Gal EF (0.67-0.69) | Stor\_EF-Gas-040gal-0.67EF | $780.00 | | 462498 | Natural Gas W/H 40 Gal EF (0.70) | Stor\_EF-Gas-040gal-0.70EF | $860.00 | | 464273 | Natural Gas W/H 40 Gal EF (0.82) | Stor\_EF-Gas-040gal-0.82EF | $1726.00 | | 462500 | Natural Gas W/H 50 Gal EF (0.67-0.69) | Stor\_EF-Gas-050gal-0.67EF | $884.00 | | 462501 | Natural Gas W/H 50 Gal EF (0.70) | Stor\_EF-Gas-050gal-0.70EF | $964.00 | | 464274 | Natural Gas W/H 50 Gal EF (0.82) | Stor\_EF-Gas-040gal-0.82EF | $1726.00 | |