**Work Paper PGECODHW103**

**Gas Storage Domestic Water Heaters**

**Revision # 7**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Gas Storage Domestic Water Heaters**

**Measure Codes HA18**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Applicable Measure Codes:** | **HA18** |
| **Measure Description:** | High Efficiency Gas Storage Condensing Water Heater > 75kBtuh input, > 90% Thermal Efficiency (TE). Only for commercial and residential multi-family building type installation |
| **Energy Impact Common Units:** | Per kBtu per hour input |
| **Base Case Description:** | DEER 2014 Standard efficiency gas water heater 0.80 TE |
| **Base Case Energy Consumption:** | DEER 2014 |
| **Measure Energy Consumption:** | DEER 2014 |
| **Energy Savings**  **(Base Case – Measure):** | DEER 2014  Varies depending on climate zone and building type. Average 2.14 therms per kBtu input |
| **Costs Common Units:** | $ per kBtuh input of unit |
| **Base Case Equipment Cost ($/unit):** | $21.80 ($6,541.26 / 300kBtuh) Work Order #017 |
| **Measure Equipment Cost ($/unit):** | DEER 2014 $26.16 ($7,848.00 / 300kBtuh) (DEER only has 90%TE as High Efficiency) Work Order #017 |
| **Gross Measure Cost ($/unit)** | DEER 2014 $26.16 per kBtuh or $7,848.00 per unit  Work Order #017 |
| **Measure Incremental Cost ($/unit):** | $4.36 per kBtuh ($26.16 - $21.80) Work Order #017  ROB, NC = measure equipment cost – base case equipment cost |
| **Effective Useful Life (years):** | Source: DEER 2014 15 years |
| **Measure Application Type:** | ROB |
| **Net-to-Gross Ratios:** | Source: DEER2014 0.60 Com Default > 2 yrs  DEER2014 0.55 Res Default > 2 yrs |
| **Important Comments:** | Note DEER2014 did not update cost information but refers to DEER 2008 for values. R7 uses Work Order #017 |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision #** | **Revision Date** | **Section-by-Section Description of Revisions** | **Author (Company)** |
| **Revision 0** | **03/24/2008** | **Non Res Storage Water Heater** | **John Shen Kema** |
| **Revision 1** | **05/20/2009** | **Non Res Storage Water Heater updated to DEER 2008 values** | **Charlene Spoor (clci) PG&E** |
| **Revision 2** | **03/24/2010** | **References updated, no new DEER data** | **Clci** |
| **Revision 3** | **06/15/2012** | **New WP template, Updated NTG per DEER 2011, References updated; 8/22/12 updated CZ and Vin per READI requirements, 11/21/13 Added EX to vintage for Exec Summ for MDSS** | **Dave Gilliand KW (clci PG&E)**  **Charlene Spoor (CLCI PG&E)** |
| **Revision 4** | **1/31/2014** | **New revision, new template format, removed all measure codes except condensing, existing DEER11 values incorporated for 2011 raising efficiency level to condensing technology 90% TE** | **Charlene Spoor (CLCi PG&E)** |
| **Revision 5** | **5/19/2014** | **Updated with DEER2014 values** | **Charlene Spoor (CLCi PG&E)** |
| **Revision 6** | **4/1/2016** | **Added Mfm to measure code HA18, Ex Ante Database Format update** | **Tai Voong ( PG&E)** |
| **Revision 7** | **3/3/2017** | **Updated cost with Work Order #017** | **Tai Voong ( PG&E)** |

# Table of Contents

[At-a-Glance Summary ii](#_Toc380659152)

[At-A-Glance Measure List iii](#_Toc380659153)

[Work Paper Approvals iv](#_Toc380659154)

[Document Revision History v](#_Toc380659155)

[Table of Contents vi](#_Toc380659156)

[List of Tables vii](#_Toc380659157)

[List of Figures vii](#_Toc380659158)

[Section 1. General Measure & Baseline Data 1](#_Toc380659159)

[1.1 Product Measure Description & Background 1](#_Toc380659160)

1.2 Product technical Description……………………………………………………………………1

[1.3 Measure Application Type 2](#_Toc380659161)

[1.4 Product Base Case and Measure Case Data 2](#_Toc380659162)

[1.4.1 DEER Base Case and Measure Case Information 2](#_Toc380659163)

[1.4.2 Codes & Standards Requirements Base Case and Measure Information 4](#_Toc380659164)

[1.4.3 EM&V, Market Potential, and Other Studies – Base Case and Measure Case Information 5](#_Toc380659165)

[1.4.4 Assumptions and Calculations from other sources—Base and Measure Cases 5](#_Toc380659166)

[Section 2. Calculation Methods 6](#_Toc380659167)

[Measure Application Type 6](#_Toc380659168)

[Measure Life Basis 6](#_Toc380659169)

[First Baseline Period: Energy Savings Baseline 6](#_Toc380659170)

[Second Baseline Period: Energy Savings Baseline 6](#_Toc380659171)

[2.1 Electric Energy Savings Estimation Methodologies 7](#_Toc380659172)

[2.2. Demand Reduction Estimation Methodologies 7](#_Toc380659173)

[2.3. Gas Energy Savings Estimation Methodologies 7](#_Toc380659174)

[Section 3 Load Shapes 7](#_Toc380659175)

[3.1 Base Case Load Shapes N/A to Gas measures 7](#_Toc380659176)

[Section 4 Base Case & Measure Costs 8](#_Toc380659177)

[4.1 Base Case(s) Costs 8](#_Toc380659178)

[4.2 Measure Case Costs 8](#_Toc380659179)

[4.3 Incremental & Full Measure Costs 9](#_Toc380659180)

[*4.3.1 Gross Measure Cost* 9](#_Toc380659181)

[*4.3.2 Incremental Measure Costs* 9](#_Toc380659182)

[References 11](#_Toc380659183)

# List of Tables

[Table 1 Measure Application Type 2](#_Toc379270745)

[Table 2 DEER Use and Technology Table 2](#_Toc379270746)

[Table 3 DEER Base Case / Measure Case Costs 3](#_Toc379270747)

Table 4 DEER Net to Gross Ratios…………………………………………………………………….3

Table 5 Title 20 Gas Storage Water Heater Efficiency Requirements……………………………..4

Table 6 DEER Effective Useful Life (EUL)…………………………………………………………….5

Table 7 Summary of Inputs for Savings Calculations………………………………………………..6

Table 8 Baseline by Measure Application Type………………………………………………………6

Table 9 DEER Gas Savings NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et…………………………7

Table 10 DEER Base Case Costs……………………………………………………………………...8

Table 11 DEER Measure Case Costs………………………………………………………………….8

Table 12 DEER Incremental & Full Measure Cost Definitions……………………………………....9

Table 13 Summary Table for Section 4………………………………………………………………10

# List of Figures

**No table of figures entries found.**

# 

# Section 1. General Measure & Baseline Data

## 1.1 Product Measure Description & Background

***Catalog Description – Residential water heater***

**Program Restrictions and Guidelines**

This work paper documents the rationale for the savings methodologies and assumptions for High Efficiency Domestic Water Heaters installed in a Commercial application, and is part of Pacific Gas and Electric Company’s Customer Energy Efficiency Program. PG&E offers incentives to non-residential customers for installing qualifying, high-efficiency equipment.

**Terms and Conditions:**

Customer must have gas/electricity distributed by PG&E to the installation address. The customer must meet all the terms and conditions as described on the rebate application form or in the upstream Trade Pro qualifications.

HA18: The rebate is **upstream** provided to the **distributor** at the time of **sale** upon receipt of application and invoice.  This **is not** a direct install program.

The Commercial Water Heater Distributor Incentive Program (hereafter referred to as the “Program”) is an energy efficiency program funded by California utility customers and administered by Pacific Gas and Electric Company (hereafter referred to as “PG&E”) under the auspices of the California Public Utilities Commission (hereafter referred to as “CPUC”). Energy Solutions serves as the “Program Implementer”.

Qualifying Customers and Installations

A qualifying customer receives commercial gas service from PG&E and pays a public goods charge. Qualifying customer facility types include, but are not limited to, all commercial building types and residential multi-family (MFm) installations.

Qualifying Equipment

Qualifying equipment is equipment that meets the following rated efficiency criteria and has been added to the Program list of qualifying equipment. The current list of qualifying equipment (hereafter referred to as the “Qualifying Equipment List”) can be found on the Program website currently located at the following URL: www.cainstantrebates.com (the “Program Website”).

Efficiency Criteria

Rebate qualified equipment shall be natural gas storage water heaters, greater than 75,000 Btu/hr input, and have a thermal efficiency of 90% TE or greater.

***Market Applicability:*** This measure applies to all commercial account holders within the PG&E service territory who have an active PG&E gas account. It applies to all climate zones, building types and vintages listed in the DEER 2014 database. Multi-family applications do not qualify unless it is for common area where a commercial NAICS code is connected to the account. The intention of this rebate is to encourage customers to replace their equipment with energy efficient equipment and is applicable as Replace on Burnout (ROB). This rebate is offered only through the distributor program defined above, and is considered a midstream program offering. Due to customers’ reluctance to replace their water heater until it fails and because water heaters are relatively expensive compared to other appliances, offering rebates for early retirement is not feasible. Therefore, the savings and costs for these measures are from DEER 2014 and are calculated assuming replace on burnout and new construction measure types. For these measure types, the baseline energy consumption is determined by applicable codes and industry standards. This rebate is paid to the distributor upon sale of the unit.

HA18: The rebate is **upstream** provided to the **distributor** at the time of **sale** upon receipt of application and invoice.  This **is not** a direct install program.

***1.2 Product Technical Description***

Conventional natural gas storage water heaters usually consist of a glass-lined steel tank with foam insulation. Located at the base end of the tank is a natural gas burner. Cold water enters the base of the tank and is heated by the burner. The water then rises to the top portion of the tank. This is where the hot water is drawn for consumption.

In general, energy efficient units have a greater amount of insulation and higher efficiency burners. The most efficient natural gas storage water heaters are condensing water heaters.

A condensing unit has more heat exchange surface between the hot exhaust gasses and the water being heated. This allows the water to absorb more of the exhaust gas heat, which in turn reduces the temperature of the exhaust gasses and condenses the exhaust by-products.

## 1.3 Measure Application Type

The Database for Energy Efficiency Resources (DEER) Measure storage water heater Cost Data Users Guide found on [www.deeresources.com](http://www.deeresources.com) describes the measure application type as follows:

Table 1: Measure Application Type

|  |  |  |
| --- | --- | --- |
| **Code** | **Description** | **Comment** |
| ER | Early retirement | *measure applied while existing equipment still viable, or retrofit of existing equipment* |
| ROB | Replace on Burnout | *measure applied when existing equipment fails or maintenance requires replacement* |
| NC | New Construction | *measure applied during construction design phase as an alternative to a code-compliant standard design* |

Based on market dynamics noted in the previous section, offering early retirement for measure HA18 is not feasible. Therefore, the savings and costs for these measures are calculated assuming replace on burnout and new construction measure types.

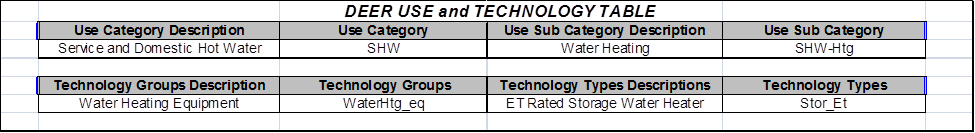
## 1.4 Product Base Case and Measure Case Data

## 1.4.1 DEER Base Case and Measure Case Information

The base case energy efficiency used by DEER2014 for storage type water heaters is 80%TE, measure case efficiency for measure HA18 is >90%TE. The base case and measure case costs for measure HA18 were downloaded directly from DEER 2014. The costs for this measure are constant and do not vary by building type, building vintage or climate zone.

* The DEER2014 data include: gas energy savings, equipment unit costs, equipment incremental costs, equipment useful life, Net to Gross and Initial Service Rate for > 90%TE Condensing Storage Water Heaters.

**Table 2: DEER Use and Technology Table**



* The DEER2014 data contain the appropriate information for this measure.

**Therms Savings Assumption (ΔTh) DEER 2014** **High Efficiency Large Gas Storage Water Heater > 0.90 ET**

The gas savings were downloaded from DEER directly, they match the intended measures.

**EUL Gas Savings** **(ΔTh): DEER 2014** High Efficiency Large Gas Storage Water Heater > 0.90 ET

**Hours of Operation**: Assumed hours of operation are 8760, as this is a gas measure with a standing pilot light. No DEER hours of operation are noted for this particular measure.

**Base Case Costs and Measure Case Costs**

**Costs Work Order #017 (WO#017)** NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et

* The Base Case / Measure Case / Incremental Costs were calculated from WO#017 directly.
* The Base Case / Measure Case / Incremental Costs were calculated from WO#017 are per unit. The values were divided by 300Btuh as this is the average installed size of units installed for 2011 and 2012 in the PG&E Service Territory in order to get a per kBtuh value to match the WO#017 per kBtuh savings numbers. The costs are the same for all building types, climate zones, and building vintages.

**Table 3: DEER Base Case / Measure Case Costs**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Costs ($)** | | |  |  |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Base Case** | **Measure Case** | **IMC** | **DEER Version** | **Impact IDs** |
| **Any** | **Any** | **Any** | **$21.80** | **$26.16** | **$4.36** | **Work Order #017** | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |

**Net-to-Gross Assumption:** *DEER2014 No Identified NTGR, technology offered > 2 yrs*

Table 4 below summarizes all applicable DEER based Net-to-Gross ratios for programs that may be used by this measure. The NTG is based on the program type described in Section 1.1.

Table 4: DEER Net-to-Gross Ratios

|  |  |
| --- | --- |
| **DEER Spreadsheet** |  |
| Program Approach | NTG |
| All-Default >2 yrs | 0.60 Com  0.55 Res |

The NTG Ratios in Table 3 are appropriate for the measure(s) because:

* This is the closest match taken directly from DEER2014
* This is a new technology offering by the utilities
* Condensing water heaters have never been previously in the PG&E energy efficiency portfolio

**Effective Useful Life / Remaining Useful Life:**

**Effective Useful Life: Com 15 years Res 11 years DEER 2014 Water Heating**

The Effective Useful Life estimates were downloaded directly from DEER, they match the intended measures for climate zones and building types and vintages

**In-service rate/first year installation rate**:

**In-service rate:** DEER 2014 ISR 1 **DEER 2014 Water Heating**

The in service rates were downloaded from DEER directly, they match the intended measures for climate zones and building types and vintages. The ISR is based on the DEER measure and delivery method described in Section 1.1.

## 1.4.2 Codes & Standards Requirements Base Case and Measure Information

***Title 20:*** This measure falls under Title 20 of the California Energy Regulations. Under this regulation the following is required:

**Table 5: Title 20 Large Gas Storage Water Heater Efficiency Requirements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Title 20 Std. Description** | **Base or Measure Case** | **Value** | **Units** | **Code Source or Reference** |
| ***Gas storage water heaters*** | *Minimum 80% TE* | *N/A* | *kBtuh* | *2008 Title 20 Standards*  *2013 Residential Compliance Manual page 9* |

Definition of a Large Storage Gas water heater per Title 20 is:

Large Storage Gas is “a storage gas water heater with input capacity greater than 75,000 Btu/h.”, they are rated with an AFUE and either a total standby loss value (that includes pilot energy) or have a pilot energy and standby loss value that does not include the pilot energy.

*Application Issues*

These units offer higher capacity and generally greater storage volume, and are therefore better suited for high load situations, including combined hydronic space and water heating applications. Many of the products available in this category are higher efficiency. These units typically require an electrical connection for controls and combustion air blowers.

***Title 24:*** This measure does not fall under the California Code of Regulations, Title 24 Part 6 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.

**Federal Standards:**

The Federal Department of Energy (DOE) standards for these measures are identical to the Title 20 standards; see above.

**Hours of Operation**: Assumed hours of operation are 8760, as this is a gas measure with a standing pilot light. No DEER hours of operation are noted for this particular measure.

**Effective Useful Life: DEER14 V 1.0.5 Commercial Water Heating**

The Effective Useful Life estimates were downloaded from codes directly, they match the intended measures for climate zones and building types and ages.

**Table 6: DEER Effective Useful Life**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **EUL (yrs)** | **RUL (yrs)** | **DEER Version** | **Impact IDs** |
| **ANY**  **MFM** | **ANY** | **ANY** | **15**  **11** | **N/A** | **DEER14** | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |

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

There are no M&V or other studies which apply to these measures. Information on the base and measure case are found in DEER2014.

**Net-to-Gross Assumption:** *DEER2014 No Identified NTGR, technology Com Default offered > 2 yrs*

Table 4 above summarizes all applicable DEER based Net-to-Gross ratios for programs that may be used by this measure.

## 1.4.4 Assumptions and Calculations from other sources—Base and Measure Cases

There are no further data or calculations provided for the support of the measures in this workpaper.

***1.4.5 Time-of-Use Adjustment Factor***

We are required by CPUC decision 06-06-063 dated June 29, 2006 to apply time-of-use (TOU) adjustment factors on residential A/C and commercial A/C (packaged and split-system direct-expansion cooling) measures only. Since this is not an A/C measure, the TOU adjustment factor is 0.

***1.5 Summary of Inputs for Savings Calculations***

The following table provides references to sections that document the inputs for calculation:

**Table 7 Summary of Inputs for Savings Calculations**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Input Variable** | **Variations** | **Base Case 1 Average Value** | **Base Case 2 Average Value** | **Measure Case Average Value** | **Reference Section** |
| **Electric Savings** | none | 0 | *0* | *0* | Section 2.1 |
| **Gas Savings** | CZ, BT, BV, CZ | N/A | N/A | 2.14 | Section 1.4.1 |
| **Hours of operation** | none | 8760 | 8760 | 8760 | Section 1.4.1 |
| **Full Cost** | ROB, NC | **$6,541.26** | N/A | **$7,848.00** | Section 1.4.1 |
| **Incremental Cost** | ROB, NC | N/A | N/A | $1,306.75 | Section 1.4.1 |
| **EUL** | ROB, NC | N/A | N/A | Com15 Res11 | Section 1.4.1 |
| **NTG** | One | N/A | N/A | Com 0.6  Res 0.55 | Section 1.4.1 |
| **ISR** | Yes | N/A | 1 | 1 | Section 1.4.1 |
| **TOU Factor** | A/C projects only | N/A | N/A | N/A | *Section 1.4.5* |

# Section 2. Calculation Methods

Table 8 Baseline by Measure Application Type

|  |  |  |  |
| --- | --- | --- | --- |
| ****Measure Application Type**** | ****Measure Life Basis**** | ****First Baseline Period: Energy Savings Baseline**** | ****Second Baseline Period: Energy Savings Baseline**** |
| ***ER* (early retirement)** | **EUL** | Customer Average Baseline | Code Baseline |
| ***ROB* (replace-on-burnout)** | **EUL** | Code Baseline | N/A |
| ***NC* (new construction)** | **RUL/EUL-RUL** | Code Baseline | N/A |

Notes:

* For ROB measures, First Baseline is the baseline for the full EUL. There is no second baseline.
* For ER measures, First Baseline Period is the period for the RUL(remaining useful life),defined by the CPUC as RUL=1/3 EUL. Second baseline period for ER is Code baseline for the period EUL-RUL.

## 2.1 Electric Energy Savings Estimation Methodologies

* There are no electric energy savings associated with this measure.

## 2.2. Demand Reduction Estimation Methodologies

* There is no anticipated demand reduction associated with this measure

## 2.3. Gas Energy Savings Estimation Methodologies

* The Gas savings are taken directly from DEER14 V 1.05. A table of sample savings is below. Please see the attached full exec summary for all values.
* This measure is not an Early Retirement measure.
* For a complete list of savings please see full At A Glance attachment.

**Table 9: DEER Gas Savings NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Building type** | **Bldg Vintage** | **Climate Zone** | **Interactive Only?**  **Yes / No** | **Gas Savings Therms** | **Deer units** | **DEER Version** | **Impact Ids** |
| Asm | Ex | Z01 | No | 2.97 | Cap-kBTUh | D13 v1.0 | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |
| Asm | Ex | Z02 | No | 2.76 | Cap-kBTUh | D13  v1.0 | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |
| Asm | Ex | Z03 | No | 2.77 | Cap-kBTUh | D14 v1.0 | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |
| Asm | Ex | Z04 | No | 2.68 | Cap-kBTUh | D13 v1.0 | NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et |

**Annual Gas Savings:**

EUL **Energy Savings [therms/unit] = Annual Code/Industry std. Base Gas Usage – Annual Energy Efficient Gas Usage**

# Section 3 Load Shapes

Load Shapes are not applicable to gas measures at this time.

## 3.1 Base Case Load Shapes N/A to Gas measures

**3.2 Measure Load Shapes** N/A to Gas measures

# Section 4 Base Case & Measure Costs

To develop average costs, Work Order #017 (WO#017) data was collected for base case storage-type water heaters and high efficient water heaters, DEER does not specify condensing water heaters.

## 4.1 Base Case(s) Costs

The following Measure Application Type is appropriate to this measure. The Base Case Costs are:

**Table 10 WO#017 Base Case Costs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Base Case Cost** |
| HA18 | ROB | Existing Code | $6,541.26 | Inc | N/A | $6,541.26 |

*All costs are noted as $ per measure unit*

WO#017 does not provide a cost per Cap kBtuh as the measure unit description, therefore, based on an average size of units installed in PG&E service territory during program year 2012-2013, of 300kBtuh costs were divided by 300 to get a per kBtuh cost for MDSS input.

## 4.2 Measure Case Costs

The following Measure Application Type is appropriate to this measure. The Measure Case Costs are from WO#017:

**Table 11: WO#017 Measure Case Costs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Measure Code*** | **Measure Application Type** | **Baseline** | **Equipment Cost** | **Labor / Installation Cost** | **Maintenance / Other Cost** | **Total Measure Case Cost** |
| HA18 | ROB | Existing, Code | $7,848.00 | Inc | N/A | $7,848.00 |

*All costs are noted as $ per measure unit*

WO#017 does not provide a cost per Cap kBtuh as the measure unit description, therefore, based on an average size of units installed in PG&E service territory during program year 2012-2013, of 300kBtuh costs were divided by 300 to get a per kBtuh cost for MDSS input.

## 

## 4.3 Incremental & Full Measure Costs

**Table 12: DEER Incremental & Full Measure Cost Definitions**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measure Application Type** | **Gross Measure Cost**  **(RUL Period/First Baseline)** | **Gross Measure Cost**  **(EUL-RUL Period/ Second Baseline)** | **Incremental Measure Cost** |
| ER | Measure Equipment Cost  +Measure Labor Cost | (-1)x(Base Equipment Cost  + Base Labor Cost) | Measure Equipment Cost  – Base Case Equipment Cost |
| ROB | Measure Equipment Cost  – Base Case Equipment Cost | N/A | Measure Equipment Cost  – Base Case Equipment Cost |
| NC | Measure Equipment Cost  – Base Case Equipment Cost | N/A | Measure Equipment Cost  – Base Case Equipment Cost |

# *4.3.1 Gross Measure Cost*

Gross Measure Cost is the cost to install an energy efficient measure per the CPUC calculators. This definition implies a different meaning depending on the Measure Application type.

This Measure Application Type is: **ROB**, so the Gross Measure Cost (GMC) is represented by the equation below (choose):

GMC = (Measure Equipment Cost + Measure Labor Cost) –

(Base Case Equipment Cost + Base Case Labor Cost)

\*Note: We assume that, unless stated otherwise, the measure case labor and base case labor are assumed to be the same value reducing the equation to the following:

GMC = Measure Equipment Cost – Base Case Equipment *Cost*

*GMC = $ 7,848.00 per (unit) - $ 4,072.94 per (unit) = $ 1,306.75 per unit*

\*Note: Various complicated price fluctuations are not addressed in these equations, such as future costs due to inflation in labor, future costs due to deflation in material cost, and other variables that cannot be accurately described at this time.

# *4.3.2 Incremental Measure Costs*

Incremental Measure Cost is the premium cost to install an energy efficient measure over a standard efficiency measure or code baseline measure. While IMC has a straightforward definition depending on the Measure Application type, the equation does vary.

This Measure Application Types is: **ROB,** so the Gross Measure Cost (GMC) is represented by the appropriate equation below:

IMC = (Measure Equipment Cost + Measure Labor Cost) –

(Base Case Equipment Cost + Base Case Labor Cost)

\*Note: Unless stated otherwise the measure case and base case labor costs are typically the same, reducing the equation to the following:

IMC = Measure Equipment Cost – Base Case Equipment Cost

*IMC = $ 7,848.00 per (unit) - $ 4,072.94 per (unit) = $ 1,306.75 per unit*

In order to match DEER14 Unit description of Cap-kBtuh, this value was divided by 300 (the average size of rebated units in 2012-2013) to get a per Cap-kBtuh value. As noted in Table 3 from section 1.4.1, page 3.

**Table 13: Summary Table for Section 4**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Measure ID** | **Measure Application Types** | **Base Case Total Cost** | **Measure Case Total Cost[[1]](#endnote-1)** | **Gross Measure Case Cost** | **Incremental Measure Cost** |
| **NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et** | **ROB** | **$6,541.26** | **$7,848.00** | **$7,848.00** | **$1,306.75** |
|  |  | **6,541.26/300 ==**  **$21.80** | **7,848.00/300=**  **$26.16** |  | **1,306.75/300=**  **$4.36** |

# 

# 

# References

Common references:

*DEER2014\_NTGR\_2012-05-16.xls* from DEER Database for Energy-Efficient Resources; Version 2011 4.01 found at :<http://www.deeresources.com/index.php?option=com_content&view=article&id=68&Itemid=60>

Under: DEER2014 Update Documentation linked at: [DEER2014 Update Net-To-Gross table](http://www.deeresources.com/DEER2011/download/DEER2011_NTGR_2012-05-16.xls)

DEER Database for Energy-Efficient Resources; Version 2014 v1.0 found at :<http://www.deeresources.com/index.php?option=com_content&view=article&id=68&Itemid=60>

READI Tool Version READI v.1.0.5 (Official "DEER2014" database); Measures D13 v1.00 – NG-WtrHt-LrgStrg-Gas-gte75kBtuh-0p90Et

1. Work Order #017 Page #114

   [↑](#endnote-ref-1)