**Work Paper PGECOHVC162**

**Water Source Heat Pumps**

**Revision # 3**

**Pacific Gas & Electric Company**

**Customer Energy Solutions**

**Water Source Heat Pumps**

**Measure Codes: HB4, HB5, HB6, HB7, HB8, HB9, HV233, HV234, HV235, HV236, HV237, HV238, HV239, HV240**

At-a-Glance Summary

|  |  |
| --- | --- |
| ****Solution and Measure Codes:**** | HB4, HB5, HB6, HB7, HB8, HB9, HV233, HV234, HV235, HV236, HV237, HV238, HV239, HV240 |
| **Measure Description:** | High efficiency water source heat pump. |
| **Base Case Description:** | Existing customer and code/standard water source heat pump. |
| **Energy Impact Common Units:** | Per Ton |
| **Base Case Energy Consumption:** | Source: DEER2016 READi (Version 2.3.0) |
| **Measure Energy Consumption** | Source: DEER2016 READi (Version 2.3.0) |
| **Energy Savings**  **(Base Case – Measure)** | Source: DEER2016 READi (Version 2.3.0)  Varies by climate zone |
| **Costs Common Units:** | $/ton of Cooling for Air Conditioners and Heat Pumps |
| **Gross Measure Cost ($/unit):** | Refer to Excel Calculation Attachment |
| **Base Case Equipment Cost ($/unit):** | Source: Distributor Costs  Varies by Equipment Type and Size |
| **Measure Equipment Cost ($/unit):** | Source: Distributor Costs  Varies by climate zone |
| **Measure Incremental Cost ($/unit):** | Refer to Excel Calculation Attachment |
| **Gross Measure Cost ($/unit)** | Source: Distributor Costs  Varies by climate zone |
| **Effective Useful Life:** | 15 years (HVAC-WSHP) |
| **Measure Application Type:** | Replace on Burnout (ROB) |
| **Net-to-Gross Ratio:** | 0.75 (NonRes-sAll-mHVAC-DX-up) |
| **Important Comments:** |  |

# Document Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Revision # | Revision Date | Author (Affiliation) | Summary of Changes |
| SCE13HC048.0 | 5/29/2012 | James Gowen (Matrix) | New work paper |
| SCE13HC048.1 | 11/21/2013 | Alfredo Gutierrez (SCE) | Updated the work paper with the following:  • New delivery early retirement delivery method which includes RET for all existing measure  • Savings and Costs for RET are actually RET-ROB values in order to prevent the HVAC Upstream program from double counting the savings |
| SCE13HC048.2 | 1/28/2014 | Alfredo Gutierrez (SCE) | Added in the following building types to be consistent with the ED filed REV 0 of this work paper:   * Agricultural * Assembly * Food Store * Grocery * Lodging - Guest Rooms * Health/Medical – Clinic * Health/Medical – Hospital * Lodging – Hotel * Industrial * Manufacturing - Bio/Tech * Misc – Commercial * Manufacturing - Light Industrial * Lodging – Motel * Health/Medical - Nursing Home * Restaurant - Fast-Food * Restaurant - Sit-Down * Storage – Conditioned * Storage – Unconditioned * Transportation - Communication – Utilities * Warehouse – Refrigerated   Measure names and solution codes have been updated to match the MMDB. |
| SCE13HC048.3 | 5/19/2014 | Alfredo Gutierrez (SCE) | Work paper updated for reporting period, effective 7/1/2014 – 12/31/2014. |
| SCE13HC048.4 | 12/19/2014 | Jason Wang (SCE) | * Added new tiers * Revised costs |
| PGECOHVC162 R2 | 1/26/2015 | Chris Li (PG&E) | * SCE lead workpaper. |
| PGECOHVC162 R3 | 1/1/2016 | Henry Liu (PG&E) | * Change to COM building type only * Revised costs * NTG update * Therm changes to DEER value |

# Section 1: General Measure & Baseline Data

## 1.1 Measure Description & Background

This work paper details the replacement of a standard efficiency water source heat pump with a high efficiency water source heat pump.

Table 1: Measures and Codes

|  |  |  |
| --- | --- | --- |
| Solution Code | Measure Code | Measure Name |
| AC-61742 | HB4 | <65kBtu/hr 14.0 EER Water-Source Heat Pump |
| AC-70694 | HB5 | <65kBtu/hr 15.0 EER Water-Source Heat Pump |
| AC-80912 | HB6 | <65kBtu/hr 16.0 EER Water-Source Heat Pump |
| AC-57464 | HV233 | <65kBtu/hr 17.0 EER Water-Source Heat Pump |
| AC-73817 | HV234 | <65kBtu/hr 18.0 EER Water-Source Heat Pump |
| AC-29674 | HB7 | 65-135 kBtu/hr 14.0 EER Water-Source Heat Pump |
| AC-88035 | HV235 | 65-135 kBtu/hr 15.0 EER Water-Source Heat Pump |
| AC-58661 | HV236 | 65-135 kBtu/hr 16.0 EER Water-Source Heat Pump |
| AC-96782 | HV237 | 65-135 kBtu/hr 17.0 EER Water-Source Heat Pump |
| AC-55861 | HV238 | 65-135 kBtu/hr 18.0 EER Water-Source Heat Pump |
| AC-98021 | HB8 | 135-240 kBtu/hr 14.0 EER Water-Source Heat Pump |
| AC-78624 | HV239 | 135-240 kBtu/hr 15.0 EER Water-Source Heat Pump |
| AC-10953 | HB9 | >240 kBtu/hr 13.0 EER Water-Source Heat Pump |
| AC-73615 | HV240 | >240 kBtu/hr 14.0 EER Water-Source Heat Pump |
| AC-89140 | N/A | <65kBtu/hr To Code Savings Portion Water-Source Heat Pump |
| AC-98263 | N/A | 65-135 kBtu/hr To Code Savings Portion Water-Source Heat Pump |
| AC-51802 | N/A | 135-240 kBtu/hr To Code Savings Portion Water-Source Heat Pump |
| AC-77978 | N/A | >240 kBtu/hr To Code Savings Portion Water-Source Heat Pump |

**Eligibility Requirements**

These measures are for all nonresidential building types and vintages. The installed equipment must meet the minimum EER values for each measure shown in Table 1.

Specifically under the HVAC Early Retirement program applicability, a sub program of the HVAC Optimization Program, only contractors actively participating in the HVAC Optimization Program are allowed to participate in this Program. Part of the application process will include verification procedures for ensuring that equipment is installed and operational.

Retrofitted HVAC equipment must have cooling capacity (e.g., Btu/h) within +/- 5% of the existing equipment OR the contractor must provide a load calculation verifying that the new unit is sized correctly for the load.

For early retirement offerings within this work paper:

* The HVAC Early Retirement Program will utilize the CPUC’s Early Retirement (ER) Savings methodology, but only claim the portion of savings that remain after the Replace on Burnout (ROB) savings is claimed by the Upstream Program.
* Initial leads for the program will be generated from participants in the Quality Maintenance (QM) and Quality Renovation (QR) Programs. Maintenance records and analyses performed for the QM and QR program will be collected to help verify unit operation. Additional information on existing EER and operating efficiency may be collected on some applications to help document the existing baseline.
* Program requirements including pre-inspection and verification are in place to ensure that equipment is classified as either Early Retirement or Replace on Burnout. The program will require pre-inspections on 75% of installations for the first 3 months, but target a 100% inspection rate. Pre-inspections will inspect unit nameplate information such as manufacturing year, will include visual verification of unit operation, and may involve measurements to verify: amperage, supply air temperature, outdoor air temperature, and mixed air temperature. After 3 months, the program will adjust the inspection percentage based on the pass-fail rates. Two rebates will be paid for Early Retirement Installation, but savings will only be claimed once.
* Certain evidence must be provided to participate in this program, including:
  + Pre-inspection data to evaluate that the units are still operating
  + A customer statement that the existing equipment is still in proper working condition and will continue to operate for at least one year
* The evidence below will be requested from the contractor or customer, but because it may not always be available, will not be a requirement for program participation:
  + Make, model and serial number of existing equipment
  + Records of ongoing equipment maintenance and performance
  + Existing equipment installation dates and invoices

The above evidence, any other evidence, and the sampling rate of this evidence, will be used to demonstrate the preponderance of evidence of program-induced early retirement. Other evidence may include emails, notes, and customer statements that demonstrate how the early retirement program accelerated the early retirement of the existing equipment and if any other non-energy efficiency drivers influenced equipment replacement.

## 1.2 Technical Description

A water source heat pump is a self-contained packaged cooling and heating unit with a reversible refrigerant cycle which uses water rather than air to transfer heat to/from the refrigerant. Typically there is one water source heat pump serving each zone, and all units are connected to a common water loop that can be supplied with cool water from a cooling tower or hot water from a boiler. Unlike typical direct expansion (DX) units, water source heat pumps can be used to heat the same zone that is cooled by reversing the flow of the refrigerant, thus extracting the heat from ambient air to warm the airstream into the conditioned zone. A separate system is used to deliver outside air.

## 1.3 Application Types and Delivery Mechanisms

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

The delivery mechanism used for the measures within this work paper is Upstream Programs / Up-Stream Incentive.

For SCE, the install types for measures in this work paper are Replace-On-Burnout (ROB) and Early Retirement (in this case RET minus ROB is claimed through the RET measures). For RET measures, units identified through the HVAC optimization program as still functional, but needing replacement, will be retired prematurely. The program will provide incentives to the contractor for this to occur.

For PG&E the install type is ROB for all measures and there is no ER.

For SDG&E the install type is ROB for all measures.

## 1.4 Measure and Base Case Cost Effectiveness Data

### 1.4.1 DEER Measure and Base Case Analysis

The DEER 2015 includes one water source heat pump measure where the measure case is a 14 EER unit and the code base case is a 12 EER unit. For measures not exactly matching DEER, a scaling method was used.

Table 2: DEER Difference Summary

|  |  |
| --- | --- |
| DEER Difference Summary Table | |
| Referenced versions of DEER and READI | DEER 2016, READI v2.3.0 |
| Summary of deviation from DEER | DEER provides savings for units with 14 EER. Other measure savings were scaled. |
| DEER measures scaled? | Yes |
| 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 |
| NonRes-sAll-mHVAC-DX-up | All package and split system AC & HP replacements | Com | Any | PreRebUp | 0.75 |

Note: Direct install measures that are not hard-to-reach will use the default NTG value.

**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 | HVAC |
| Measure Case UseSubCats | Space Heating and Cooling (HeatCool) |
| Measure Case TechGroups | dx HP Equipment (dxHP\_equip) |
| Measure Case TechTypes | Water Source Heat Pump (WSHP) |
| Base Case TechGroups | dx HP Equipment (dxHP\_equip) |
| Base Case TechTypes | Water Source Heat Pump (WSHP) |

**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.

Table 6: EUL and RUL

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EUL ID | Description | Sector | UseCategory | EUL (Years) | RUL (Years) |
| HVAC-WSHP | High Efficiency Water Source Heat Pump | Com | HVAC | 15 | 5 |

### 1.4.2 Codes and Standards Analysis

The 2013 Title 24 [355] code, effective July 1st of 2014, provides the minimum efficiency requirements for water source heat pumps in Table 110.2–B. The minimum efficiency can be seen below:

Table 7: 2013 Title 24 Code

|  |  |  |  |
| --- | --- | --- | --- |
| Equipment Type | Size Category | Subcategory or Rating Condition | Efficiency |
| Water source (cooling mode) | ≥ 65,000 Btu/h and < 135,000 Btu/h | 86ºF entering water | 12.0 EER |
| Water source (heating mode) | < 135,000 Btu/h (cooling capacity) | 68ºF entering water | 4.2 COP |

The 2014 Title 20 [422] Appliance Efficiency Standards also provide minimum efficiency requirements for water source heat pumps in Table C-4.

Table 8: 2014 Title 20 Standards for Water Source Heat Pumps (Table C-4)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Appliance | Cooling Capacity (Btu per hour) | Minimum EER | | | |
| Effective Prior to October 29, 2012 | Effective January 10, 2011 | Effective June 1, 2013 | Effective June 1, 2014 |
| Water-Source Heat Pumps | < 17,000 | 11.2 (4.2 COP) | - | - | - |
| Water-Source Heat Pumps, including VRF | ≥ 17,000 and < 65,000 | 12.0 (4.2 COP) | - | - | - |
| Water-Source Heat Pumps, including VRF | ≥ 65,000 and < 135,000 | ~~12.0 (4.2 COP)~~ | - | 11.9 (4.2 COP) | - |
| Water-Source Heat Pumps | ≥ 135,000 and < 240,000 | ~~11.0 (2.9 COP)~~ | - | - | 12.3 (2.9 COP) |
| Water-Source Heat Pumps | ≥ 240,000 and < 760,000 | ~~11.0\*~~ | ~~11.0\*~~ | ~~-~~ | 12.2 |
| \* Deduct 0.2 from the required EER for units with heating sections other than electric resistance heat. | | | | | |

Please note that only the latest efficiency values are used. All other values shown in the tables above are shown as historic values and are not applicable (crossed out values). Title 24 values (Table 7) should be used for the 65 kBtu/h to 135 kBtu/h measures as of July 1st, 2014.

Table 9: Code Summary

|  |  |  |
| --- | --- | --- |
| Code | Applicable Code Reference | Effective Dates |
| Title 24 (2013) | 2013 Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Table 110.2-B; Unitary and Applied Heat Pumps - Minimum Efficiency Requirements | July 1st, 2014 |
| Title 20 (2014) | Table C-4 Standards for Water – Cooled Air Conditioners, Evaporatively Cooled Air Conditioners, and Water – Source Heat Pumps | July 1st, 2014 |

### 1.4.3 Non-DEER Study Review

There are no other studies used for this work paper.

# Section 2: Calculation Methodology

DEER 2015 contains one water loop heat pump measure, D03-069, which replaces a 12 EER unit with a 14 EER unit. Measures AC-61742 and AC-29674 match this DEER measure and therefore use its savings. Savings for the rest of the measures in this work paper were scaled based on D03-069. The READI tool v.2.3.0 was used to export DEER savings.

The following table contains data files for measures taken directly from or created with the DEER READI Tool. These results have not been modified and are being included in the workpaper for reference.

Table 10: READI Tool Outputs

|  |  |  |  |
| --- | --- | --- | --- |
| Solution Code | Measure Code | Measure Name | READI Results |
| AC-61742 | HXXX | <65kBtu/hr 14.0 EER Water-Source Heat Pump |  |
| AC-29674 | HXXX | 65-135 kBtu/hr 14.0 EER Water-Source Heat Pump |  |

Savings for D03-069 were provided for the following building types:

* Office - Large, for all climate zones and all PAs
* Transportation - Communication - Utilities, for SCE only
* Com, for the “IOU” climate zone only and all PAs

The Office - Large and Transportation - Communication - Utilities building type savings were mapped directly from DEER 2015. The savings for all the other building types in Table 12 were mapped to the Com building type. The savings for Com were not permutated by climate zone.

Work paper measures that do not exactly match D03-069 were scaled by kW/ton, assuming kW/ton = 12/EER. The measures were not scaled by EER because that resulted in a linear relationship that yielded unrealistic values at high EERs.

Example savings calculation for “<65kBtu/hr 15.0 EER Water-Source Heat Pump”, Office - Large, CZ 06

The kW reduction and therm savings were determined in the same way.

Example savings calculation for “<65kBtu/hr To Code Savings Portion Water-Source Heat Pump”, Office - Large, CZ 06

The kW reduction and therm savings were determined in the same way.

For all To Code measures, the values reported are the RET minus ROB savings, i.e. 1st baseline (above customer whole building) – 2nd baseline (above standard whole building) which are meant to prevent the double counting of 2nd baseline savings with the Upstream HVAC program for the measures contained within this work paper. The ROB savings will be reported in the upstream HVAC program, and the RET minus ROB savings will be reported for the early retirement mechanism.

See Attachment 1 for all savings, and Attachment 2 for the calculations.

# 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 11: Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| Building Type | Load Shape | E3 Alt. Building Type |
| Agricultural | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Assembly | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Education - Primary School | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Education - Secondary School | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Education - Relocatable Classroom | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Education - Community College | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Education - University | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Grocery | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Food Store | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Health/Medical - Hospital | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Health/Medical - Nursing Home | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Health/Medical - Clinic | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Hotel | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Guest Rooms | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Lodging - Motel | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Manufacturing - Bio/Tech | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Manufacturing - Light Industrial | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Industrial | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Misc - Commercial | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Office - Large | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Office - Small | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Restaurant - Fast-Food | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Restaurant - Sit-Down | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Retail - Multistory Large | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Retail - Single-Story Large | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Retail - Small | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Storage - Conditioned | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Storage - Unconditioned | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Transportation - Communication - Utilities | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |
| Warehouse - Refrigerated | PGE:DEER:Com:HVAC\_Split-Package\_HP | NON\_RES |

# 

# Section 4: Base Case & Measure Costs

## 4.1 Base Case Cost

The base case equipment is from distributors with a 20% markup. They are the same for all non-To-Code measures because the base case is a standard efficiency unit.

## 4.2 Measure Case Cost

Measure costs are scaled from Distributor costs using the forecast function and a 20% markup added.

Example: Measure cost calculation for “<65kBtu/hr 15.0 EER Water-Source Heat Pump”

## 4.3 Gross and Incremental Measure Cost

### 4.3.1 Gross Measure Cost (GMC)

For ROB measures, the equipment being replaced is assumed to have failed in place or is past its useful life. The customer is faced with either purchasing standard efficiency or code baseline equipment versus energy efficient equipment. Therefore, gross measure cost (GMC) means the cost premium required to install the energy efficient measure over a less efficient piece of equipment. GMC is represented by the equation below:

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

(Base Case Equipment Cost + Base Case Labor Cost)

= (Measure Equipment Cost – Base Case Equipment Cost)

\*Note: Unless stated otherwise the measure case labor and base case labor are assumed to be the same value.

For RET To Code Measures, the values reported are the RET minus ROB costs, i.e. 1st baseline costs - 2nd baseline costs, which are meant to prevent the double counting of 2nd baseline costs with the Upstream HVAC program for the measures contained within this work paper. Thus the ROB costs will be reported in the upstream HVAC program, and the RET minus ROB costs will be reported for the early retirement mechanism.

GMC = (Measure Equipment Cost + Measure Labor Cost) - (GMC for ROB)

This simplifies to:

GMC = Base Case Equipment Cost + Measure Labor Cost

Table 12 Gross Measure Cost

|  |  |  |  |
| --- | --- | --- | --- |
| Measure Name | Base Equipment Cost | Measure Equipment Cost | IMC |
| <65kBtu/hr 14.0 EER Water-Source Heat Pump | $858.70 | $1,052.95 | $194.25 |
| <65kBtu/hr 15.0 EER Water-Source Heat Pump | $858.70 | $1,150.08 | $291.38 |
| <65kBtu/hr 16.0 EER Water-Source Heat Pump | $858.70 | $1,247.20 | $388.50 |
| <65kBtu/hr 17.0 EER Water-Source Heat Pump | $858.70 | $1,344.33 | $485.63 |
| <65kBtu/hr 18.0 EER Water-Source Heat Pump | $858.70 | $1,441.45 | $582.75 |
| 65-135 kBtu/hr 14.0 EER Water-Source Heat Pump | $848.99 | $1,052.95 | $203.96 |
| 65-135 kBtu/hr 15.0 EER Water-Source Heat Pump | $848.99 | $1,150.08 | $301.09 |
| 65-135 kBtu/hr 16.0 EER Water-Source Heat Pump | $848.99 | $1,247.20 | $398.21 |
| 65-135 kBtu/hr 17.0 EER Water-Source Heat Pump | $848.99 | $1,344.33 | $495.34 |
| 65-135 kBtu/hr 18.0 EER Water-Source Heat Pump | $848.99 | $1,441.45 | $592.46 |
| 135-240 kBtu/hr 14.0 EER Water-Source Heat Pump | $887.84 | $1,052.95 | $165.11 |
| 135-240 kBtu/hr 15.0 EER Water-Source Heat Pump | $887.84 | $1,150.08 | $262.24 |
| >240 kBtu/hr 13.0 EER Water-Source Heat Pump | $878.13 | $955.83 | $77.70 |
| >240 kBtu/hr 14.0 EER Water-Source Heat Pump | $878.13 | $1,052.95 | $174.82 |

### 4.3.2 Incremental Measure Cost (IMC)

For the ROB measures contained within this work paper, the incremental measure cost is seen in Table 12 above.

# Attachments

Savings calculations are found in the accompanying calculation spreadsheet.

# References



[355]

[422]

# 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. |