Work Paper SCE13HC049

**Revision 2**

**Southern California Edison**

**Setback Programmable Thermostat Controls**

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | AC-73932, AC-15141 |
| **Measure Description** | Programmable thermostat |
| **Base Case Description** | Non-programmable thermostat |
| **Units** | Per Unit |
| **Energy Savings** | Refer to Excel Calculation Attachment |
| **Full Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Incremental Measure Cost ($/unit)** | Refer to Excel Calculation Attachment |
| **Effective Useful Life** | 11 years (DEER EUL ID: HVAC-ProgTStats, HV-ProgTstat); Please note that since this measure is a retrofit add on onto an existing system the RUL of the existing system is used as the EUL for the measure |
| **Measure Installation Type** | Retrofit Add-on (REA) |
| **Net-to-Gross Ratio** | 0.6 (DEER NTGR ID: Com-Default>2yrs, Ind-Default>2yrs, Agric-Default>2yrs)  0.85 (DEER NTGR ID: Com-Default-HTR-di, Ind-Default-HTR-di, Agricult-Default-HTR-di, Res-Default-HTR-di) |
| **Important Comments** | This work paper has a complementary Ex Ante Database data set that will be provided in a separate submission to the California Public Utilities Commission (CPUC). |

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Rev** | **Date** | **Author** | **Summary of Changes** |
| 0 | 6/19/12 | Rob Guajardo/SCE | Original workpaper for 2013 PC |
| 1 | 7/23/14 | Jason Wang/SCE | * Work paper updated for the reporting period, effective 7/1/14 – 12/31/14. * Updated with DEER 2014 values * Added DMO common area measure and DMO building type * Changed program type to REA * Added midstream delivery |
| 2 | 1/27/16 | Ryan Cho/SCE | -New template update for 2016 program year  -WP effective from 1/1/2016 thru 12/31/2016  -Removed SCE building types  -No value modifications |

# Commission Staff and Cal TF Comments

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Rev** | **Party** | **Submittal Date** | **Comment Date** | **Comments** | **WP Developer Response** |
|  |  |  |  |  |  |

Cal TF website: <http://www.caltf.org/>

# Section 1. General Measure & Baseline Data

## 1.1 Measure Description & Background

This workpaper details the installation of a programmable thermostat with temperature setback capability replacing an existing non-programmable thermostat. The measures in this workpaper are from DEER 2014.

**Base, Standard, and Measure Cases**

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | Programmable thermostat |
| Existing Condition | Non-programmable thermostat |
| Code/Standard | N/A |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | AC-73932 |  | Setback Programmable Thermostat Control |
|  |  | AC-15141 |  | Setback Programmable Thermostat Control (Common Area) |

## 1.2 Technical Description

Programmable thermostats allow the user to create a schedule which regulates operation of the heating and cooling system. For example, the thermostat can be programmed to raise the building temperature after occupants leave, and return to a comfortable temperature before occupants return. This measure can achieve substantial savings over a base case where the temperature setpoint is manually adjusted.

## 1.3 Installation Types and Delivery Mechanisms

The delivery methods for this workpaper are:

* Financial Support / Downstream Incentive – Deemed
* Financial Support / Direct Install
* Partnership / Downstream Incentive – Deemed
* Partnership / Direct Install
* Midstream Programs / Mid-Stream Incentive

Solution code AC-15141 is only available through: Financial Support / Direct Install.

The program type for this workpaper is Retrofit Add-on (REA).

**Installation Type Descriptions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Retrofit Add-on (REA) | Above Customer Existing | N/A | EUL | N/A |

A delivery mechanism is a delivery method paired with an incentive method. Delivery mechanisms are used by programs to obtain program participation and energy savings.

**Delivery Method Descriptions**

|  |  |
| --- | --- |
| **Delivery Method** | **Description** |
| Financial Support | The program motivates customers, through financial incentives such as rebates or low interest loans, to implement energy efficient measures or projects. |
| Mid-Stream Programs | *See Mid-Stream Incentive in the Incentive Method Descriptions table.* |
| Partnership | The program implements projects through a partnership between the utility and an institutional, government, or community-based organization. |

**Incentive Method Descriptions**

|  |  |
| --- | --- |
| **Incentive Method** | **Description** |
| Direct Install | The program implements energy efficiency measures for qualifying customers, at no cost to the customer. |
| Down-Stream Incentive | 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. Such an incentive may be deemed or customized. |
| Mid-Stream Incentive  Mid-Stream Buy Down | The program gives a financial incentive to a midstream market actor (distributor, vendor, or retailer) to encourage the promotion of efficient measures. Buy Down means that the incentive is required to be passed down to the end-use customer. |

## 1.4 Measure Parameters

### 1.4.1 DEER Data

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Workpaper?** |
| Modified DEER methodology | No |
| Scaled DEER measure | No |
| DEER Base Case | Yes |
| DEER Measure Case | Yes |
| DEER Building Types | Yes |
| DEER Operating Hours | Yes |
| DEER eQUEST Prototypes | Yes |
| DEER Version | DEER 2014 |
| Reason for Deviation from DEER | AC-73932: No deviation  AC-15141: The savings from Hotel building type is used |
| DEER Measure IDs Used | D03-073 |

**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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **NTGR ID** | **Description** | **Sector** | **BldgType** | **Measure Delivery** | **NTGR** |
| Com-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Com | Any | Any | 0.6 |
| Ind-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Ind | Any | Any | 0.6 |
| Agric-Default>2yrs | All other EEMs with no evaluated NTGR; existing EEM in programs with same delivery mechanism for more than 2 years | Ag | Any | Any | 0.6 |
| Com-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Com | Any | DirInstall | 0.85 |
| Res-Default-HTR-di | All other EEM with no evaluated NTGR; direct install hard-to-reach only. | Res | Any | DirInstall | 0.85 |
| Ind-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Ind | Any | DirInstall | 0.85 |
| Agricult-Default-HTR-di | All other EEM with no evaluated NTGR; direct install to hard-to-reach only. | Ag | Any | DirInstall | 0.85 |

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

This work paper includes measures that are offered via direct install activities into hard-to-reach (HTR) customer facilities. “Final Resolution E-4700”, dated December 18, 2014, defines specific criteria to classify customer facilities as HTR and also states that two criteria are sufficient to identify HTR customers if one of the criteria met is the geographic criteria.

SCE’s Commercial Direct Install program delivers free and low cost energy efficiency hardware retrofits through installation contractors to reduce peak demand and energy savings for small and medium commercial customers. The barriers for customer participation include limited capital resources, lack of expertise and understanding of the understanding of the benefits of energy efficiency, a suspicion of the “free offer” and its legitimacy, and language and cultural barriers. The program also addresses the ongoing concern with “split incentives”, where the customer is not the owner of the property, and therefore, lack incentive to improve their energy usage. SCE’s Commercial Direct Install program will track the following three (3) customer data points to identify direct install activities in HTR customer facilities. If geography and business size criteria are satisfied, SCE will identify the customer as HTR. If geography and language criteria are satisfied, SCE will identify the customer as HTR. Other measures in the Commercial Direct Install program will receive default NTG (NTGR\_ID: Com-Default>2), unless otherwise specified in DEER.

o **Business Size** – Customer must have less than ten employees

o **Language** – Customer’s primary language spoken is not English

o **Geography** – Businesses in areas other than the United States Office of Management and Budget (OMB) Combined Statistical Areas (CSA) of the San Francisco Bay Area, the Greater Los Angeles Area and the Greater Sacramento Area or the OBM metropolitan statistical areas or San Diego County

The “Required Corrections to Measure Level Input Parameters Identified by Commission Staff per D.14-10-046 Order Paragraph 16”, dated November 3, 2014, includes additional clarification for the geographic criteria:

“Notes on OMB CSA designations:

The OMB has designated a 12-county CSA titled the San Jose-San Francisco-Oakland, CA Combined Statistical Area which includes the nine counties of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma which border the San Francisco Bay plus the three counties of San Joaquin, Santa Cruz, and San Benito that are economically tied to the nine counties that that border the San Francisco Bay.”

The OMB definition of this CSA includes Los Angeles, Orange, San Bernardino, Riverside and Ventura counties.

The OMB definition of this CSA includes Sacramento, Yolo, El Dorado, Placer, Sutter, Yuba, and Nevada counties.”

**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.

**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.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **GSIA ID** | **Description** | **Sector** | **BldgType** | **ProgDelivID** | **GSIAValue** |
| Def-GSIA | Default GSIA values | Any | Any | Any | 1 |

**Effective and Remaining Useful Life**

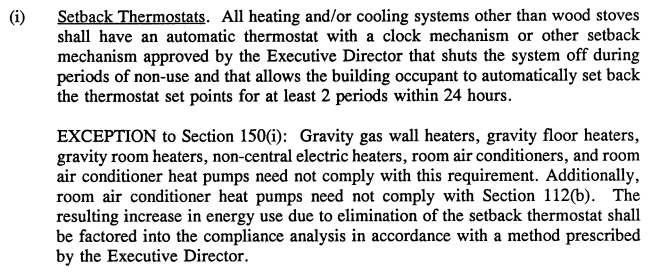
The EUL and RUL values were obtained using the DEER READI tool. DEER defines the RUL as 1/3 of the EUL value. The RUL value is only applicable to the first baseline period for an RET measure with an applicable code baseline. The relevant EUL and RUL values for the measures in this work paper are in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **EUL ID** | **Description** | **Sector** | **UseCategory** | **EUL (Years)** | **RUL (Years)** |
| HVAC-ProgTStats | Setback Programmable Thermostats | Com | Any | 11 | 3.7 |
| HV-ProgTstat | Programmable Thermostat | Res | Any | 11 | 3.7 |

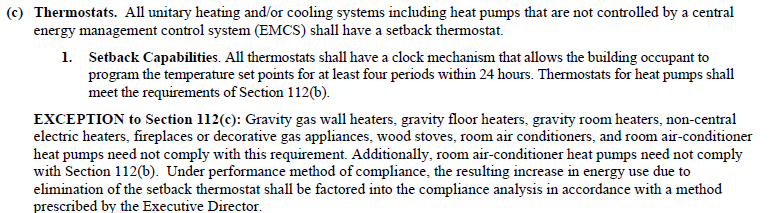
### 1.4.2 Codes and Standards Analysis

**Title 24** has required programmable setback thermostats for all occupancies since the 2008 version [208]; Title 24 2013 [355] maintains this requirement. For low-rise residential buildings, automatic thermostats for heating and cooling have been required since at least the 1992 version. The measures in this work paper are only eligible for HVAC systems that were installed and permitted before programmable setback thermostats were required by code; see effective dates in the table shown below.

**Title 24 (1992) Section 150(i) Low-rise Residential Buildings—Mandatory Features and Devices:**



**Title 24 (2008) Section 112(c) Mandatory Requirements for Space-conditioning Equipment (All Occupancies):**



**Title 24 (2013) Section 110.2(c) Mandatory Requirements for Space-conditioning Equipment (All Occupancies):**

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 24 (1992) | Section 150(i) | July 1, 1992 |
| Title 24 (2008) | Section 112(c) | January 1, 2010 |
| Title 24 (2013) | Section 110.2(c) | July 1, 2014 |

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

N/A

## 1.6 Data Quality and Future Data Needs

N/A

# Section 2. Calculation Methodology

The following table indicates which measures are taken directly from or created with the DEER READI tool.

READI Data Used

|  |  |  |
| --- | --- | --- |
| **Measure Code** | **Measure Name** | **READI Data** |
| AC-73932 | Setback Programmable Thermostat Control |  |

It is assumed that each thermostat will control 1000 square feet. DEER provides savings normalized to 1000 sq ft, and this work paper’s units are per-unit, so DEER savings are used without modification.

For AC-73932, DEER 2014 savings are used directly.

Solution code AC-15141 is applicable to common areas of manufactured homes, and the savings can be approximated to those from the “Lodging - Motel Corridor Area” building type. However, since the READi export did not provide this building type, the “Hotel” savings (most conservative of all Lodging and Office building types) were used.

# 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.

Building Types and Load Shapes

|  |  |  |
| --- | --- | --- |
| **Building Type** | **Load Shape** | **E3 Alternate Building Type** |
| Assembly | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Education - Primary School | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Education - Secondary School | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Education - Relocatable Classroom | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Education - Community College | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Education - University | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Grocery | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Health/Medical - Hospital | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Health/Medical - Nursing Home | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Lodging - Hotel | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Lodging - Motel | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Manufacturing - Bio/Tech | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Manufacturing - Light Industrial | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Office - Large | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Office - Small | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Restaurant - Fast-Food | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Restaurant - Sit-Down | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Retail - Multistory Large | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Retail - Single-Story Large | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Retail - Small | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Storage - Conditioned | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Warehouse - Refrigerated | DEER:HVAC\_Split-Package\_AC | NON\_RES |
| Residential Mobile Home - Double-Wide | DEER:HVAC\_Split-Package\_AC | NON\_RES |

# Section 4. Costs

## 4.1 Base Case Cost

Since this is an REA application for a retrofit on existing equipment, the base case cost is zero.

## 4.2 Measure Case Cost

The measure case cost is from DEER 2008, Cost Case ID “ProgTStats”: $94.12. The labor cost is $56.48.

## 4.3 Full and Incremental Measure Cost

**Full and Incremental Measure Cost Equations**

|  |  |  |  |
| --- | --- | --- | --- |
| **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| ROB | (MEC + MLC) – (BEC + BLC) | (MEC + MLC) – (BEC + BLC) | N/A |
| NEW/NC |
| RET/ER | (MEC + MLC) – (BEC + BLC) | MEC + MLC | (MEC + MLC) – (BEC + BLC) |
| REF | (MEC + MLC) – (BEC + BLC) | MEC + MLC | N/A |
| REA | MEC + MLC | MEC + MLC | N/A |

MEC = Measure Equipment Cost; MLC = Measure Labor Cost

BEC = Base Case Equipment Cost; BLC = Base Case Labor Cost

**Full and Incremental Costs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure** | **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| AC-73932 | REA | $150.60 | $150.60 | N/A |
| AC-15141 | REA | $150.60 | $150.60 | N/A |

# Attachments

1. 

# References



|  |  |
| --- | --- |
|  |  |
| [208] | 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings |
| [355] | 2013 Building Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) |
|  |  |