Work Paper SCE13WP004

**Revision 3**

**Southern California Edison**

**Faucet Aerator and Low Flow Showerhead**

**For Work Paper Reviewer Use Only**

**List all major comments that occurred during the review. This table may only be removed during management review.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Major Comment** | **Reviewer Name** | **Date** | **Outcome/Resolution** |
| E.g. Please remove measure LT-12345 (LD123) from this work paper because it is no longer eligible for incentives. | Reviewer 1 | 6/1/15 | E.g. Comment incorporated. LT-12345 was removed. |
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|  |  |  |  |
|  |  |  |  |

# At-a-Glance Summary

|  |  |
| --- | --- |
| **Measure Codes** | WH-62220, WH-79994 |
| **Measure Description** | Faucet Aerator, Low Flow Showerhead |
| **Base Case Description** | No Faucet Aerator, Standard Showerhead |
| **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** | 10 years (EUL ID: WtrHt-WH-Aertr, WtrHt-WH-Shrhd) |
| **Measure Installation Type** | Retrofit (RET) |
| **Net-to-Gross Ratio** | Aerator, SFM: 0.59 (NTG ID: Res-sSF-mDHWaerator)  Aerator, MFM: 0.65 (NTG ID: Res-sMF-mDHWaerator)  Low Flow Showerhead, SFM: 0.7 (NTG ID: Res-sAll-mDHWshwr)  Low Flow Showerhead, SFM: 0.55 (NTG ID: Res-Default>2) |
| **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 | 06/19/2012 | Alfredo Gutierrez (SCE) | - Original workpaper for 2013 PC |
| 1 | 12/12/13 | Ryan Cho (SCE) | In accordance with the Energy Division’s disposition, the following revisions are incorporated to this workpaper.   * Revised all Unit Energy Savings (UES) values.   Updated the Installation Rates to 0.67 (Faucet Aerator) and 0.74 (Showerheads) |
| 2 | 9/9/14 | Jason Wang (SCE) | Added 7% adjustment factor based on 7% market share of electric water heaters in SCE territory. |
| 3 | 02/14/16 | Jay Bhakta (SCE) | -New template update for 2016 program year  -WP effective from 1/1/2016 thru 12/31/2016  -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

The measures are:

* Faucet aerator replacing No Faucet Aerator
* Low Flow Showerhead replacing Standard Showerhead

**Base, Standard, and Measure Cases**

|  |  |
| --- | --- |
| **Case** | **Description of Typical Scenario** |
| Measure | Faucet Aerator; Low Flow Showerhead |
| Existing Condition | No Faucet Aerator; Standard Showerhead |
| Code/Standard | N/A |
| Industry Standard Practice | N/A |

Measures and Codes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure Codes** | | | | **Measure Name** |
| SCG | SDG&E | SCE | PG&E |
|  |  | WH-62220 |  | Faucet Aerator replacing No Faucet Aerator |
|  |  | WH-79994 |  | Low Flow Showerhead replacing Standard Showerhead |

**Implementation Requirements**

Eligible building types are:

* Residential Single Family
* Residential Multi-family
* Residential Mobile Home - Double-Wide

All SCE climate zones are eligible.

For direct install measures, the contractor must verify that the product is installed correctly.

## 1.2 Technical Description

A faucet aerator is a device that screws onto an existing faucet head in order to reduce water flow. It splits the flow of water into multiple streams and adds air. This reduces flow while maintaining sufficient water pressure. This work paper assumes an aerator measure case flow of 1.5 gallons per minute (gpm).

There are 2 types of low flow showerheads:

* Aerating showerheads introduce water into the flow, which produces an even, misty spray while maintaining sufficient water pressure.
* Laminar flow showerheads split the flow of water into multiple parallel streams; no air is added. They produce less steam than aerating showerheads.

This work paper assumes a showerhead measure case flow of 1.7 gpm.

## 1.3 Installation Types and Delivery Mechanisms

The delivery mechanisms for these measures are:

* Financial Support - Direct Install
* Financial Support – Giveaway
* Partnership – Giveaway

The program type/install type is Retrofit – First Baseline Only (REF).

**Installation Type Descriptions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Installation Type** | **Savings** | | **Life** | |
| 1st Baseline (BL) | 2nd BL | 1st BL | 2nd BL |
| Retrofit First Baseline Only (REF) | 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. |
| 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. |
| Giveaway | The program provides customers with energy efficiency equipment or services for free. |

## 1.4 Measure Parameters

### 1.4.1 DEER Data

Both measures were in DEER 2005 but do not remain in DEER 2016. Savings in this work paper are based on an Energy Division disposition.

DEER Difference Summary

|  |  |
| --- | --- |
| **DEER Item** | **Used for Workpaper?** |
| Modified DEER methodology | No |
| Scaled DEER measure | No |
| DEER Base Case | No |
| DEER Measure Case | No |
| DEER Building Types | No |
| DEER Operating Hours | No |
| DEER eQUEST Prototypes | No |
| DEER Version | DEER 2016, READI v2.3.0 |
| Reason for Deviation from DEER | DEER contained similar measures which have since been removed. |
| DEER Measure IDs Used | D03-934 Faucet Aerators; D03-937 Low Flow Showerhead, 2.0 gpm |

**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** |
| Res-sSF-mDHWaerator | Faucet aerators | Res | SFm | DirInstall | 0.59 |
| Res-sMF-mDHWaerator | Faucet aerators | Res | MFm | DirInstall | 0.65 |
| Res-sAll-mDHWshwr | Low flow showerheads | Res | Any | DirInstall | 0.7 |
| Res-Default>2 | All other EEM with no evaluated NTGR; existing EEM with same delivery mechanism for more than 2 years | Res | Any | All | 0.55 |

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

**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** |
| Res-LowF-FA-All, ED Disposition | Residential low-flow Faucet Aerator; Annual Installation Rate | Res | Any | NonUpStrm | 0.67 |
| Res-LowF-SH-All, ED Disposition | Residential low-flow Showerhead; Annual Installation Rate | Res | Any | NonUpStrm | 0.74 |

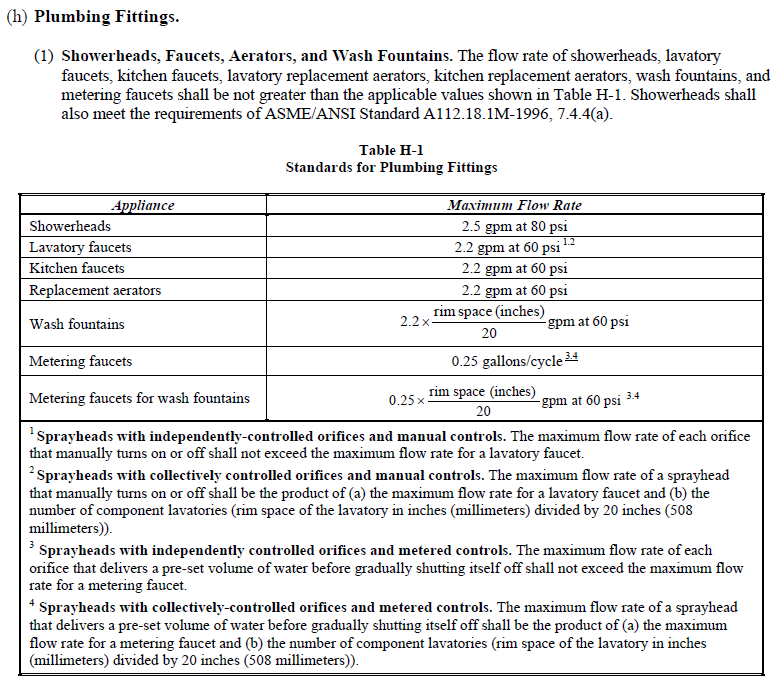
**Effective and Remaining Useful Life**

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)** |
| WtrHt-WH-Aertr | Faucet Aerators | Any | SHW | 10 | 3.3 |
| WtrHt-WH-Shrhd | Low-Flow Showerhead | Res | SHW | 10 | 3.3 |

### 1.4.2 Codes and Standards Analysis

**Title 20 2014 [422]:** Section 1605.1, Table H-1 provides requirements for aerators and showerheads. The measure cases in this work paper have lower flow rates (1.5 gpm for aerators and 1.7 gpm for showerheads) than code requirements.



**Title 24 2013 [355]**: The Residential Compliance Manual, Section 5.9.1 §110.3(c)7 references the requirements set in Title 20.

Code Summary

|  |  |  |
| --- | --- | --- |
| **Code** | **Reference** | **Effective Dates** |
| Title 20 (2014) | Section 1605.1, Table H-1 Standards for Plumbing Fittings | July 1, 2014 |
| Title 24 (2013) | 2013 Residential Compliance manual, Section 5.9.1 §110.3(c)7 – Certification of Showerheads and Faucets | July 1, 2014 |

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

**1.5.1 Non-DEER Study Review**

No studies were reviewed for this work paper.

## 1.6 Data Quality and Future Data Needs

N/A

# Section 2. Calculation Methodology

The 2/22/13 Energy Division Workpaper Disposition for Water Fixtures provided “basis” savings values for:

* Showerheads 1.5 gpm, 1.6 gpm, and 1.7 gpm
  + The average base case flow is 2.25 gpm, according to SCG and SDG&E study data.
* Faucet Aerators 0.5 gpm, 1 gpm, and 1.5 gpm
  + The average base case flow is 1.91 gpm, according to SCG and SDG&E study data.

These basis values were multiplied by climate zone-specific multipliers to determine final savings. The Single Family, Multi Family, and Mobile Home building types were included.

The measures in this workpaper do not have requirements for measure case flow rate, so the most conservative ED-provided savings are used. The most conservative measures were:

* Showerhead 1.7 gpm ( “ShowerHd-Gas-1.7,” “ShowerHd-Elec-1.7”)
* Faucet Aerator 1.5 gpm (“FaucetAer-Gas-1.5-Lav,” “FaucetAer-Elec-1.5-Lav”)

Note that although the written ED disposition shows the correct savings values for Showerheads 1.5 and 1.7 gpm (Tables 2 and 3 in the disposition), the calculation spreadsheet “20132014DHWFixturesMeasures.xlsx” has reversed the two sets of values. Additionally, it appears that showerhead savings are higher for multifamily and manufactured homes than for single family. The reason for this is unclear.

**Market Share**

Due to the program delivery, it is unknown whether the customer uses electric water heating. Therefore the savings are multiplied by an adjustment factor of 7%, which is the market share of electric water heaters in SCE territory, from the 2009 Residential Appliance Saturation Study [428].



The table below shows example savings for Faucet Aerators in Single Family Homes. See Attachment 1 for a full list of savings.

**Faucet Aerators Savings for Single Family**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ED Disposition Savings** | | | | **Adjusted Savings** | | |
|
| **CZ** | **kWh** | **kW** | **Therms** | **kWh** | **kW** | **Therms** |
| 6 | 22.05 | 0.00222 | 0.958 | 1.54 | 0.00016 | 0.067 |
| 8 | 20.90 | 0.00210 | 0.908 | 1.46 | 0.00015 | 0.064 |
| 9 | 21.30 | 0.00214 | 0.925 | 1.49 | 0.00015 | 0.065 |
| 10 | 21.07 | 0.00212 | 0.915 | 1.48 | 0.00015 | 0.064 |
| 13 | 21.13 | 0.00212 | 0.918 | 1.48 | 0.00015 | 0.064 |
| 14 | 22.34 | 0.00224 | 0.970 | 1.56 | 0.00016 | 0.068 |
| 15 | 17.73 | 0.00178 | 0.770 | 1.24 | 0.00012 | 0.054 |
| 16 | 25.05 | 0.00252 | 1.088 | 1.75 | 0.00018 | 0.076 |

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** |
| WH-62220 | Faucet Aerator replacing No Faucet Aerator | D03-934 |
| WH-79994 | Low Flow Showerhead replacing Standard Showerhead | D03-937 |

# 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** |
| Residential Mobile Home - Double-Wide | HeatPump\_WtrHt-RC | Residential |
| Residential Multi-family | HeatPump\_WtrHt-RC | Residential |
| Residential Single Family | HeatPump\_WtrHt-RC | Residential |

# Section 4. Costs

## 4.1 Base Case Cost

The base case cost is $0 because the base case is the customer’s existing equipment.

**Base and Measure Case Costs**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Measure** | **Base Case Cost Source** | **Base Case Equipment Cost** | **Base Case Labor Cost** | **Measure Case Cost Source** | **Measure Case Equipment Cost** | **Measure Case Labor Cost** |
| Faucet Aerator replacing No Faucet Aerator | N/A | $0.00 | $0.00 | DEER 2005: D03-934 | $7.12 | $5.58 |
| Low Flow Showerhead replacing Standard Showerhead | N/A | $0.00 | $0.00 | 2010-12 Ex Ante Measure Cost Study [475] | $18.50 | $15.67 |

## 4.2 Measure Case Cost

See Section 4.1.

## 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** |
| REF | (MEC + MLC) – (BEC + BLC) | MEC + MLC | N/A |

MEC = Measure Equipment Cost; MLC = Measure Labor Cost

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

For REF, the Gross Measure Cost is the full measure cost. Since a code case does not exist, the Incremental Measure Cost is not applicable.

**Full and Incremental Costs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Measure** | **Installation Type** | **Incremental Measure Cost** | **Full Measure Cost** | |
| **1st Baseline** | **2nd Baseline** |
| WH-62220 | REF | N/A | $12.70 | N/A |
| WH-79994 | REF | N/A | $34.17 | N/A |

# Attachments

1. 

1. ****

1. ****

# References



[355]

[422]

[428]

[475]