eTRM

best in class

SERVICE & DOMESTIC HOT WATER

FAUCET AERATOR, COMMERCIAL

SWWH019-03

CONTENTS

MEASURE NAME

Faucet Aerator, Commercial

STATEWIDE MEASURE ID

SWWH019-03

TECHNOLOGY SUMMARY

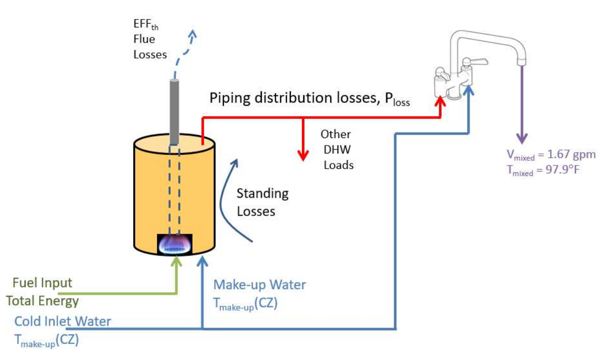
This workpaper describes the installation of a low-flow faucet aerator or flow control valves (FCV) on a faucet in commercial buildings.

An aerator is an add-on device that is installed at the faucet outlet to reduce the flow rate of water. The aerator reduces the water exiting a faucet by mixing it with air; a screen is used to introduce air into the water stream, dividing a single stream of water into many tiny streams. Since there is less space for the water to flow through, the flow rate of the water exiting the faucet is reduced.[1]

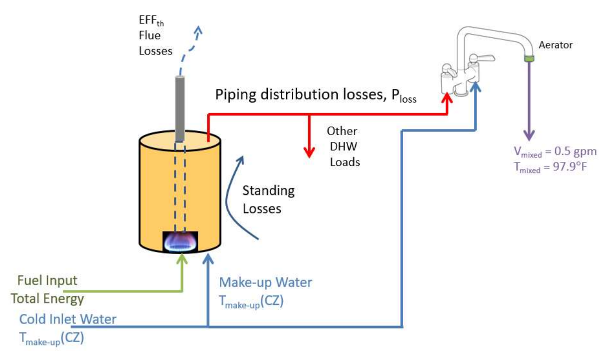
A flow control valve (FCV) acts as a converging-diverging section with a throat in which the flow area is reduced to impede full flow of incoming water while retaining pressure. Flow control valves for faucet water line inlets must be installed in pairs, one in the cold line and one in the hot line.

The installation of aerators or FCVs reduces the flow rate of water demanded by the system, leading to a decrease in overall water consumption. This reduction in overall water consumption ultimately translates into energy savings since it results in a reduction of the thermal load of the system.

Existing DHW System BEFORE Aerator Installation



Existing DHW System AFTER Aerator Installation



There are approximately 106,100 commercial customers in the Southern California Gas Company (SCG) service area. The estimated number of faucets at each facility type was established using NAICS codes and published studies. These estimates are likely conservative since they only include a subset of the

[1] Umesh, V. and Sitaram, N. 2014. "Hydraulic Performance of Faucet Aerator as Water Saving Device and Suggestions for its Improvements." International Journal of Research in Engineering and Technology, Volume 3 (Issue 7).

commercial sector. However, it is uncertain how many of these estimated faucets already have low-flow capabilities or flow-restricting devices installed.

Estimated Market Size

Target Market Segment (NAICS)	Total SCG Customer Accounts[2]	Total Estimated Faucets[3]
Restaurants	34,000	100,000
Hotels/motels	4,600	885,000
Schools	8,500	810,000
Retail	21,000	42,000
Office Buildings	37,000	74,000
Fitness Centers	1,000	11,500
Total	106,100	1,922,500

MEASURE CASE DESCRIPTION

The measure case is defined as a low-flow faucet aerator or flow control valve (FCV) installed on an existing faucet in a public or private lavatory in a commercial building, reducing the faucet flow rate to 0.50 and 1.0 gpm. (A *private lavatory faucet* is located in an individual dwelling unit such as a hotel/motel guest room, dorm room, or nursing home room. A *public lavatory faucet* is located in a bathroom shared by a communal area, such as a school, restaurant, hotel lobby, or office building.)

For FCV measures, the flow rate indicates the combined flow of cold and hot inlet lines.

Measure Offerings

Statewide Measure Offering ID	Measure Offering Description
SWWH019A	Public Lavatory Faucet Aerator for Commercial Buildings – 1.0 GPM Flow Rate
SWWH019B	Public Lavatory Faucet Aerator for Commercial Buildings – 0.5 GPM Flow Rate
SWWH019C	Private Lavatory Faucet Aerator for Commercial Buildings – 1.0 GPM Flow Rate
SWWH019D	Private Lavatory Faucet Aerator for Commercial Buildings – 0.5 GPM Flow Rate
SWWH019E	Public Lavatory Faucet Flow Control Valves for Commercial Buildings – 1.0 GPM Flow Rate
SWWH019F	Public Lavatory Faucet Flow Control Valves for Commercial Buildings – 0.5 GPM Flow Rate
SWWH019G	Private Lavatory Faucet Flow Control Valves for Commercial Buildings – 1.0 GPM Flow Rate
SWWH019H	Private Lavatory Faucet Flow Control Valves for Commercial Buildings – 0.5 GPM Flow Rate

[2] Southern California Gas Company (SCG). 2016. "PotentialMarketSize_Aerator_Showerhead_122016.xls" Proprietary database. December 20.

[3] Southern California Gas Company (SCG). 2016. "PotentialMarketSize_Aerator_Showerhead_122016.xls" Proprietary database. December 20.

BASE CASE DESCRIPTION

The base case is defined as an existing faucet with no aerator and a flow rate of 1.67 gpm[4] or greater in a public or private lavatory in a commercial building.

CODE REQUIREMENTS

Standards for plumbing fittings and fixtures are outlined in the California Appliance Efficiency Regulations (Title 20).[5] Applicable codes for this measure are stipulated in Table H-3 and H-4 Section 1605.1. The 1.67 gpm maximum flow rate is specified as an eligibility requirement for this measure but is not specified as a baseline in the savings calculations due to the strong evidence of higher pre-existing faucet flow rates from the results of the studies summarized in the Gas Savings section.

Applicable State and Federal Codes and Standards

Code	Applicable Code Reference	Effective Date
CA Appliance Efficiency Regulations – Title 20 (2016)	Section 1605.1(h). Table H-3 and H-4.	July 1, 2016
CA Building Energy Efficiency Standards – Title 24	None.	n/a
Federal Standards	None.	n/a

California Title 20 Standards for Plumbing Fittings and Fixtures

Regulated Water Appliance	Regulation (Pre Sept. 1, 2015)	Effective Date			
		Sept. 1, 2015	Jan. 1, 2016	July 1, 2016	July 1, 2018
Lavatory Faucet and Aerator	2.2 gpm @60 psi	1.5 gpm @ 60 psi	-	1.2 gpm @60 psi	-
Public Lavatory Faucet	2.2 gpm @60 psi	-	0.5 gpm @60 psi	-	-

NORMALIZING UNIT

The normalizing unit is per aerator fixture (each).

PROGRAM REQUIREMENTS

Measure Implementation Eligibility

All combinations of measure application type, delivery type, and sector that are established for this measure are specified below. Measure application type is a categorization based on the circumstances and timing of the measure installation; each measure application type is distinguished by its baseline

---

[4] Southern California Gas Company (SCG). 2017. "WPSCGNRWH161222A-Rev00_Com Faucet Aerator Savings Calculations and Assumptions.xlsx" See Calculated Assumptions tab.

[5] California Energy Commission (CEC). 2017. *2016 Appliance Efficiency Regulations*. CEC-400-2017-002.

determination, cost basis, eligibility, and documentation requirements. Delivery type is the broad categorization of the delivery channel through which the market intervention strategy (financial incentives or other services) is targeted. This table also designates the broad market sector(s) that are applicable for this measure.

Note that some of the implementation combinations below may not be allowed for some measure offerings by all program administrators.

Implementation Eligibility

Measure Application Type	Delivery Type	Sector
Add-on equipment	DnDeemDI	Com
Add-on equipment	DnDeemed	Com

Eligible Products

This energy efficiency measure is applicable to an existing faucet in a commercial building that has a flow rate of 1.67 gpm or greater.

Only facilities that utilize natural gas water heating equipment are eligible to receive incentives for this measure.

Eligible Building Types and Vintages

This measure is applicable for any existing nonresidential facility of any vintage. Newly constructed buildings, additions to existing buildings, and alterations to existing buildings are excluded.

Eligible Climate Zones

This measure is applicable in all California climate zones.

PROGRAM EXCLUSIONS

Faucets at health care facilities that are subject to the Office of Statewide Health Planning and Development (OSHPD) code and regulation (e.g. hospitals, clinics, skilled nursing facilities) are not applicable for this measure. The use of aerators is banned in the health care industry due to aerator flow control methods and components. The mixing of air and water within the aerator allows airborne bacteria to become waterborne and, in warm stagnant conditions, promote bacterial growth. Non-aerating laminar flow restrictors (LFRs) must be installed on faucets in these facilities.[6]

[6] California Building Standards Commission. 2016. *California Code of Regulations. 2016 Title 24 Part 5, California Plumbing Code*.

DATA COLLECTION REQUIREMENTS

Data collection requirements are to be determined.

USE CATEGORY

Service & Domestic Hot Water

ELECTRIC SAVINGS (kWh)

Not applicable.

PEAK ELECTRIC DEMAND REDUCTION (kW)

Not applicable.

GAS SAVINGS (Therms)

Water Usage Studies

The following studies estimate baseline water and gas usage for lavatory faucets in a variety of commercial building types. The results of these studies influence the underlying assumptions for the savings calculations for this measure.

Savings Calculations for Commercial Faucet Aerator: Baseline Water and Gas Consumption Estimates for Commercial Hot Water Applications (2016).[7] The purpose of this study was to establish baseline consumption values and estimate the savings that occur from the installation of low-flow faucet aerators. Baseline water and gas consumption for lavatory faucets were estimated for eight commercial facilities (5 hotels, two schools, one restaurant). These estimates were prepared by CLEAResult in March 2016 and were determined by reviewing multiple studies on water consumption in commercial buildings.

Data from water conservation programs, published studies, and assumptions from statewide technical reference manuals were used to determine the average consumption of water per faucet per year. Engineering calculations and assumptions were used to derive water and energy savings associated with the reduction of flow rate due to the implementation of aerators. The base case was assumed to be existing faucets with a flow rate of 1.67 gpm, while the efficient case was assumed to be a faucet with an aerator installed with a flow rate of 1.0 or 0.5 gpm.

- For the hotels, the studies indicated that water consumption in the five hotels were metered over a short-term period at a whole-building level or sub-metered by room then disaggregated to determine consumption at multiple end uses. These calculations also take occupancy rate of the hotel into account.
- For the schools, the studies reported both logged water consumption and monthly usage in bills. These data points were disaggregated into annual consumption for multiple end uses. Water

[7] CLEAResult. 2016. *Savings Calculations for Commercial Faucet Aerator.*

consumption at lavatory faucets was based on number of flushes occurring per student or employee per day.

- For the restaurant, water consumption at lavatory faucets was based on the number of flushes.

The results of this study provide baseline water and gas consumption estimates as well as the estimated savings from the installation of aerators.

Water Consumption Patterns in Hospitals (2016).[8] The purpose of this study was to investigate existing water consumption patterns (e.g. time usage per day, gallons of water consumed per day, length of average usage instance, existing faucet flow rates) at various faucet types and determine the impacts of installing faucet flow control devices. Water consumption patterns were measured and analyzed for 19 faucets at three hospitals over two ten-day periods by Water Saver Solutions, Inc. in 2016. The first ten-day period measured baseline water consumption patterns before the installation of flow control devices. The second ten-day period measured the post-installation consumption patterns.

These faucet types included: public restroom, private patient room, patient care, nurse stations, and scrub sinks. Faucets were spot checked using physical measurement techniques. Flow rate measurements were taken using digital flow meters or a flow rate measurement bag, in addition to flow meters and data loggers to obtain more detailed consumption data at each faucet. Water temperature coming out of the faucet was determined using a temperature gun.

The results of this study provide useful information on the water consumption patterns at existing faucets in large hospitals. These results also help verify the underlying assumptions made in the savings calculations for this measure, such as usage time, existing flow rate, behavioral factor, and mixed water temperature coming out of a faucet. Moreover, the results of this study also reveal that faucet usage time is not significantly impacted by the installation of flow restrictors.

However, the sample size of faucets was limited; only six or seven faucets were monitored at each hospital despite that each of these facilities likely included up to 800 faucets. Thus, these results should be interpreted as a snapshot of the faucet consumption of a health care facility and not representative of all the faucets of the entire facility. More monitoring is needed to determine how well the results of these subsets of faucets represent all faucets of the hospital and how they scale to similar but smaller facilities such as clinics or nursing homes.

Existing Fixtures and Water Consumption Patterns in Hotels (2016).[9] Blackstone Research Solutions, Inc. conducted surveys in 2016 at five hotels to record the condition of the existing water fixtures at these sites. Faucets at three of the five sites were metered to gather data on water consumption patterns for these building types.

Water fixtures of various types at each hotel were spot checked for flow rate and water temperature. Flow rate measurements were taken using a flow rate measurement bag, and flow meters and data loggers were installed at guest room and public restroom faucets at three hotels to obtain more detailed consumption data at each faucet. Water temperature coming out of the fixture was determined using a temperature gun.

[8] Water Saver Solutions, Inc. 2016. *Water Consumption Patterns in Hospitals.*

[9] Blackstone Research Solutions, Inc. 2016. *Existing Fixtures and Water Consumption Patterns in Hotels.*

The results of this study provide useful information on the water consumption patterns at existing faucets in hotels. These results also help verify the underlying assumptions made in the savings calculations for this workpaper measure such as usage time, existing flow rate, behavioral factor and mixed water temperature coming out of a faucet.

The sample size of this study was also limited, and it was difficult to ensure that the guest rooms were occupied during the duration of the metering. Thus, these results should be interpreted as a snapshot of the faucet consumption of a hospitality facility and not representative of all the faucets of the entire facility. More monitoring is needed to determine how well the results of these subsets of faucets represent all faucets of a hotel and how they scale to similar but smaller sized facilities such as motels.

Calculation of Gas Unit Energy Savings

The approach to calculate the gas unit energy savings (UES) of this measure compares the energy consumption of the domestic hot water (DHW) system of the base case existing condition (faucet without aerator) with the measure case condition (faucet with aerator). Specifically, the gas UES of this measure is based upon the estimated decrease in hot water usage as a result of the installation of a low-flow aerator.

Calculation of Water Usage and Water Savings

Water savings was calculated as the difference between the baseline and measure case water usage. Water usage (baseline or measure case) is a function of the flow rate and the assumed minutes and days of operation.

$$WU = FlowRate \times Min \times Days$$

$$WS = WU_{base} - WU_{measure}$$

WS = *Annual water savings (gal/yr)*
WU = *Annual water use (gal/yr), for base or measure case*
FlowRate = *Water volume flow rate (gpm), for base or measure case*
Min = *Faucet average operating time (min/day)*
Days = *Faucet days of operation (days/yr)*

Water Usage Inputs – Base Case

Parameter	Public	Private	Source
Flow rate (gpm)	1.67	1.67	Southern California Gas Company (SCG). 2017. “WPSCGNRWH161222A-Rev00_Com Faucet Aerator Savings Calculations and Assumptions.xlsx” See Calculated Assumptions tab.
Average Use (min/day/faucet)	12.40	3.99	Blackstone Research Solutions, Inc. 2016. *Existing Fixtures and Water Consumption Patterns in Hotels.* Water Saver Solutions, Inc. 2016. *Water Consumption Patterns in Hospitals.*
Annual Operating Days (days/yr)	168.8	168.8	U.S. Energy Information Administration (EIA). 2012. “EIA 2012 CBECS Operating Days.pdf.”

Water Usage Inputs – Measure Case

Parameter	Public	Public	Private	Private	Source
Flow rate (gpm)	1.0	0.5	1.0	0.5	--
Average Use (min/day/faucet)	12.40	12.40	3.99	3.99	Blackstone Research Solutions, Inc. 2016. *Existing Fixtures and Water Consumption Patterns in Hotels.* Water Saver Solutions, Inc. 2016. *Water Consumption Patterns in Hospitals.*
Annual Operating Days (days/yr)	168.8	168.8	168.8	168.8	U.S. Energy Information Administration (EIA). 2012. "EIA 2012 CBECS Operating Days.pdf."

Flow Rate. The average maximum flow rate of an existing faucet was determined by taking physical flow rate measurements of faucets when turned on to their full potential flow. An average behavioral factor of (calculated as the ratio of measured flow rate to the maximum flow rate) 0.466 was applied to that maximum flow rate to account for human behavior in turning on a faucet since not every operator will turn the faucet on to its full potential flow rate. This was determined by analyzing the metered faucet usage data of the Water Saver Solutions and the Blackstone Research Solutions studies summarized above.

Average Use per Day. The average annual operating time per faucet was determined from analysis of metered data of the Water Saver Solutions and the Blackstone Research Solutions studies summarized above.

Annual Operating Days. The number of operating days per year was derived from the operating days per year across commercial building types, reported in the 2012 commercial building energy consumption survey (CBECS).

Operating Hours by Commercial Building Type[10]

Building Type	Operating Days/Year
Education	114.83
Food Sales	262.17
Food Service	177.67
Lodging	357.50
Mercantile	138.67
Office	119.17
Public Assembly	121.33
Public Order and Safety	244.83
Religious Worship	67.17
Service	121.33
Other	132.17
Average of Commercial Sector	168.80

[10] U.S. Energy Information Administration (EIA). 2012. "EIA 2012 CBECS Operating Days.pdf."

Calculation of Gas Unit Energy Savings

The gas unit energy savings (UES) of this measure is based upon the estimated decrease in hot water usage as a result of the installation of a low-flow aerator.

$$UES_{therms} = \left[\frac{WS \times Cp \times WaterWeight \times \left(\frac{1\ therm}{100{,}000\ Btu}\right)(T_{mixed} - T_{ground})}{EFF_{gas}} \right]$$

$UES_{therms} =$	*Annual gas unit energy savings (therms/yr)*
$WS =$	*Annual water savings (gal/yr)*
$Cp =$	*Specific heat capacity of water (Btu/lb/°F), fixed constant*
$WaterWeight =$	*Weight of water (lb/gal), fixed constant*
$T_{mixed} =$	*Mixed water temperature, at faucet (°F)*
$T_{ground} =$	*Make-up groundwater temperature, (°F)*
$EFF_{gas} =$	*Water heater efficiency, gas*

Gas UEC Inputs

Parameter	Value	Source
Specific Heat Capacity of Water (Btu/lb/°F)	1	Fixed constant
Water Weight (lb/gal)	8.34	Fixed constant
Average Make-up (Groundwater) Water Temperature (°F)	Varies by climate zone	See table below.
Mixed Water Temperature @ Faucet (°F)	97.9 °F	Blackstone Research Solutions, Inc. 2016. *Existing Fixtures and Water Consumption Patterns in Hotels.* Water Saver Solutions, Inc. 2016. *Water Consumption Patterns in Hospitals.*
Water Heater Thermal Efficiency (gas)	83%	California Public Utilities Commission (CPUC), Energy Division. 2020. "DEER-WaterHeater-Calculator-v4.2.xlsm." Updated September 17, 2020. Itron, Inc. and ERS, Inc. 2016. "2014 Nonresidential Downstream Deemed ESPI Pipe Insulation Impact Evaluation Report." Prepared for the California Public Utilities Commission. Itron, Inc. and ERS, Inc. 2017. 2015 Nonresidential Downstream Deemed ESPI Pipe Insulation Impact Evaluation Report. Prepared for the California Public Utilities Commission.

Make-Up (Groundwater) Temperature. Make-up water(groundwater) temperature was derived from data collected from a field survey conducted for the Sempra Energy Utilities (San Diego Gas and Electric and the Southern California Gas Company) in 2009.[11]

[11] Sempra Energy Utilities (SEU). 2012. "SEU 2009 ASW Data REDACTED.xlsx".

Make-up (Groundwater) Water Temperatures by Climate Zone

Climate Zone	Make-up (Groundwater) Temperature (°F)	Source
CZ 1	51.4	Reeves, P. (Consultant to California Public Utilities Commission, Energy Division). 2013. "Comparison-of-Ground-Temperatures-v2_byPaulReeves.xlsx."
CZ 2	57.3	
CZ 3	57.1	
CZ 4	59.5	
CZ 5	55.8	
CZ 6	61.8	
CZ 7	62.6	
CZ 8	63.7	
CZ 9	63.8	
CZ 10	64.2	
CZ 11	63.2	
CZ 12	60.9	
CZ 13	64.1	
CZ 14	62.7	
CZ 15	75.5	
CZ 16	51.8	

Mixed Water Temperature. The mixed water temperature was determined from physical water temperature measurements recorded in the Water Saver Solutions and the Blackstone Research Solutions studies.

Water Heater Thermal Efficiency. The efficiency of a gas water heater was derived from data extracted from the California Energy Commission Water Heater Calculatorv4.1 in 2020. The average thermal efficiencies for all baseline water heater technologies was used and compared to the deemed pipe insulation evaluation conducted by Itron, Inc.

LIFE CYCLE

Effective useful life (EUL) is an estimate of the median number of years that a measure installed through a program is still in place and operable. Remaining useful life (RUL) is an estimate of the median number of years that a technology or piece of equipment replaced or altered by an energy efficiency program would have remained in service and operational had the program intervention not caused the replacement or alteration.

The EUL and RUL specified for faucet aerators in commercial facilities are specified below. Based on guidance from the CPUC, the RUL of add-on equipment measures should be used for the savings calculations. The RUL is equal to one-third of the EUL of the device being modified by the measure addition, in this case, the faucet.

Effective Useful Life and Remaining Useful Life

Parameter	Value	Source
EUL (years) – low-flow aerator	10.00	California Public Utilities Commission (CPUC). 2014. "DEER2014-EUL-table-update_2014-02-05.xlsx."
EUL(years) – host faucet	20.00	National Association of Home Builders (NAHB) / Bank of America Home Equity. 2007. *Study of Life Expectancy of Home Components.* Prepared by the Economics Group of NAHB. Glacier Bay. N.d. "Glacier Bay Faucets 20-year Limited Warranty."
RUL (years) – host faucet	6.67	California Public Utilities Commission (CPUC). 2016. *Resolution E-4807.* December 16. Page 13.

BASE CASE MATERIAL COST ($/UNIT)

Insofar as this measure is an add-on equipment measure, baseline costs are assumed to be $0 since the base case assumes no faucet aerator is present.

MEASURE CASE MATERIAL COST ($/UNIT)

The measure case material costs were calculated as the average of third-party direct install contractor costs for aerator measures. Insofar as the negotiated contractor costs are proprietary, documentation is not available.

Faucet flow control valves (FCVs) are sold in pairs for a price of $25.00, this price will be used for material cost for faucet applications as the measure must be installed in pairs.

BASE CASE LABOR COST ($/UNIT)

Insofar as this measure is an add-on equipment measure, baseline labor costs are assumed to be $0 since the base case assumes no faucet aerator or flow control valve is present.

MEASURE CASE LABOR COST ($/UNIT)

The installation labor cost was calculated as the average of third-party direct install contractor costs for aerator measures. Insofar as the negotiated contractor costs are proprietary, documentation is not available.

Installation of flow control valves (FCVs) in residential faucets adopts the labor cost of low-flow showerhead from DEER cost data [12], at $16.74 per fixture. However, the installer will have to work on the

[12] California Public Utilities Commission (CPUC). 2008. "Revised DEER Measure Cost Summary (05_30_2008) Revised (06_02_2008).xlsx."

cold and hot water lines, and the labor cost will be multiplied by a factor of 2, for total labor cost of $33.48 ($16.74 x 2).

NET-TO-GROSS (NTG)

The net-to-gross (NTG) ratio represents the portion of gross impacts that are determined to be directly attributed to a specific program intervention. This sector average NTG ("default NTG") is applicable to all energy efficiency measures that have been offered through commercial sector programs for more than two years and for which impact evaluation results are not available.

Net-to-Gross Ratios

Parameter	Value	Source
NTG – Commercial	0.60	Itron, Inc. 2011. *DEER Database 2011 Update Documentation.* Prepared for the California Public Utilities Commission. Page 15-4 Table 15-3.

GROSS SAVINGS INSTALLATION ADJUSTMENT (GSIA)

The gross savings installation adjustment (GSIA) rate represents the ratio of the number of verified installations of the measure to the number of claimed installations reported by the utility. This factor varies by end use, sector, technology, application, and delivery method. This GSIA rate is the current "default" rate specified for measures for which an alternative GSIA has not been estimated and approved.

Gross Savings Installation Adjustment Rates

Parameter	Value	Source
GSIA	1.0	California Public Utilities Commission (CPUC), Energy Division. 2013. *Energy Efficiency Policy Manual Version 5*. Page 31.

NON-ENERGY BENEFITS

The non-energy impacts of this measure are the water savings that result from the installation of a faucet aerator. The approach to calculate the reduction in water usage outlined in the Gas Savings section.

DEER DIFFERENCES ANALYSIS

This section provides a summary of DEER-based inputs and methods, and the rationale for inputs and methods that are not DEER-based. There is no DEER measure for faucet aerators in the commercial sector.

DEER Difference Summary

DEER Item	Comment / Used for Workpaper
Modified DEER methodology	No
Scaled DEER measure	No
DEER Base Case	No
DEER Measure Case	No
DEER Building Types	Yes: Com

DEER Item	Comment / Used for Workpaper
DEER Operating Hours	No
DEER eQUEST Prototypes	No
DEER Version	DEER 2014, READI v2.4.7
Reason for Deviation from DEER	DEER does not contain this type of measure for the commercial sector
DEER Measure IDs Used	n/a
NTG	Source: DEER 2014. The NTG of 0.60 is associated with NTG ID: *Com-Default>2yrs*
GSIA	The GSIA of 1.0 is associated with GSIA ID: *Def-GSIA*
EUL/RUL	Source: The EUL value of 10 years is associated with EUL ID: *WtrHt-WH-Aertr*. The host faucet EUL of 20 years is associated with EUL ID: *WtrHt-WH-Faucet*.

REVISION HISTORY

Measure Characterization Revision History

Revision Number	Revision Complete Date	Primary Author, Title, Organization	Revision Summary and Rationale for Revision Effective Date and Approved By
01	03/31/2018	Jennifer Holmes Cal TF Staff	Draft of consolidated text for this statewide measure is based upon: Workpaper WPSCGNRWH161222A Revision 0 (March 24, 2017) Consensus reached among Cal TF members.
	01/31/2019	Jennifer Holmes Cal TF Staff	Revisions for submittal of version 01
02	6/12/2018	Chan Paek SoCalGas	Added flow control valve (FCV) measures
03	10/7/2020	Anders Danryd SoCalGas	Updated water heater thermal efficiency to match baseline technologies in “Water Heater Calculator v4.2” per E-5082
	11/20/2020	Anders Danryd SoCalGas	Various typo fixes