**Work Paper Abstract**

**Hot Water Point of Use**

**Revision # 0**

**California Technical Forum**

**WP Abstract Prepared by: Jesse Martinez, PE, CEM & Julianna Colwell, CEM, Southern California Gas Company**

**Laminar Flow Restrictors for Hospitals and Health Care Facilities**

***Abstract***

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| --- |
| WP Abstract Tracking Log |
| Task | **Date Issued** | **Due By** | **Version** | **Author Last Name** **(or primary editor)** |
| Submitted to TF Staff for review | 6/2/15 | 6/10/15 | NR | Martinez |
| TF Staff sent to TF Members for 10-day review | 6/11/15 | 6/21/15 |  |  |
| Abstract presented at meeting | 6/25/15 | 6/25/15 |  |  |
| Cal TF Staff summarizes comments, sends back to abstract developer |  |  |  |  |
| Abstract developer incorporates TF comments into abstract, sends back to TF Staff |  |  |  |  |
| Abstract presented to Subcommittee (if applicable) |  |  |  |  |
| TF Staff summarizes TF Subcommittee recommendations, sends back to abstract developer |  |  |  |  |
| Abstract developer incorporates TF Subcommittee comments into abstract, sends back to TF Staff |  |  |  |  |
| TF Staff sends abstract to Commission staff for 10-day review |  |  |  |  |
| Comments from Commission staff received (if applicable) |  |  |  |  |
| Cal TF summarizes comments |  |  |  |  |
| Abstract presented at Meeting; consensus decision-marking |  |  |  |  |
| Cal TF finalizes abstract; prepares comparison exhibit of non-consensus items |  |  |  |  |
| Abstract to TF Subcommittee |  |  |  |  |
| Abstract to TF Subcommittee |  |  |  |  |
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Table 1 Work Paper Abstract Snapshot

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| Work Paper Abstract Snapshot |
| Item | **Details** | **Notes** |
| Measure name | Laminar Flow Restrictors for Hospitals and Health Care Facilities |  |
| Measure description | Water conservation measure for faucets | Laminars are not aerators |
| Sector (Res/Non-Res) | Non-Res |  |
| Subsector (e.g. Ag) | Commercial | Hospitals, in&out patient care, nursing homes |
| Delivery Channel (e.g. Upstream) | Direct install | 3rd party installations with tamper proof devices |
| Measure Application Type (e.g. ROB) | Retrofit Add On  |  |
|  |  |  |
|  |  |  |

1. Measure Description & Key Terms

Laminar Flow Restrictors (LFR) are an add on device that attach to an existing faucet to reduce the flow rate. They are primarily used in situations that ban aerators such as hospitals, in and out patient care facilities, and nursing homes. The LFR design reduces overall throughput through the faucet by changing the flow pattern to produce a laminar flow out the end of the device. Compared to an aerator which produces the reduced flow through creating turbulence at the exit and allowing air to make up part of the flow.

* Base Case:
	+ Any existing faucet with no aerator or other flow restriction device.
* Delivery Method:
	+ Direct install.
* Sectors:
	+ The savings are realized in commercial sectors in the health care field.
* Unique Characteristics:
	+ California Office of Statewide Health Planning and Development (OSHPD) bans aerators in health care facilities due to the introduction of a turbulent flow within the faucet, which allows for air to penetrate the faucet and contribute to bacteria/bio film growth. LFRs create a laminar flow exiting the faucet head to eliminate the chance of penetration by air into the faucet head and are thus not banned from these types of facilities. LFRs are permitted in health care facilities as of the 2009 OSHPD Code update.
	+ The health care industry typically uses straight faucets with no flow reduction, as seen in studies which suggest a typical GPM flow rate of 2.5 or higher.
	+ Current Title 20 code would suggest the baseline faucet is a 2.2 gpm at 60 psi device.
1. Program Implementation Method

At this point in the process, a direct install program using third party installers is the most viable option. This would also entail a possible collaboration with Metropolitan Water District (MWD). MWD currently has a program that rebates LFR in the commercial health care market and they have expressed interest in working with us.

The program specifically targets the portions of the health care industry that has patients present in their facilities. Where aerators are not applicable due to California code restrictions, LFRs are the next available option that produces identical end results of flow reduction.

This program will be offered to all other IOUs for participation during the workpaper development process.

Due to the fact this will be a third party direct install measure; records will be kept on the number of installations/sites served. The LFR should also be the tamper proof models.

True market potential is still being developed at this time along with how/if this product will be marketed to the general public.

1. Mixed Baseline

At this time SCG is not considering mixed baselines. Only faucets with no type of add on restriction device are being considered eligible for the addition of a laminar flow device.

1. Measure Summary

At this point SCG is the only involved party. The measure will be made available for collaboration during the workpaper development process.

Table 2 Measure Summary

|  |  |
| --- | --- |
| **Characteristic** | **Measure** |
| Baseline Technology or Mix | Existing Faucet |
| Measure Technology | Laminar Flow Restrictor |
| Measure Application Type | REA |
| Delivery Mechanism | Direct Install |
| Impacted Markets | Commercial |
| Relevant Codes and Standards | OSHPD Regulations & CA Health and Safety Code |

1. Estimated Size of Offer (Number of Participants)

This program does have the potential to be a high impact. Data was pulled from NAICS.

|  |  |  |  |
| --- | --- | --- | --- |
| Application | Faucets per Facility | Buildings in SCG Territory  | Faucets in SCG Territory (1000s) |
| Inpatient | 500 | 820 | 410 |
| Outpatient | 100 | 14,500 | 1,450 |
| Nursing Homes | 50 | 2,100 | 106 |
| Total | N/A | 17,400 | 1,964 |

1. Estimated Impact of the Measure on Statewide Energy Efficiency Savings

The technical savings potential for this measure (assuming 100% adoption/uptake) is approximately 40 million therms per year. In a 3 year program, a reasonable savings estimate is 1.22 million – 4 million therms (excluding savings from future years). The measure is expected to reach 1% of total portfolio savings to become a high impact measure.

1. Applicable DEER & CPUC Guidance

No current DEER data is available pertaining to LFRs.

DEER data may exist for the usage rates of faucets seen in hospitals and health care facilities.

1. Proposed Measure Parameter Values, Methodology, and Data Sources

The following table discusses methodology, assumptions, and data sources for the LFR measure. The preceding bullet points are meant to be in addition to the table and are added as extra support for the information presented.

* The 8 min/faucet/day run time was a conservative value taken from the range of 4-12 min a day. The range was developed from looking at custom calculated data, information obtained from Chuck Bragdon of Water Saver SolutionsTM, and the estimation of 10 min/faucet/day by MWD.
* The value of 110°F was a conservative value chosen from the code range of 105-120°F. CA plumbing code sec 613 table 613.1states the range.
* A ∆T was calculated to be 40°F by subtracting an inlet temperature of 70°F from the outlet temperature of 110°F. The inlet temperature was chosen as a conservative value from the state wide range of 51°F – 75 °F.
* The proposed system efficiency is 70%. The boiler is assumed to be 82% efficient with another 12% subtracted due to line losses. Boiler efficiency is assumed from internal SCG documentation. Line losses are estimated from Navigant’s experiences and former projects.
* The measure flow rate of 1 gpm was chosen for the example calculation. The final workpaper will have savings values for the .5 gpm, 1 gpm, and 1.5 gpm tamper proof LFRs.
* Measure cost is a combination of material and installation costs. The material cost was estimated by looking at NeoPerl’s bulk price listing. The installation cost comes from the SCG aerator program and is the highest currently paid cost.
* The 5 yr EUL comes from the current MWD program offering. There is a possibility of claiming the 10 yr EUL from DEER as this is a close technology. There is a risk of the association with aerators derailing previous efforts to establish this as a new technology.
* The NTG was taken directly from DEER.
* MWD’s current program gallon savings claim is 7495 gal/yr/faucet. Using SCG’s baseline choices that number goes down to 4380 gal/yr/faucet.

Table 3 Proposed Measure Parameter Methods, Data, Assumptions and Sources

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| --- | --- | --- | --- | --- | --- | --- |
| **Measure Parameter** | **Proposed Value** | **Methodology Description** | **Key Assumptions** | **Data Source Name and Description[[1]](#footnote-1)** | **Input Requested from TF** | **Confidence Level** **(High, Medium, Low)** |
| Baseline EnergykWh/yr | - |  |  |  |  |  |
| Measure EnergykWh/yr | - |  |  |  |  |  |
| Savings – kWh/yr | - |  |  |  |  |  |
| Baseline DemandkW/yr | - |  |  |  |  |  |
| Measure DemandkW/yr | - |  |  |  |  |  |
| Savings – kW/yr | - |  |  |  |  |  |
| Baseline EnergyTherms/yr | 34.7 |  | 2.5 gpm flow rate, 8 min a day/faucet, faucet temp 110 degrees F leaving faucet, System (Boiler-estimated line loss) Efficiency 70% | OSHPD code and Water Saver SolutionsTM for ∆T, Navigant estimation based on system knowledge (82% boiler and 12% loss in lines)  | Input requested on proper system efficiency | Medium |
| Measure EnergyTherms/Yr | 13.9 |  | 1 gpm flow rate, 8 min a day/faucet, faucet temp 110 degrees F leaving faucet, System (Boiler-estimated line loss) Efficiency 70% |  | Input requested on proper system efficiency | Medium |
| Savings – therms/yr | 20.8 |  |   | MWD claimed water savings from their program 7,500 gallons per day saved. Our assumptions land us at 4,380 gallons per year saved. |  | Medium |
| EUL or RUL | 5 |  | MWD choose a 5 yr EUL in their program |  | Input requested on EUL  | Medium |
| MC or IMC | $15 |  | Used the same installation costs as our currently running Aerator program | Care Guard Price List, Vandal proof 1.5 gpm = $300 for 40  |  | Medium |
| NTG | .7 | DEER generated value for a new program less than 2 yrs old |  |  |  | High |

1. Proposed Level of Complexity

The method that will be used to calculate the therms used for the baseline and the measure will be

This will yield the energy use in terms of the number of gallons leaving the faucet head at an assumed temperature of 110 degrees. The measure savings will be the difference between the baseline energy use and the measure energy use. This method relies heavily on knowing the typical water/time usage of a faucet in the various hospital settings. Currently the estimation of 8 min a day is based on custom program data and the prescriptive rebate program already in place by MWD. This will need to be confirmed or changed based on more concrete data. Also the Eff% of the system needs to be confirmed. 82% Eff for the boiler is a typical assumption with relative confidence. The system efficiency is currently being estimated to be 12% based on experience and it will need to be confirmed with other information and data. The ∆T is based on the assumption of an average inlet water temperature of 70 °F and a faucet outlet temperature of 110 °F, which yields a ∆T of 40 °F.

The final workpaper will have separate savings values for different laminar flow rates that are available in the market. SCG is currently looking at installing .5 gpm, 1 gpm, and a 1.5 gpm LFRs in health care facilities based on faucet end use. SCG will also have savings values broken down by climate zones for California, as this will affect the ∆T and thus the end savings. There is also a possibility of separating base case flow rates by endues. Ex. Operating room sinks will use more water per day then patient bathroom sink.

1. Preliminary TRC Estimates

Table 4 Preliminary TRC Estimates and Parameters

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| --- | --- | --- | --- |
| **TRC Parameter** | **Parameter Estimate or** **Required Parameter Value Threshold** (specify if estimate or threshold) | **Confidence Level** **(High, Medium, Low)** | **Comments** |
| UES | 20.08 | Medium | Initial estimates based on average values and not accounting for climate zones or different measure gpm values |
| IMC | 15 | Medium | Direct Install using material and labor cost from aerator program |
| EUL | 5 | Medium | Based on MWD claims |
| NTG | .7 | High | New Program less than 2 years |
| Incentive/unit | 15 | Medium | Direct Install |
| Number of units | 1 | High | Place Holder |
| Installation Rate | 1 | High | Vandal Resistant  |
| Gross Realization Rate | 1 | High | Place Holder |
|  |  |  |  |
|  |  |  |  |
| ***TRC Value:***  | **.83** |

1. Literature Review
* The market assessment was performed by the Customer Insight and Analytics group at SCG and used the best available data.
* Savings values were corroborated by custom measured data that has been collected.
* No relevant EM&V studies at this time.
1. Additional Research Needed
* More accurate picture of the number of hospitals within SCG territory that are eligible to participate.
* Investigate for existing information on the distribution of hot and cold water use per faucet.
* Find further information on the usage rates of faucets for health care field.
* Check the READI Tool for the possibility of hot water usage values for hospitals and health care facilities.
* Proper average cost estimate for material and estimated installation costs.
	+ There are multiple supplier with wide ranging price options.
1. Questions for CPUC Staff on Applicability of DEER Values, Methods, Tools, Data, Etc.

None at this time.

1. Cal TF Comments on Proposed Measure Parameter Values, Methodology, and Data Sources

*Cal TF comments on proposed data and sources. Do data represent best available data? If not, what are alternate data/sources that should be considered?*

Table 5 Cal TF Comments on Measure Parameter Methods, Data, Assumptions, and Sources

|  |  |
| --- | --- |
| **Measure Parameter** | **Cal TF Comments / Recommendations** |
| Baseline EnergykWh/yr |  |
| Measure EnergykWh/yr |  |
| Savings – kWh/yr |  |
| Baseline DemandkW/yr |  |
| Measure DemandkW/yr |  |
| Savings – kW/yr |  |
| Baseline EnergyTherms/yr |  |
| Measure EnergyTherms/Yr |  |
| Savings – therms/yr |  |
| EUL or RUL |  |
| MC or IMC |  |
| NTG |  |

1. Cal TF Comments on Proposed Level of Complexity

*Cal TF comments on proposed level of complexity based on input from abstract developer and Cal TF discussion.*

1. Other Cal TF Comments
2. Commission Staff Review and Feedback

*Commission staff should provide feedback on proposed data and sources within 10 days of request.*

Table 6 Commission Staff Feedback on Proposed Data and Sources

|  |  |
| --- | --- |
| **Measure Parameter** | **Commission Staff Comments / Recommendations** |
| Baseline EnergykWh/yr |  |
| Measure EnergykWh/yr |  |
| Savings – kWh/yr |  |
| Baseline DemandkW/yr |  |
| Measure DemandkW/yr |  |
| Savings – kW/yr |  |
| Baseline EnergyTherms/yr |  |
| Measure EnergyTherms/Yr |  |
| Savings – therms/yr |  |
| EUL or RUL |  |
| MC or IMC |  |
| NTG |  |

# Appendix A – Sources

List all source links or embedded documents (reference relevant page number as appropriate)

1. Provide a link to source or embed source in Appendix A of this document with page numbers specified. [↑](#footnote-ref-1)