STAFF PAPER

# Staff Analysis of Lavatory Faucet Appliance Standards

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# ABSTRACT

This staff paper presents a water and energy analysis of the lavatory faucet standard in the *Appliance Efficiency Regulations* (California Code of Regulations, Title 20, Sections 1601 to 1609). California Energy Commission staff analyzed the cost-effectiveness and technical feasibility of proposed efficiency standards for lavatory faucets. The statewide water and energy (electricity and natural gas) use and savings, and other related environmental impacts and benefits, are also included in this analysis.

California has adopted water efficiency standards for the installation of water-efficient plumbing fixtures, including faucets, through Senate Bill 407 (Padilla, Chapter 587, Statutes of 2009). Title 20 sets the maximum flow rate for lavatory faucets at 1.2 gallons per minute from the previous 2.2-gallons-per-minute maximum flow rate. Staff has also analyzed savings for immediately implementing a 1.5-gallons-per-minute maximum flow rate standard as part of a proposal put forward by the plumbing industry.

The current standard for lavatory faucets (1.2 gallons per minute) will save about 4.5 billion gallons of water, 16.0 million therms of natural gas, and 118 gigawatt hours of electricity for the first year (2016) the standard is in effect. Alternatively the Plumbing Manufacturers International proposal for a one-year postponement of the 1.2-gallons-per-minute standard and an immediate implementation of a 1. 5 gallons per minute maximum flow rate standard on residential lavatory faucets will save about 3.4 billion gallons of water, 12 million therms of natural gas, and 89 gigawatt hours of electricity for 2016. The immediate 1.5-gallons-per-minute standard will save an additional 730 million gallons of water for the period of September through December 2015. The difference between the current standard and the proposal by Plumbing Manufacturers International from September 2015 through December 2016 would be 358 million gallons of water used.

**Keywords**: Appliance Efficiency Regulations, appliance regulations, water efficiency, energy efficiency, lavatory faucets

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# EXECUTIVE SUMMARY

On January 17, 2014, Governor Edmund G. Brown Jr. proclaimed a state of emergency in response to the ongoing and persistent drought conditions that California was and is still experiencing. In a continuing response to the drought, Governor Brown issued Executive Order B-29-15 on April 1, 2015, authorizing the California Energy Commission to adopt emergency regulations to establish standards that improve the efficiency of water appliances. The Energy Commission subsequently adopted emergency water efficiency standards for toilets, urinals, and kitchen and lavatory faucets on April 8, 2015, which will become effective January 1, 2016.

This staff paper presents findings and analyses for the 1.2- and 1.5-gallons-per-minute maximum flow rate for lavatory faucets; summarizes Plumbing Manufacturers International's claim and staff's investigative findings regarding the availability of 1.2-gallons-per-minute faucets by the January 1, 2016 effective date; and presents an analysis to show that substantial statewide water and energy savings are available at the 1.2- and 1.5-gallons-per-minute maximum flow rates (over the previous 2.2 gallons per minute maximum flow rate standard.) The difference between the current standard and the proposal by Plumbing Manufacturers International from September 2015 through December 2016 would be 368 million gallons of water used.

PMI proposed an additional year, until January 1, 2017, to comply with the standard. Staff concurs additional time is appropriate but the information on product production available does not support an additional 12 months. Staff proposes the following amendments to the faucet regulation:

- Implement a 1. 5 gallons per minute maximum flow rate standard on residential lavatory faucets.
- Extend effective date for 1.2 GPM flow rate faucets to July 1, 2016.
- Allow the sale or offer for sale of faucets of 1.5 GPM or less that were manufactured before July 1, 2016.

# BACKGROUND

On April 8, 2015, the California Energy Commission adopted an emergency drought regulation that, among other things, set the maximum flow rate of residential lavatory faucets at 1.2 gallons per minute (GPM), effective for all products sold or offered for sale on or after January 1, 2016, regardless of manufacture date. Retailers and manufacturers could not sell through existing noncompliant inventory. Plumbing Manufacturers International (PMI) requested a one-year extension to this effective date with sell through[1] to provide industry time to develop and manufacture 1.2 GPM faucets. PMI also proposed an immediate implementation of a 1.5 GPM maximum flow rate on residential lavatory faucets.

## Availability of 1.2 GPM Lavatory Faucets

PMI asserted that few, if any, available residential lavatory faucets meet the new 1.2 GPM regulation or will be available on January 1, 2016. PMI presented a product development and manufacturing schedule, which extends to January 1, 2017. PMI asserts that this schedule demonstrates the need for an extension. For faucets that do not have a flow rate of 1.2 GPM or less, PMI claimed that manufacturers must design new aerators, reevaluate faucet designs, and certify both aerator and faucets to meet the new lower flow rate. Manufacturers must also certify to the mandatory American Society of Mechanical Engineers (ASME) (for state and federal efficiency regulations) , and National Sanitation Foundation (NSF) safe water standards. Furthermore, many manufacturers desire to certify to voluntary WaterSense®[2] performance standards. PMI expressed concerns that the third-party certifiers may become backlogged as many products rush to complete certification. Industry estimated a late 2016 delivery to retailers for the redesigned faucets.

As a faucet retailer, Home Depot explained that it places orders 9 to 12 months ahead of the anticipated delivery of new product to its stores to allow 6 months for product development and certification, one month for production, and 6 weeks for shipping. Home Depot has stopped lavatory faucet orders that were intended to be delivered at the beginning of 2016 to prepare for the new requirement. In addition, faucet manufacturers have cancelled orders for faucet parts and packaging that will be noncompliant with the new regulation.

## Staff Investigation of 1.2 GPM Lavatory Faucets

Energy Commission staff investigated PMI's claims and confirmed that as of May 2015, few lavatory faucet models (64 of the 5,785 models in the database, including discontinued and duplicative models) meet the new regulation and are intended for residential use.

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[1] Sell through means sale or offer for sale of products manufactured before the regulation effective date.

2 WaterSense®, a partnership program by the U.S. Environmental Protection Agency (EPA), collaborates with stakeholders to establish voluntary specifications for high-efficiency water-consuming appliances, such as toilets, urinals, lavatory faucets, and showerheads.

Neoperl (an aerator manufacturer) sells a retrofit 1.0 GPM aerator product that meets WaterSense standards and provides a flow rate less than the maximum 1.2 GPM Title 20 Standards. Staff has not been able to determine why manufacturers are unable to use an existing 1.0 GPM aerator on existing products to meet the California requirement, rather than redesign all their products with a 1.2 GPM aerator.

During the original rulemaking proceeding, manufacturers expressed concerns about consumer acceptance of the then-proposed 1.0 GPM flow rate. Volume of product may also be an issue, as several searches showed few products available for retail purchase. The Appliance Efficiency Database lists 82 aerators that have a flow rate of 1.2 GPM or less, although many of these are for commercial use, are designed as replacement parts for specific faucets, or have been discontinued.

Staff spoke with Neoperl and confirmed that 1.2 GPM aerators were being designed, with a projected delivery date to faucet manufacturers in early 2016. As a result, the long production lead times (about six months) quoted by PMI seem reasonable given the quantity of products affected and the long global supply chains.

Staff spoke with NSF International (a product testing and certification organization) to confirm that the product certification timespan is accurate. Staff understands that voluntary WaterSense certification can take a significant amount of time. WaterSense certification provides verification that products meet the performance requirements in CalGREEN[3] and the California plumbing codes, which incorporate WaterSense. However, WaterSense permits a faucet to certify as WaterSense-compliant if the aerator has already certified as WaterSense, so there is not a need for both the aerator and the faucet to undergo WaterSense certification, thereby shortening the certification timeframe.[4]

## ANALYSIS

### Technical Feasibility

Implementing a 1.5 GPM maximum flow rate for all lavatory faucets is technically feasible, as demonstrated in the *Staff Analysis of Water Efficiency Standards for Toilets, Urinals, and Faucets*.[5] Controlling flow from faucets means restricting the flow area with a gasket and

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3 The *California Green Building Standards Code* (CalGREEN) enhances the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices including water efficiency and conservation.

4 EPA WaterSense, High-Efficiency Lavatory Faucet Specification, § 2.2, http://www.epa.gov/WaterSense/docs/faucet_spec508.pdf.

5 Singh, Harinder, Ken Rider, and Tuan Ngo. 2015. *Staff Analysis of Water Efficiency Standards for Toilets, Urinals, and Faucets.* California Energy Commission. Publication Number: CEC-400-2015-008-SD, available at: http://docketpublic.energy.ca.gov/PublicDocuments/15-AAER-01/TN203718_20150220T141432_Staff_Analysis_of_Water_Efficiency_Standards_for_Toilets_Urinal.pdf.

creating a feeling of adequate flow or coverage with an aerator (laminar flow[6] or gentle spray).[7] At the time of that staff analysis, 41 percent of lavatory faucets in the Commission's database would comply with a 1.5 GPM standard. A July 2016, search of the Commission's database showed 56 percent of lavatory faucets would comply with the 1.5 GPM standard.

Staff did not encounter any issues with consumer acceptance, health and safety, or heat transfer loss from a 1.5 GPM standard and concludes that a 1.5 GPM maximum flow rate is technically feasible.

6 A smooth parallel flow as contrasted with a turbulent chaotic flow
7 *Id.* at p. 34.

## Cost-Effectiveness

Implementing a 1.5 GPM maximum flow rate for all residential lavatory faucets is both technically feasible and cost-effective, as demonstrated in the *Staff Analysis of Water Efficiency Standards for Toilets, Urinals, and Faucets*.[8] The staff analysis concluded that there was no incremental cost between a 1.5 GPM faucet and a 2.2 GPM faucet, based on studies conducted by the investor-owned utilities and verification through a retail price search showing no premium for the more efficient products.[9] In contrast, a 1.5 GPM faucet has significant energy savings over the then-existing standard of 2.2 GPM, making the proposed standards highly cost-effective.[10] Staff prepared the savings analysis below in comparing proposed amendments to the residential lavatory faucet regulations.

## Comparing Alternatives

Staff evaluated the PMI proposal to show the difference in water, energy, and cost savings from the current California standard using assumptions from the 2013 Codes and Standards Enhancement (CASE) report on *Residential Faucet & Faucet Accessories*.[11] Staff found that both the current regulation and the PMI proposal result in significant water and energy conservation. After a complete 10-year product turnover, there is no difference between the current regulation and the PMI proposal in yearly water savings.

**Table 1** reports savings for the current regulation and the PMI proposal as compared to the prior standard.

**Table 1: Water, Energy, and Cost Summary**

| Residential Lavatory Faucet | First Year Savings | | | | Annual Existing and Incremental Stock Savings | | | |
|---|---|---|---|---|---|---|---|---|
| | Water (Mgal) | Nat. Gas (Mthm) | Electricity (GWh) | Savings (M$) | Water (Mgal) | Nat. Gas (Mthm) | Electricity (GWh) | Savings (M$) |
| **Current Regulation (1.2 GPM 2016)** | 4,453 | 16 | 118 | 68 | 44,834 | 160 | 1187 | 683 |
| **PMI Proposal (1.5 GPM 2015, 1.2 GPM 2017)** | 3,355 | 12 | 89 | 51 | 44,834 | 160 | 1187 | 683 |

Source: CASE report calculations as modified by Energy Commission staff

Savings increase on a yearly basis for both regulations as more stock is turned over to the 1.2 GPM standard. For year 2016 the PMI proposal would use 1,098 million gallons more than the current regulation. Staff analysis showed an additional 730 million gallons of water would be saved if the 1.5 GPM maximum flow standard was implemented from September through December 2015. The difference between the current standard and the proposal by

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8 Singh, Harinder, Ken Rider, and Tuan Ngo. 2015. *Staff Analysis of Water Efficiency Standards for Toilets, Urinals, and Faucets*. California Energy Commission. Publication Number: CEC-400-2015-008-SD, available at: http://docketpublic.energy.ca.gov/PublicDocuments/15-AAER-01/TN203718_20150220T141432_Staff_Analysis_of_Water_Efficiency_Standards_for_Toilets_Urinal.pdf.

9 *Id.* at p. 25.

10 *Id.* at p. 26.

11 Available at http://www.energy.ca.gov/appliances/2013rulemaking/documents/proposals/12-AAER-2C_Water_Appliances/California_IOUs_and_Natural_Resources_defense_Councils_Response_to_the_Invitation_for_Standards_Proposals_for_Faucets_-_Updated_2013-08-05_TN-71810.pdf.

Plumbing Manufacturers International from September 2015 through December 2016 would be 1,098 – 730 = 368 million gallons of water used.

The one-year postponement of the 1.2 GPM flow rate standard implementation date would cause 24,055 million gallons (Mgal) of additional water use during the 10-year stock turnover period. This is less than 0.8 percent of the total 2016 yearly urban water use. **Table 2** reports the difference between PMI proposal and the current regulation.

**Table 2: Total Increase in Water Energy and Cost During Stock Turnover Period due to One-Year Extension to 1.2 GPM Regulation**

| | Increase in Water and Energy Use due to 1 year extension to 1.2 GPM Regulation (2015-2025) | | | |
|---|---|---|---|---|
| | Water (Mgal) | Nat. Gas (Mthm) | Electricity (GWh) | Cost (M$) |
| Water Use Difference (PMI proposal to Current Regulation | 24,055 | 86 | 637 | 367 |

Source: CASE report calculations as modified by Energy Commission staff

More important, the additional savings from the current standard can only be realized if the plumbing industry can deliver 1.2 GPM residential lavatory faucets by January 2016 so that stock turnover can begin per the current regulation implementation date. Because the plumbing manufacturing industry has stated that it will not be able to deliver a sufficient number of compliant faucets to replace the existing retail stock by January 2016, the savings shown in **Table 2** for the current regulation may not be realized.

## STAFF'S RECOMMENDATION

The 1.2 GPM standard was published by the Secretary of State on May 15, 2015, therefore providing eight months for 1.2 GPM products to be in retail stores. Based on the supplemental staff analysis, additional time is necessary for industry to complete the design, testing, manufacture and distribution process. Because staff has identified viable pathways for more expeditiously designing and certifying residential lavatory faucets that would comply with the proposed standard, staff disagrees with PMI that the industry needs an additional year to comply with the standard. Staff is especially cognizant of the severe and persistent drought and the need to obtain water savings as soon as possible. Therefore, staff proposes the following amendments to the faucet regulation:

- Immediately implement a 1. 5 gallons per minute maximum flow rate standard on residential lavatory faucets. Extend effective date for 1.2 GPM flow rate faucets to July 1, 2016.
- Allow the sale or offer for sale of faucets of 1.5 GPM or less that were manufactured before July 1, 2016.

**Table 3: Manufacture date for sale or offer for sale**

| Max Flow Rate | Effective Date for sale or offer for sale |
|---|---|
| 1.5 GPM Lavatory Faucets | September 1, 2015 |
| 1.2 GPM Lavatory Faucets | July 1, 2016 |

Source: Energy Commision staff

A July 1, 2016, effective date will provide industry with 14 months from the publication by the Secretary of State until manufactured products are required to comply with the 1.2 GPM standard.

## CONCLUSION

Staff analysis has shown that substantial statewide water and energy savings will be achieved with the current 1.2 GPM and proposed 1.5 GPM maximum flow rate appliance standards for lavatory faucets.