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Appliance and Equipment Standards Program
U.S. Department of Energy
Building Technologies Office, Mailstop EE-5B
1000 Independence Avenue SW
Washington, DC 20585-0121

Re: Docket Number EERE-2017-BT-STD-0014 - Alliance for Water Efficiency's Comments on Energy Conservation Standards for Residential Clothes Washers

Dear Appliance and Equipment Standards Program Staff:

The Alliance for Water Efficiency ("AWE") is a stakeholder-based 501(c)(3) organization with more than 500 member organizations dedicated to the efficient and sustainable use of water. AWE provides a forum for collaboration around policy, information sharing, education, and stakeholder engagement. AWE supports increasing the efficiency of residential clothes washers through DOE updating new energy conservation standards when appropriate. Additionally, AWE urges the federal government to offer financial incentives for replacing older, legacy clothes washers with more efficient models. These comments were developed by AWE's WaterSense-Water Efficient Products Advisory Committee, which is comprised of representatives from AWE member utilities, businesses, and other industry partners; the comments were approved by a vote of AWE's Board of Directors. AWE has four comments summarized here and with more detail below:

1. For its water and wastewater price trend forecast, DOE should extrapolate from the annualized rate increases for 1998 to 2020 from the AWWA/Raftelis Water and Wastewater Rate Survey.[1]

2. DOE should consider using actual data from the Residential End Uses of Water, Version 2 Water Research Foundation Report #4309b ("REU 2016"), or other actual end-use data, for its assumptions about loads per residential clothes washer per year.[2]

3. DOE should consider the energy embedded in the water that will be saved and account for the energy and emissions-related benefits.

4. DOE and the federal government can accelerate and ease the transition to more efficient washers, while also maximizing lifetime energy and water savings for consumers, by increasing funding for rebates and other incentives to replace older, less-efficient residential clothes washers.

[1] *2021 Water and Wastewater Rate Survey: 2020 Rates and Charges Data from 42 States*, Co-Produced by the American Water Works Association ("AWWA") and Raftelis, available for purchase from AWWA.
[2] More information available at https://www.waterrf.org/research/projects/residential-end-uses-water-version-2.

These comments are outlined in detail below. AWE appreciates the opportunity to engage with DOE's rulemaking process on this important matter.

1. For its water and wastewater price trend forecast, DOE should extrapolate from the annualized rate increases for 1998 to 2020 from the AWWA/Raftelis Water and Wastewater Rate Survey.

In its March 3, 2023 notice of proposed rulemaking, DOE uses two different data sources for water and wastewater pricing. First, for establishing current water and wastewater prices, DOE uses data from the AWWA/Raftelis 2021 Water and Wastewater Rate Survey ("AWWA/Raftelis Survey"). Here is DOE's approach to current water and wastewater prices:

> "DOE obtained residential water and wastewater price data from the [AWWA/Raftelis Survey]. The survey covers approximately 194 water utilities and 140 wastewater utilities analyzing each industry (water and wastewater) separately. For each water or wastewater utility, DOE calculated the average price per unit volume by dividing the total volumetric cost by the volume delivered. DOE also calculated the marginal price by dividing the incremental cost by the increased volume charged at each consumption level.
>
> The samples that DOE obtained of the water and wastewater utilities is too small to calculate regional prices for all U.S. Census divisions. Therefore, DOE calculated regional costs for water and wastewater service at the Census region level (Northeast, South, Midwest, and West) by weighting each State in a region by its population."

Second, for the purpose of calculating trends used to forecast future price increases, here is DOE's approach:

> "To estimate the future trend for water and wastewater prices, DOE used data on the historic trend in the national water price index (U.S. city average) from 1988 through 2021 provided by [U.S. Department of Labor-Bureau of Labor Statistics, Consumer Price Indexes, Item: Water and sewerage maintenance, Series Id: CUSR0000SEHG01, U.S. city average, 2021]. DOE extrapolated the future trend based on the linear growth from 1988 to 2021. DOE used the extrapolated trend to forecast prices through 2050. To estimate price trend after 2050, DOE used a constant value derived from the average values from 2046 through 2050."

It is unclear why DOE switches from the AWWA/Raftelis Survey for current prices to the water and sewerage maintenance item from the Consumer Price Index ("CPI") for price trends. Additionally, the methodology for price trends DOE is using for residential clothes washers appears to be different than the methodology it is using for the recent notice of proposed rulemaking for dishwashers. We urge DOE to use AWWA/Raftelis for both products in order to be consistent and to use the best methodology, .

AWE supports the use of data from the AWWA/Raftelis Survey as the basis for DOE's calculation for both the current water and wastewater prices and water and wastewater price trends. AWE is confident that the price trend data in the AWWA/Raftelis Survey is more accurate and representative because it is based on a review of the actual rates from a large sample set of utilities from nearly all US states on a biennial basis. It is better to use rate data when performing calculations based on specific volumes of water saved rather than data on average customer bills, which is what the water and sewerage maintenance item from CPI is based on.

In addition, water and wastewater rates are likely to continue to outpace the water and sewerage item from CPI, notwithstanding the recent spike in inflation. While water and wastewater infrastructure have a long useful life, the maintenance, repair, and replacements needed each year are increasing more quickly than in the past. For more on this trend, see AWWA's 2017 report *Buried No Longer: Confronting America's Water Infrastructure Challenge*. Looking back to 1988, as DOE currently does, won't capture the recent growth in water and wastewater rates. Looking back to a more recent date, like 1998, will better reflect current trends.

For these reasons DOE should use the AWWA/Raftelis Survey annualized increases for 1998 to 2020 of 4.61% for water and 5.18% for wastewater and extrapolate the future trend based on linear growth.

2. <u>DOE should consider using actual data from REU 2016, or other actual end-use data, for its assumptions about loads per residential clothes washer per year</u>.

The water industry frequently relies on residential end use data from REU 2016. The most detailed end use data in REU 2016 is based on flow trace analysis from data loggers installed on 737 homes. Here is a summary of the clothes washer data from REU 2016 and from the first version of the report from 1999.

Table 6.14 Summary statistics for clothes washers

	REU2016	REU1999
Number of houses logged	762	1187
Total number of clothes washer loads recorded	7,509	26,982
Total number of days logged	9,659	28,013
Total volume of water devoted to clothes washing use during the logging period (gal)	218,231 826094 liters	1,104,179 4,179,772 liters
Average loads per household per day	0.78	0.81
Average # of loads per person per day	0.3	0.3
Average gallons per load	31 (117 liters)	41 (155 liters)
Median gallons per load	31 (117 liters) per load	40 (151 liters) per load
Average daily household clothes washer use (gphd)	22.7 ± 1.4 (85.8 ± 5.3 lpd)	39.3 ± 1.6 (148.6 ± 6 lpd)
Median daily household clothes washer use (gphd)	17.8 (67.3 lpd)	32.8 (124 lpd)
Per capita clothes washer use	9.6 *	15.0

Given the average loads per household per day of 0.78, that translates to 284.7 loads per household per year and then rounded up to 285.

The Energy Information Administration's 2015 Residential Energy Consumption Survey, which is what DOE is using for this rulemaking, does provide robust survey data on a significant number of households. However, AWE's experience and academic research[3] suggests that there are often large gaps between consumer survey responses and actual behavior when it comes to fixture and appliance usage. With smart metering technologies on both the utility side and on the end user side, it would be better to use data from reports like REU 2016 or procured from smart metering companies. DOE could explore acquiring data from companies using smart devices, sub-meters, or sensors installed on water meters and supply

[3] E.g., "Using advanced metering infrastructure to characterize residential energy use," Brock Glasgo, Chris Hendrickson, Ines M.L. Azevedo, The Electricity Journal 30 (2017) 64-70.

lines in thousands of homes across the United States that collect real-time end use data that they are then able to disaggregate.

In summary, AWE is asking DOE to consider using actual customer end use data beyond the EIA's survey data, and in the absence of better data from additional sources, AWE urges DOE to use 285 loads per year based on the actual data from REU 2016 instead of 234 loads per year.

3. DOE should consider the energy embedded in the water that will be saved and account for the emissions-related benefits.

DOE should more thoroughly consider and evaluate the energy embedded in the water that will be saved from the proposed standard, in addition to end-user energy use. AWE has developed a water conservation tracking tool for evaluating the water savings, costs, and benefits of urban water conservation programs and for projecting future water demands. More information can be found at: www.allianceforwaterefficiency.org/resources/topic/water-conservation-tracking-tool.

Among other things, this tool provides a range of estimates for embedded water and wastewater energy. Here are the two relevant tables from the AWE tracking tool, which refer to embedded energy as Water Supply Energy Use and Wastewater Energy Use, which also applies to indoor water efficiency. These were developed with ranges based on industry leading research from California and elsewhere in the nation.[4] To come up with a reasonable nationwide estimate, these tables have been completed for the purpose these comments to assume a simple breakdown of water supply (60% local surface water and 40% groundwater)[5] and the most prevalent drinking water treatment process (Coag, Flocc, Filtration), which is also on the lower end of energy intensity compared to the other options.

[4] See Embedded Energy in Water Studies, Study 2: Water Agency and Function Component Study and Embedded Energy-Water Load Profiles. Prepared for California Public Utilities Commission by GEI Consultants/Navigant Consulting, August 31, 2010; Embedded Energy in Water Studies, Study 1: Statewide and Regional Water-Energy Relationship. Prepared for California Public Utilities Commission by GEI Consultants/Navigant Consulting, August 31, 2010; U.S. Congressional Research Service. Energy-Water Nexus: The Water Sector's Energy Use, by Claudia Copeland and Nicole T. Carter, January 24, 2017.

[5] Using a simplified breakdown of 60% local surface water and 40% groundwater results in a conservative estimate because it does not include the other higher intensity sources of water, including imported water. This simplified breakdown is based on the U.S. Geological Survey's Estimated use of water in the United States in 2015, Circular 1441. If DOE can find a more detailed, nationwide estimate of water supply sources, this should be used instead.

Water Supply Energy Use (kWh/AF)

Water Supply Sourc	Intensity	Default	User Supplied	Used in Model	% of Total Supply
Groundwater	Medium	624		624	40%
Local surface water	Medium	222		222	60%
Imported surface water	Medium	870		870	
Recycled water	Medium	730		730	
Brackish desalination	Medium	528		528	
Seawater desalination	Medium	4,497		4,497	
Other supply				0	
			Energy Us	383	kWh/AF

Drinking Water Trea	Intensity	Default	User Supplied	Used in Model	% of Water Receiving Treatment
Coag, Flocc, Filtration	Medium	82		82	100%
Microfiltration	Medium	153		153	
Disinfection (Ozone)	Medium	72		72	
			Energy Us	82	kWh/AF

Distribution System

Terrain: Moderate

Distribution	Intensity	Default	User Supplied	Used in Model	
Booster pumps	Medium	163		163	
Pressure pumps	Medium	477		477	
			Energy Us	640	kWh/AF

Avoided Energy Per AF Reduction in Demand: 1,105 kWh/AF

Wastewater Energy Use (kWh/AF)

	Intensity	Default	User Supplied	Used in Model
Collection pumps	Medium	74		74
Treatment level: Primary/secondary	Medium	344		344
Incremental energy for				
Microfiltration	None	0		0
Reverse osmosis	None	0		0
UV treatment	None	0		0

Avoided Energy Per AF Reduction in Wastewater: 418 kWh/AF

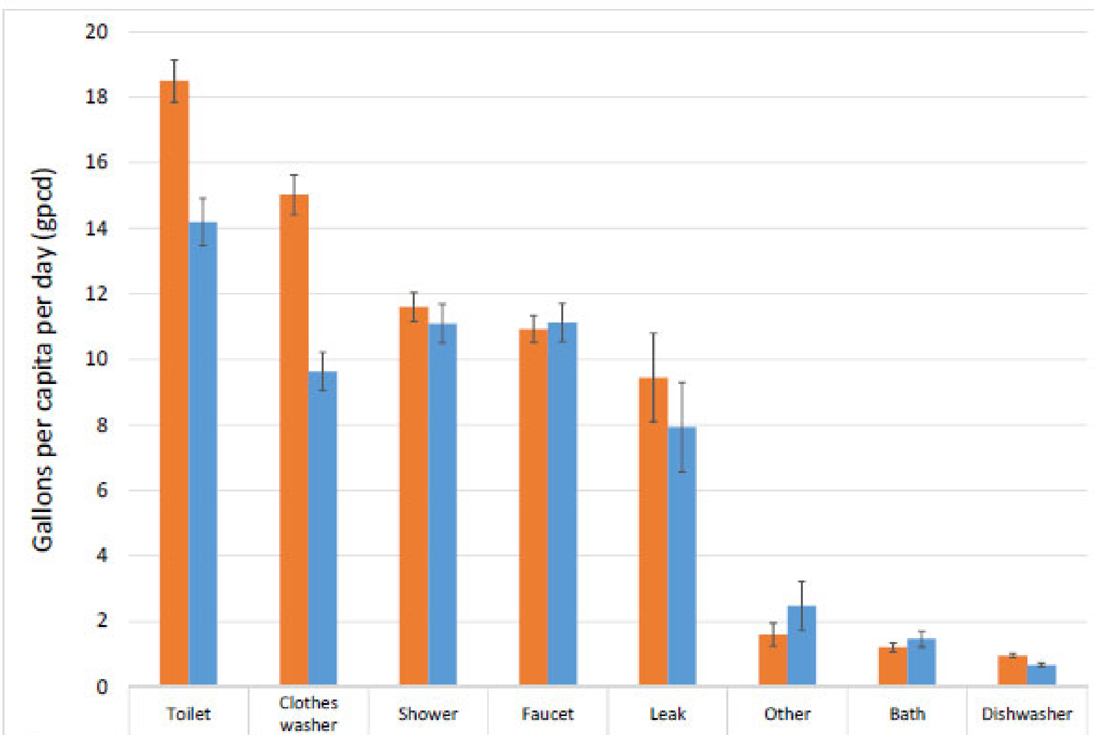
With the two conservative assumptions on water supply and water treatment plus the midrange defaults for energy use in the water distribution system, the wastewater collection system, and wastewater treatment, this translates to 1,523 kWh per acre-foot of water or 4,569 kWh per million gallons. This estimate is also conservative because it is expected that the energy use embedded in water treatment will increase as additional treatment technologies are added to the process to address recent PFAS regulations.

AWE recommends that DOE use these estimates from AWE's conservation tracking tool for calculating the energy embedded in the water that will be saved from the proposed standard. DOE could also adjust this based on the assumptions it is currently using for private wells. Finally, with the embedded energy estimate, DOE can calculate the emissions-related benefits in the same way it has calculated them for direct energy savings.

4. DOE and the federal government can accelerate and ease the transition to more efficient washers, while also maximizing lifetime energy and water savings for consumers, by increasing funding for rebates and other incentives to replace older, less-efficient residential clothes washers.

While it is not officially part of this rulemaking, DOE and the federal government should use whatever authorities and funding available to help minimize any additional up-front costs for consumers and accelerate replacement of older, less-efficient residential clothes washers by funding rebates and other incentives. These programs could be new or existing federal programs as well as federal support for state and local programs, and they could take the form of rebates, direct install programs, tax credits, or other types of consumer-focused incentives. These programs should be structured to ensure they are readily available and easily accessible by low- and moderate-income consumers, including renters and residents of multifamily housing developments.

Many local water utilities have been offering rebates for clothes washers because they represent a significant portion of residential water use, and residential use in turn is commonly more than half of the total water use for a water utility. Here are two tables from the 2016 REU study, which represents the best national study of residential water use. Figure ES.3 shows the change in per capita water use attributable to clothes washers from the 1999 version of this study to REU 2016. Figure ES.4 shows the relative share of clothes washers compared to overall residential water use.



	Toilet	Clothes washer	Shower	Faucet	Leak	Other	Bath	Dishwasher
REU1999	18.5	15.0	11.6	10.9	9.5	1.6	1.2	1.0
REU2016	14.2	9.6	11.1	11.1	7.9	2.5	1.5	0.7

Figure ES.3 Indoor per capita water use - REU1999 and REU2016

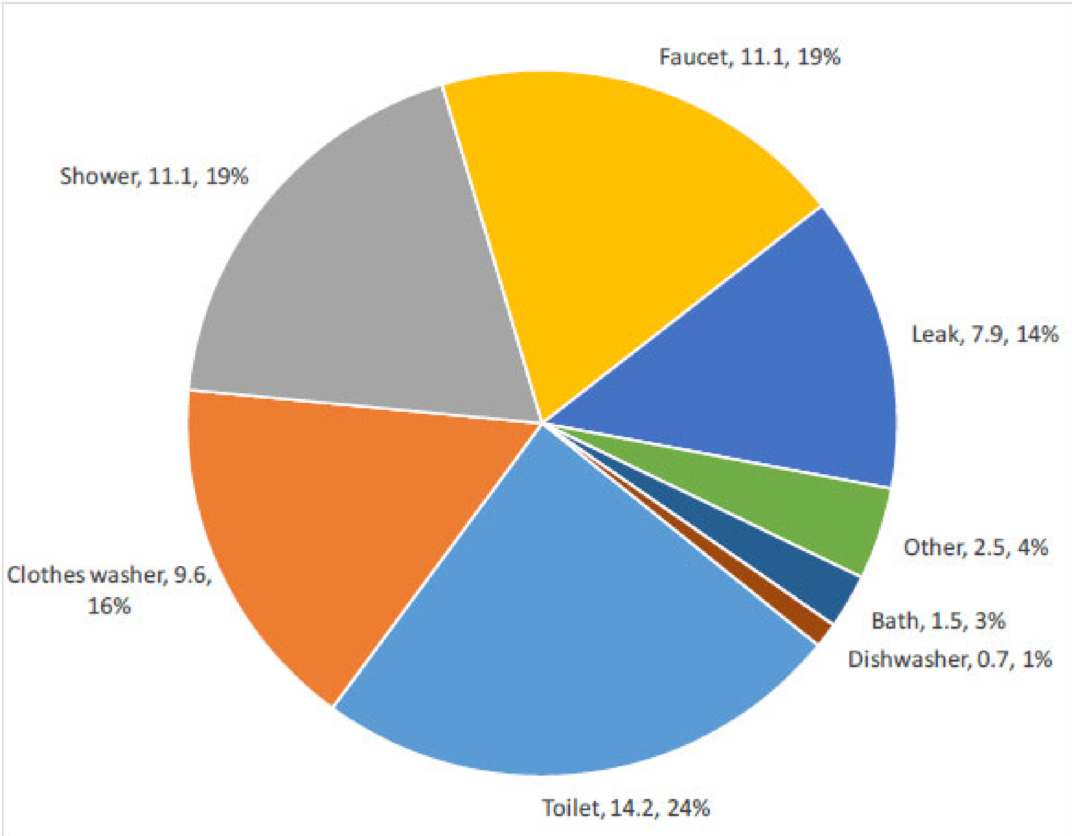


Figure ES.4 Indoor per capita use (gpcd and percent of indoor use) by fixture, 9 study sites, n=737

Clearly, natural replacement supplemented by utility rebate programs have resulted in significant water savings from the 1999 study to REU 2016. If DOE and the federal government were to both adopt a more efficient standard for residential clothes washers, which would improve residential clothes washer efficiency by 25% to 30% compared to the current DOE standard, and then commit significant federal funding to replacing legacy clothes washer, this would meaningfully increase the already significant savings from natural replacement.

Conclusion.

AWE supports DOE's proposed changes to federal energy conservation standards for residential clothes washers, with two conditions: 1) That the energy, water, and cost savings estimates remain favorable after modifying DOE's analyses based on AWE's recommendations described above and after considering comments from other stakeholders; and 2) that the federal government significantly increases funding for financial incentives to replace older, less-efficient clothes washers – with a focus on washers owned by low-income households - in order to increase water and energy savings and ease the transition for consumers and manufacturers. In addition, AWE encourages DOE to carefully consider product performance in setting the standards. There are many examples of high-performing products that are also water-efficient. In fact, products must meet standards for both parameters to earn EPA's WaterSense label. Poor product performance can potentially undercut water and energy savings if it leads to a backlash of public opinion or contributes to the "hacking" of products. We encourage DOE to consider comments about product performance from manufacturers and other stakeholders.

Please contact me any time if DOE would like access to AWE's conservation tracking tool or otherwise needs assistance locating copies of the resources AWE has referenced in this letter.

Sincerely,

Ron Burke
President and CEO
Alliance for Water Efficiency