Alliance for Water Efficiency

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Submitted via Regulations.gov

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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–2019–BT–STD–0039 - Alliance for Water Efficiency's Comments on Energy Conservation Standards for Dishwashers

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 energy and water efficiency of dishwashers through DOE updating new energy conservation standards when appropriate. AWE has three main comments.

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 May 19, 2023 notice of proposed rulemaking ("NOPR"), 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 2020 Water and Wastewater Rate Survey ("AWWA/Raftelis Survey"). Here is DOE's approach to current water and wastewater prices:

> "DOE obtained data on public supply water prices for 2020 from the *Water and Wastewater Rate Survey* conducted by Raftelis Financial Consultants and the American Water Works Association. The survey covers approximately 194 water utilities and 140 wastewater utilities, analyzing each industry (water and wastewater) separately. The water survey includes the cost to consumers of a given volume of water for each utility. The total consumer cost is divided into fixed and volumetric charges. DOE's calculation of water prices uses only volumetric charges, as only those charges would be affected by a change in water consumption. Including the fixed charge in the price average would lead to a higher water price. For wastewater utilities, the data format is similar except that the price represents the cost to treat a given volume of wastewater."

Second, for the purpose of calculating trends used to forecast future water and sewer price increases, the NOPR describes DOE's approach as follows: "Historical Water CPI extrapolated projection to 2050 and constant value thereafter." There isn't any additional information in the NOPR to explain this approach.

AWE recently reviewed and submitted comments on the notice of proposed rulemaking for residential clothes washers, and it is unclear whether DOE is taking the same approach on water and sewer price trends for this NOPR on dishwashers. For the purpose of this comment letter, AWE assumes that DOE is using the same approach for both dishwashers and residential clothes washers.

Instead of using AWWA/Raftelis for historic and current pricing and a CPI-based approach for future price trends, AWE supports the use of data from the AWWA/Raftelis Survey as the basis for DOE's calculation for both the historic and current water and wastewater prices and for price trends. AWE is confident that the price trend data in the AWWA/Raftelis Survey are 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. Furthermore, 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.

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 for its assumptions about cycles per year</u>.

There is a significant difference between the 197 cycles per year that DOE is using and the 95 cycles per year the water industry typically uses. The water industry frequently relies on residential end use data from Residential End Uses of Water, Version 2 Water Research Foundation Report #4309b ("<u>REU 2016</u>"). 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 dishwasher data from REU 2016 and from the first version of the report from 1999.

Table 6.15 Summary of dishwasher statistics

	REU2016	REU1999
Number of houses logged	762	1187
Total number of dishwasher events recorded	2498	6810
Total number of days logged	9,659 days	28,013
Average number of residents per home	2.6	2.7
Total volume of water devoted to dishwasher use during the logging period (gal.)	15,353 (58,034 liters)	67,902 (256,670 liters)
Average # of dishwasher uses per household per day	0.26	0.24
Average dishwasher uses per person per day	0.10*	0.09
Average dishwasher load volume (gal.)	6.1 (23.1 liters)	10.0 (37.8 liters)
Average daily household dishwasher use (gphd)	1.6 ± 0.13 (5.97 ± 0.49 lpd)	2.4 ± 0.2 (9.07 ± 0.8 lpd)
Median daily household dishwasher use (gphd)	0.99 (3.74 lpd)	2.0 (7.6 lpd)
Average per capita dishwasher use	0.7 *	1.0

*Based on 737 houses for REU2016

Given the average cycles per household per day of 0.26, that translates to 94.9 cycles per household per year.

The Energy Information Administration's 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[1] 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 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 to ensure whatever number is used reflects actual consumer behavior. This is

[1]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.

especially important given the large differences between the DOE's survey-based data and the water industry's data based on end use measurements.

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.[2] To come up with a reasonable nationwide estimate, these tables have been completed for the purpose of these comments to assume a simple breakdown of water supply (60% local surface water and 40% groundwater)[3] 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.

[2] 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.

[3] 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.

Conclusion.

AWE supports DOE's proposed changes to federal energy conservation standards for dishwashers. 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