Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
New York State Energy Research and Development Authority

May 2, 2023

Dr. Carl Shapiro
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-2B
1000 Independence Avenue SW
Washington, DC 20585

RE: EERE-2017-BT-STD-0014: Energy Conservation Standards for Residential Clothes Washers

Dear Dr. Shapiro:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), and the New York State Energy Research and Development Authority (NYSERDA) on the notice of proposed rulemaking (NOPR) for consumer clothes washer standards. 88 Fed. Reg. 13520 (March 3, 2023). We appreciate the opportunity to provide input to the Department.

We strongly support the proposed standards, which would save U.S. consumers up to $14.5 billion over 30 years of sales through reduced operating costs,[1] while providing nearly 1.5 quads of full-fuel cycle (FFC) energy savings and 2.5 trillion gallons of water savings.[2] The proposed standards would be particularly beneficial for renters, who rarely get to choose their own clothes washers but often pay their utility bill. Neither the performance nor the size of washers, particularly top-loaders, would be negatively impacted by DOE's proposal. Furthermore, we believe that DOE's analysis may be both overestimating incremental costs and underestimating utility bill savings, and that actual savings for consumers may be even larger than what DOE estimates in the NOPR.

We strongly support DOE's proposed standards, which would provide large cost savings for consumers, particularly low-income households. In the NOPR, DOE has proposed to adopt Trial Standard Level (TSL) 4, which represents the CEE Tier 1 level for top-loading standard-size washers and the ENERGY STAR Most Efficient level for front-loading standard-size washers.[3] The vast majority of consumer cost-savings arise from the top-loading standard-size product class, which represents about three-quarters of the market; the average life-cycle cost (LCC) savings for affected consumers for this product class is $134.[4] For a consumer moving from a baseline top-loader to the proposed standard level (TSL 4), DOE estimates a $363 reduction in lifetime operating cost versus an incremental cost increase of $185. For front-loading standard washers, the average LCC, operating cost savings from baseline to TSL 4, and incremental cost from baseline to TSL4 are $19, $176, and $49, respectively.

[1]88 Fed. Reg. 13523.
[2]88 Fed. Reg. 13522.
[3]Together these two standard-size classes represent over 96% of washer shipments.
[4]Table V.37. 88 Fed. Reg. 13608.

Impacts on affected customers (e.g., average LCC) for front-loaders are smaller than for top-loaders in part because much of the front-loader market is already above baseline efficiency (e.g., ENERGY STAR).

Importantly, the proposed rule would provide large cost savings for low-income households. As part of DOE's consumer subgroup analysis, the Department estimated impacts on both low-income and senior-only households. Low-income consumers may benefit in particular from improved efficiency as they face high energy burdens[5] and are often renters with landlords who have little incentive to install efficient appliances.[6] For low-income renters who pay their energy bills, DOE estimated that they receive all of the benefits (i.e., reduced operating costs) while bearing none of the incremental cost;[7] this yields an estimated average LCC savings of $189 for all low-income households and a percent of consumers experiencing net cost (13%) about half that of the overall consumer sample (25%) for the top-loading standard product class.[8]

Furthermore, DOE's consumer cost analysis would support higher efficiency levels. The highest evaluated TSL, TSL 5, would provide up to $6.3 billion in additional consumer savings, an additional 0.8 quads of FFC energy savings, and an additional 0.4 trillion gallons of water savings relative to the proposed TSL 4 levels.[9] For the top-loading standard class, both the average LCC savings for all households ($157 vs. $134) and the percent of consumers with net benefit (76% vs. 69%) at TSL 5 are higher than at TSL 4.[10] For the front-loading standard class, the average LCC savings for all households and the percent of consumers with net benefit are both nearly three times higher at TSL 5.[11]

We believe DOE is likely overestimating incremental cost increases, especially for top-loading washers. DOE assumes in the engineering analysis that baseline top-loading washers have enameled (porcelain) baskets and that units meeting the proposed standard would have more expensive stainless-steel baskets. However, market research from the Northwest Energy Efficiency Alliance (NEEA) found that almost 2/3 of all sales of baseline top-loaders already have stainless steel baskets, including half of the least expensive baseline models.[12] Historically, retrospective studies on clothes washer prices following amended standards have shown DOE has overestimated cost increases resulting from more stringent efficiency standards. For example, a 2022 study by Spurlock & Fujita analyzed clothes washer prices following the 2004 and 2007 standard changes and found that baseline washer prices stayed flat while efficiency increased by 30%.[13] They concluded that efficiency standards for clothes washers benefited all consumers, but particularly low-income consumers and/or renters. In other words, low-

[5]Low-income households spend about 3.5x more of their income on energy costs (8.1%) vs. the median non-low-income household (2.3%). How High Are Household Energy Burdens? pp. 8-9. www.aceee.org/research-report/u2006

[6]C. A. Spurlock & K. S. Fujita, "Equity implications of market structure and appliance energy efficiency regulation," Energy Policy, 2022, Vol. 165, 112943.

[7]Table IV.36. DOE use the same methodology applied to the overall analysis for low-income homeowners. Low-income renters who do not pay their utility bills are assumed to be unaffected by amended standards.

[8]Table V.16. 88 Fed. Reg. 13589.

[9]88 Fed. Reg. 13522, 13523.

[10]*Ibid.*

[11]Table V.18. 88 Fed. Reg. 13589, 13590.

[12]EERE-2017-BT-STD-0014-0042, pp. 3-6. www.regulations.gov/comment/EERE-2017-BT-STD-0014-0042

[13]C. A. Spurlock & K. S. Fujita, "Equity implications of market structure and appliance energy efficiency regulation," Energy Policy, 2022, Vol. 165, 112943.

income consumers were not priced out of the market but rather benefited particularly from washer standards that improved the least expensive, baseline products. Overall, both DOE's assumption regarding use of enameled baskets at the baseline level and historical trends suggest realized incremental first cost increases experienced by customers will likely be smaller than estimated by DOE.

We believe DOE is likely underestimating the utility bill savings resulting from the proposed standards. First, DOE's analysis assumes that tub capacity would increase from 4.0 to 4.7 ft^3 in response to the proposed standards for top-loading standard washers. DOE's per cycle energy and water use analysis is based on the test procedure, which assumes that average load sizes are larger for larger machines. For example, the average of the two test procedure load sizes for a 4.7 ft^3 washer is about 15% larger, 11 lbs compared to only 9.6 lbs for a 4.0 ft^3 unit. This means that DOE's energy and water use analysis assumes that consumers wash 15% more clothing annually under the proposed standard; this scenario seems unlikely. This has the effect of reducing overall energy, water, and cost savings in the downstream analysis.

Additionally, we believe that DOE may be underestimating baseline clothes dryer energy use and therefore the dryer energy savings achievable from higher efficiency levels. DOE estimates that drying energy use represents about three-quarters of total washer energy usage.[14] Therefore, estimates of overall drying energy usage can have a significant impact on the overall energy savings and economic analysis. According to DOE's analysis for the September 2022 clothes dryers standards NOPR, the market-weighted average standard electric clothes dryer has an annual energy usage of 692 kWh.[15] In comparison, based on the washers NOPR analysis, market-average top-loading and front-loading standard size annual dryer energy usage is only 467 kWh/yr and 371 kWh/yr, respectively.[16] The dryer analysis estimates agree much more closely with real-world data from the 2015 RECS (776 kWh/yr)[17] and a 2014 NEEA study (915 kWh/yr).[18]

Finally, as described in comments from the Alliance for Water Efficiency,[19] data found in the 2016 Residential End Uses of Water report suggest that DOE may be significantly underestimating the average number of clothes washer loads per year.[20] Taken together, we believe that DOE may be significantly underestimating the utility bill savings from the proposed standards.

DOE's testing indicates that washer performance should not be negatively impacted by the proposed standards. As part of the NOPR analysis, DOE tested clothes washers across a range of efficiency levels to evaluate any potential impacts of more stringent standards on performance.[21] DOE's testing shows

[14]Technical Support Document (TSD), pp. 7-3, 7-4. www.regulations.gov/document/EERE-2017-BT-STD-0014-0058
[15]Calculated from the no-new standards market efficiency distribution (Table 8.2.40) and annual energy usage as a function of efficiency level (Table 7.5.1). Clothes Dryers TSD, pp. 7-10, 8-36. www.regulations.gov/document/EERE-2014-BT-STD-0058-0034
[16]Using energy use per cycle from Table 7.2.3 and Table 7.2.5 and market share estimates from Tables 8.4.1 and 8.4.2 in the clothes washers TSD. Assumed 233 and 258 cycles/year for top-loading and front-loading, respectively.
[17]2015 RECS, Table CE5.3a. www.eia.gov/consumption/residential/data/2015/c&e/pdf/ce5.3a.pdf
[18]#E14-287, Dryer Field Study, 2014, p.15. neea.org/resources/rbsa-laundry-study
[19]EERE-2017-BT-STD-0014-0444, pp. 2-3. www.regulations.gov/comment/EERE-2017-BT-STD-0014-0444
[20]Residential End Uses of Water, Version 2. Water Research Foundation. www.waterrf.org/research/projects/residential-end-uses-water-version-2
[21]EERE-2017-BT-STD-0014-0059. www.regulations.gov/document/EERE-2017-BT-STD-0014-0059

that the proposed standard levels can be achieved with key performance attributes (e.g., wash temperatures, stain removal, mechanical action, and cycle duration) that are comparable to the performance of lower-efficiency units available on the market today. Manufacturers commented previously that reducing water temperatures below 85 °F could make it difficult to remove fatty soils from clothing.[22] However, DOE's test data show that the proposed standards would not necessitate a reduction in wash temperature and that clothes washers meeting the proposed standard levels can maintain good cleaning performance. DOE's analysis demonstrates that by prioritizing hardware improvements (e.g., more efficient motors, higher spin speeds) in meeting the proposed standard for top-loading units, manufacturers could provide cleaning performance equivalent to the highest performance achieved by units at lower efficiency levels. These results are generally consistent with ratings from Consumer Reports which indicate that efficient top-loading models, using impellers rather than agitators, generally perform better than less efficient units.[23]

Additionally, top-loading washers meeting the proposed standard have lower (i.e., better) mechanical action scores than baseline units, indicating that the higher-efficiency machines cause less wear and tear on clothing than inefficient baseline unit; better mechanical action scores at higher efficiency correlate with the use of impellers rather than agitators. Finally, for both top-loading and front-loading standard-size washers, DOE's test data show no observable correlation between efficiency and average cycle time. Thus, the Department concluded that the proposed standards would not necessitate an increase in cycle time. Overall, we are supportive of DOE's testing methodology and agree with the Department that washer performance should not be negatively impacted by the proposed standards.

Top-loading standard washer exterior dimensions are not expected to meaningfully increase as a result of the proposed standards. Top-loading standard-sized washers typically have cabinet widths of about 27". DOE's analysis assumes that top-loading capacity will increase from 4.0 to 4.7 ft^3 in response to the proposed standard. However, DOE screened out any capacity increase that would increase cabinet widths since larger cabinets (e.g., 28+") may affect practicability of installation (i.e., larger machines may not fit through doorways or in existing spaces).[24] Concerns were raised at DOE's public meeting suggesting that washers may grow (e.g., in height) in response to the proposed standards, resulting in a loss of utility. However, a comparison of models from Whirlpool suggests that capacity can be increased with little change in washer height (H), depth (D), or width (W). For example, a baseline 3.8 ft^3 washer has listed exterior dimensions of 44" x 27 1/2" x 27" (H x W x D), [25] while an ENERGY STAR-rated 5.3 ft^3 unit has exterior dimensions of 42 1/2" x 27 1/4" x 27 7/8".[26] This example illustrates that manufacturers today can increase top-loading washer capacity by about 40%, more than double what DOE projects in their analysis for baseline units, without a meaningful increase in washer dimensions.

[22]EERE-2017-BT-STD-0014-0040, pp. 9-10. www.regulations.gov/comment/EERE-2017-BT-STD-0014-0040

[23]Based on Consumer Reports testing, top-loader models using agitators have an average "washing performance" score of 3.4 (out of 5), while high-efficiency top-loader models score an average of 4.0. www.consumerreports.org/appliances/washing-machines/

[24]88 Fed. Reg. 13543.

[25]www.whirlpool.com/laundry/washers/he-top-load-washer/p.3.8-cu.-ft.-top-load-washer-with-soaking-cycles,-12-cycles.wtw4955hw.html

[26]www.whirlpool.com/laundry/washers/he-top-load-washer/p.5.3-cu.-ft.-smart-top-load-washer.wtw7120hc.html?

We are generally supportive of DOE's proposed changes regarding clothes washer product classes. As part of the NOPR, DOE proposed three changes to the product classes: (1) Re-introducing the semi-automatic product class;[27] (2) increasing the upper capacity threshold for the front-loading compact product class from 1.6 ft^3 to 3.0 ft^3; and (3) changing the name of the smaller top-loading washer class (less than 1.6 ft^3) from "compact" to "ultra-compact" to avoid confusion arising from the new front-loading compact class size threshold.[28] We generally support these product class changes; however, we encourage DOE to monitor the front-loading compact product class following the capacity threshold change. While there are currently no models on the market between 1.6 ft^3 and 3.0 ft^3, there is some concern that manufacturers could produce larger "compact" units (e.g., 2.9 ft^3) that would then be subject to a less stringent amended standard than under the current lower threshold.

Thank you for considering these comments.

Sincerely,

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[27] Semi-automatic washers are units that attach to a faucet wherein a user must control the water supply.