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May 18, 2020

Via E-Mail

Katharine Kaplan  
U.S. Environmental Protection Agency  
ENERGY STAR Appliance Program

appliances@energystar.gov

Re: ENERGY STAR Program Requirements, Product Specification  
for Residential Dishwashers, Eligibility Criteria, Draft 1, Version 7.0

Dear Ms. Kaplan:

The Association of Home Appliance Manufacturers (AHAM), respectfully submits the following comments regarding the ENERGY STAR Product Specification for Residential Dishwashers, Eligibility Criteria, Draft 1, Version 7.0.

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's more than 150 members employ hundreds of thousands of people in the U.S. and produce more than 95% of the household appliances shipped for sale within the U.S. The factory shipment value of these products is more than \$50 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes nearly \$200 billion annually to the economic security of the United States. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

AHAM supports EPA and the Department of Energy (DOE) in their efforts to provide incentives to manufacturers, retailers, and consumers for energy efficiency improvement, as long as product performance can be maintained for the consumer. As AHAM has commented in the past, for some products, including residential dishwashers, the opportunities for additional savings beyond those already achieved are severely diminished as products are nearing maximum energy and water efficiency under available technology. ENERGY STAR specifications with further restriction on energy and water use, such as the one EPA is proposing for Version 7.0, are likely to result in limited energy savings as compared to increased costs to consumers and manufacturers and, we believe in this case, degraded performance and functionality.

EPA's specification revision cycle indicates an assumption that specifications will be revised in a continuous cycle. But EPA needs to revisit that assumption here. The specification has been successful, and EPA should consider alternatives to revising the specification. Specifically, **AHAM proposes EPA and DOE sunset the dishwasher specification, establish market penetration targets in an effort to increase dishwasher ownership, and educate consumers on proper dishwasher use to reduce handwashing and pre-rinsing.** AHAM believes manufacturers, EPA, and DOE can claim success in helping to drive the development of highly energy and water efficient dishwashers and thus we propose that EPA and DOE sunset the ENERGY STAR specification for residential dishwashers at this time. It may be that cost-effective technologies will become available in the future that could justify the reinvigoration of the specification, but those technologies do not currently exist.

We note that EPA proposed a development cycle for a new specification that includes a final version released sometime during the third quarter of 2020, followed by an effective date in the second quarter of the year 2021. EPA indicated that to meet this timeline, it intends to release subsequent drafts of the specification this spring. This is an incredibly aggressive timeline for revision, especially given the significant issues AHAM has raised and our proposal that EPA and DOE sunset the ENERGY STAR specification for residential dishwashers. We are confident that EPA will not rush that timeline and will fully consider the comments it receives. We appreciate that EPA granted extensions on the comment deadline for this first draft as companies are dealing with COVID-19 pandemic responses. We hope that EPA will continue to be flexible on timing as future drafts are released.

## **I. EPA Should Sunset the ENERGY STAR Specification for Residential Dishwashers.**

AHAM proposes EPA and DOE sunset the ENERGY STAR specification for residential dishwashers for several reasons summarized below and described in detail in this section:

- As AHAM has previously demonstrated, there are cleaning performance concerns at levels beyond the current ENERGY STAR Version 6.0 levels. Additionally, at levels beyond ENERGY STAR Version 6.0 levels, there would likely also be performance impacts beyond cleaning performance, such as increases in cycle time, decreases in drying performance, and increases in noise level.
- Additional, cost-effective efficiency gains are not available.<sup>1</sup> EPA's energy savings analysis for Version 7.0 is fatally flawed. EPA's analysis compares the proposed ENERGY STAR levels to current DOE requirements, and not to ENERGY STAR Version 6.0. The use of an improper comparison, for a product category where nearly all products are ENERGY STAR qualified, artificially inflates the energy savings and shortens the payback periods EPA claims for Version 7.0. An analysis that more appropriately compares ENERGY STAR Version 6.0 to Version 7.0 Draft 1 levels finds

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<sup>1</sup> See ENERGY STAR Products Program Strategic Vision and Guiding Principles ("Under certain circumstances, EPA makes the determination that an ENERGY STAR specification for a particular product category should be sunset rather than revised." Factors that play into such a decision include "[a]dditional, cost-effective efficiency gains are not available or anticipated.").

limited energy savings and very long payback periods. This is discussed further in Section V along with other significant issues in the EPA's data analysis.

A. AHAM Has Demonstrated Performance Concerns at Energy and Water Levels More Stringent Than ENERGY STAR Version 6.0.

All energy efficiency requirements must balance product performance and the availability of features consumers desire against energy efficiency improvements. The ENERGY STAR program as a whole suffers when consumers cannot purchase ENERGY STAR products that have the performance and features they expect at a price point they can afford. While ENERGY STAR does not set mandatory energy conservation standards, ENERGY STAR qualification has essentially become mandatory in the marketplace as is demonstrated by the particularly high penetration of ENERGY STAR dishwashers. Thus, EPA must recognize that it is not setting criteria for only a few niche products that may be able to meet the levels and maintain performance at a higher cost to consumers. It is setting levels for a broader range of products at a variety of price points.

AHAM commented in 2015 in response to DOE's then-proposed energy conservation standards that several aspects of product performance would be impacted at levels beyond the ENERGY STAR Version 6.0 level, which, at the time, was just about to become effective.<sup>2</sup> To be clear, though cleaning performance is a key element of dishwasher performance, it is not the only one. Other performance elements important to consumers that are at risk at levels beyond the current ENERGY STAR levels are cycle time, drying performance, and noise levels. In our 2015 comments, which we incorporate by reference here and include in Exhibit A, AHAM demonstrated that levels beyond the Version 6.0 ENERGY STAR levels would negatively impact performance for dishwashers as a product category. Note that this does not mean that there could not be a limited number of dishwasher models that can achieve higher levels of efficiency and maintain product performance as is demonstrated by the niche models achieving the Most Efficient designation. But those may come at a higher cost to consumers and their efficiency levels are not likely capable of being achieved by a broader range of products.

Our comments to the 2015 rulemaking still apply today despite the passage of time. Instead of repeating the full comments here, some important points are highlighted below.

- To be consumer relevant, several elements of performance must be evaluated, and EPA's currently proposed cleaning performance threshold addresses only one of them. The dishwasher is a holistic system—changes in one area impact other areas. The washing process, and ultimately wash performance, is a function of washing temperatures, length of washing cycles, types and amounts of detergent applied, and mechanics (power).<sup>3</sup> These four factors all impact each other. Decreasing one factor, like energy or water,

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<sup>2</sup> 2014-12-19 Energy Conservation Programs: Standards for Residential Dishwashers; Notice of proposed rulemaking; EERE-2014-BT-STD-0021.

<sup>3</sup> See, e.g., Elpress. (2020). An Optimal Cleaning Process With Sinner's Circle; accessed online May 4, 2020; <https://blog.elpress.com/an-optimal-cleaning-process-with-sinners-circle>.

means that the other factors, such as time, need to increase. The key point is that in order to reduce energy and water use and maintain cleaning performance, it is likely that cycle time will reach a level unacceptable to consumers. At the levels DOE proposed in 2015, which are similar to those EPA is proposing now, the shipment weighted average cycle time would have increased by 37 percent.

Note that a proposal to add an ENERGY STAR cycle length requirement would miss the point of these comments, which is that in order to decrease one aspect of the system, something else *must* increase. Given the laws of physics, at some point the combined requirements of energy efficiency and cycle time limits make producing qualifying products impossible.

We also note the strange timing of an EPA proposal to increase the stringency of the dishwasher ENERGY STAR eligibility criteria. The proposed levels will likely lengthen cycle time despite (1) a DOE proposed rule to create a new product class for dishwashers with normal cycles under one hour that cites consumer dissatisfaction with long cycle times as one of the reasons supporting the proposal,<sup>4</sup> and (2) the President's recent remarks about his concerns regarding dishwasher performance and cycle length.

- Not all elements of the wash performance can be altered and maintain product functionality. For example, wash temperature must be warm enough to activate the detergent, otherwise the dishwasher will lose its utility. This is a critical point because water heating is the biggest contributor to energy use regardless of the manufacturer and because once that lever has been pulled as far as it can, that leaves fewer options for manufacturers to consider other than lengthening cycles in order to maintain cleaning performance.

In addition to these performance challenges, AHAM indicated that, at the proposed energy conservation standards levels, it believed consumers might be more likely to select cycles or options other than the “normal” cycle tested under the DOE test procedure. Those cycles/options could use more energy and/or water and, thus the projected energy savings would be lost. In addition, as a “rebound effect,” consumers could choose to run the dishwasher more than once to reach the desired level of cleanliness or pre-rinse dishes before placing them in the dishwasher, both of which would negate the projected energy savings.

AHAM also presented additional data to DOE on cleaning performance testing to demonstrate that the proposed dishwasher standards would negatively impact performance.<sup>5</sup> AHAM incorporates our memorandum on this additional testing by reference here and it is attached at Exhibit B.

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<sup>4</sup> See Energy Conservation Standards for Dishwashers, Grant of Petition for Rulemaking; EERE-2018-BT-STD-0005.

<sup>5</sup> See Memorandum from Jennifer Cleary to DOE, Ex parte Communication, NOPR for Energy Conservation Standards for Residential Dishwashers, Docket No. EERE-2014-BT-STD-0021 (July 31, 2015).

For this testing, AHAM investigated its concern that the proposed levels would negatively impact performance by making it more difficult for dishwashers to remove adhered soils and grease, therefore resulting in buildup over time on the dishes. This would not be revealed by a single performance test using the ENERGY STAR performance test procedure. Thus, AHAM members conducted the ENERGY STAR performance test with slight variations. One set of testing focused on grease and buildup over time. The second set of testing focused on adhered soils and particulates. The ENERGY STAR performance test does not evaluate these areas—the test upon which it is based—ANSI/AHAM DW-1-2010—is meant to measure the redistribution of soils and, thus, uses soils best suited for that purpose. Consumer panels were asked to comment on the cleanliness of the dishes at the existing DOE standards levels as well as more stringent levels. Pictures of the results are included in the memorandum attached at Exhibit B.

For the first set of testing, which focused on grease and buildup over time, the consumer feedback showed that consumers generally accept performance of dishwashers meeting existing energy conservation standards, but some do have concerns with performance—this is true across dishwasher brands. Conversely, consumer feedback on the levels DOE was analyzing, which are similar to the levels EPA is proposing for Version 7.0, was overwhelmingly negative. Comments included that the dishes seemed dirty and unsanitary and that consumers could see grease on them and would not eat off them.

For the second set of testing, which focused on adhered soils and particulates, the consumer comments show that consumers generally accept performance of dishwashers meeting existing energy conservation standards, but do have some concerns with performance—this is true across dishwasher brands. The results were, however, overwhelmingly negative at the considered 234 kWh/year and 3.1 gal/cycle level, with consumers stating that the dishes were unsanitary, unappetizing, filthy, and gross.

As a result of this testing, AHAM commented “**AHAM believes that anything more stringent than the upcoming ENERGY STAR level of 270 kWh/year and 3.5 gallons/cycle for standard size dishwashers will negatively impact performance. As discussed above, manufacturers report, and consumer feedback shows, signals of consumer dissatisfaction even at less stringent levels, such as today’s standard.**”<sup>6</sup>

B. Data Demonstrate Diminishing Returns and Do Not Support Continuation of the ENERGY STAR Specification for Residential Dishwashers.

Additional, cost-effective efficiency gains are not achievable with existing technology and thus, the ENERGY STAR specification for residential dishwashers should be sunset.

EPA’s data analysis is fundamentally flawed in several areas and a revised analysis demonstrates that it is appropriate to sunset the ENERGY STAR specification for residential dishwashers.

First, in evaluating consumer and energy savings, EPA compares proposed revised specification levels to Federal energy conservation standards. EPA should instead be comparing its proposed

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<sup>6</sup> *Id.* at 12.

revised levels to the existing ENERGY STAR levels as opposed to a scenario under which EPA did not institute new levels. EPA should evaluate whether these savings justify *revised* levels, particularly when compared to manufacturer cost and burden. This is not to say that EPA should not also look at the savings comparing a revised level to the Federal minimum when stating ENERGY STAR’s benefits. But that is not the proper comparison for deciding whether it is appropriate to revise an ENERGY STAR level. This is especially the case for dishwashers given that close to 90 percent of dishwashers currently meet the ENERGY STAR Version 6.0 criteria according to EPA. Under those circumstances, claiming energy and water savings as compared to products at the standard level artificially inflates the potential savings.

For standard size dishwashers, EPA estimated consumers will save approximately \$16 annually or \$190 over the lifetime of the dishwasher, which it assumes is 12 years. Comparing energy savings between ENERGY STAR Version 6.0 and the proposed Version 7.0 instead of to energy conservation standards results in a much lower savings to consumers. The tables below show the revised calculations. Energy savings for consumers decrease by almost half to \$3.90 per year and only \$0.68 cents per year for water savings for a total of approximately \$7.60 per year (This is includes an approximate \$3.03 gas savings, which is kept constant). These minimal savings demonstrate the diminishing returns for continued increasing stringency in dishwasher specifications and do not justify a continued ENERGY STAR specification for this product category.

Comparison	ENERGY SAVINGS			
	Annual Savings kWh	Annual Cost Savings (\$)	Lifetime Savings kWh	Lifetime Cost Savings (\$)
Federal Standard vs. ENERGY STAR V 7.0	67	8.70	804	104.44
ENERGY STAR V 6.0 vs. ENERGY STAR V 7.0	30	3.90	360	46.76

Comparison	WATER SAVINGS			
	Annual Savings gal	Annual Cost Savings (\$)	Lifetime Savings Tgal	Lifetime Cost Savings (\$)
Federal Standard vs. ENERGY STAR V 7.0	387	4.08	4.6	48.95
ENERGY STAR V 6.0 vs. ENERGY STAR V 7.0	65	0.68	0.8	8.16

\*Note: All other assumptions made in the EPA analysis remain the same. Gas savings remains constant. Average purchase cost remains constant

Second, EPA’s methodology for evaluating consumer payback is seriously flawed and needs to be not only changed, but done uniformly. Currently, EPA selects models it believes are similar but for efficiency and calculates a retail price differential between them. The theory is that by selecting models with similar features, EPA can isolate the cost of improved efficiency. In many instances, EPA has selected only one set of models for comparison.

EPA’s approach is flawed in part because it does not take into account that different manufacturers have different cost structures. Thus, EPA could be comparing apples to oranges. Moreover, EPA often relies upon a single data point or only a couple of data points which may or may not be representative. If EPA continues with this flawed methodology, it should at least know the shipments associated with the model pairings it selects so it can identify whether the models are representative of the market.

AHAM recalculated the payback period correcting only for the inflated comparison of proposed Version 7.0 levels to the energy conservation standards. When comparing instead to the Version 6.0 ENERGY STAR eligibility criteria, the payback period is 10.4 years, which is nearing the average useful life of the product according to EPA’s assumed 12 years. Were EPA to correct its other assumptions per AHAM’s comments below, we expect that payback period would be significantly longer and would likely exceed the average useful life of the dishwasher. Even assuming the lower payback period of 10.4 years, this payback period far exceeds the target payback period of between two and five years in the ENERGY STAR Products Program Strategic Vision and Guiding Principles. This is further support for AHAM’s position that it is time for DOE and EPA to sunset the ENERGY STAR specification for residential dishwashers.

Comparison	PAYBACK ANALYSIS			
	Annual Operation Cost (\$)	Average Purchase Cost Per EPA (\$)	Average Payback (years)	Total Lifetime Savings (\$)
Federal Standard	51.21	521.54	3.7	190
ENERGY STAR V 7.0	38.43	569.28		
ENERGY STAR V 6.0	43.00	521.54	10.4	91
ENERGY STAR V 7.0	38.43	569.28		

\*Note: All other assumptions made in the EPA analysis remain the same. Gas savings remains constant. Average purchase cost remains constant

Third, EPA does not currently evaluate the incremental costs manufacturers would incur in reaching the proposed criteria and does not always consider in detail the technology options manufacturers could avail themselves of to meet the criteria. These analyses, of course, rely on confidential data from manufacturers. DOE’s analysis for minimum energy conservation standards is a good starting place and can often provide the analysis necessary. If that data is out of date, EPA should reach out to manufacturers to fill any gaps. It is important that EPA consider not only the environmental and consumer benefits associated with a specification change, but also the impact on manufacturers. Although the ENERGY STAR program is technically voluntary, its success essentially mandates it in the market for home appliances. Moreover, manufacturers are EPA’s partners in the program—without manufacturer innovation, the program could not succeed. Thus, the impact on manufacturer partners should be of utmost importance to EPA.

In its analysis on a proposed revised dishwasher specification, EPA states dishwasher technology has made numerous advancements that increase energy and water efficiency. Some of the technologies that EPA believes improve washing and efficiency include in-sump heaters, variable-speed motors, new spray-arm geometry, and flow through heating. EPA further states

that advancements in drying technology seen on the market include automatic door releases, fan drying, and desiccant drying among others. EPA believes additional improvements in water use have been delivered through better food filters and soil-sensing controls.

Evaluating data AHAM collected to respond to DOE's energy conservation standards rulemaking in 2015, up to 84 percent of dishwasher models are using at least some of the technology options EPA and DOE identified could be used to meet the proposed Version 7.0 levels to meet today's less stringent levels. Thus, they may not be available for use to meet more stringent ENERGY STAR qualification criteria. This supports AHAM's proposal that EPA and DOE sunset the residential dishwasher ENERGY STAR specification until such time as cost-effective technologies are available to further improve energy and water efficiency without negatively impacting performance, including cleaning performance, cycle length, drying performance, and noise level.

Finally, EPA typically evaluates the number of models that would meet proposed levels rather than looking at the shipments those models represent. AHAM recognizes this approach is outlined in the ENERGY STAR Products Program Strategic Vision and Guiding Principles. However, the approach is flawed because simply counting models can miss the penetration of those models in the market. It could be that the models meeting the proposed levels are low volume models and, thus, those models may not be representative of the market. And, if the models meeting the proposed criteria are relatively unavailable, that could mean the proposed levels will not actually achieve the consumer and environmental benefits EPA estimates in its analysis. Instead, EPA should use shipments to evaluate the products that would meet proposed levels.

## **II. EPA Should Work to Increase Dishwasher Ownership and Proper Use.**

AHAM requests that EPA partner with key stakeholders to launch and run a campaign that (1) promotes increasing proper consumer usage of dishwashers, and (2) promotes ownership of dishwashers in U.S. homes. Increasing consumer adoption and proper use of dishwashers by even a small percentage of American consumers would save significantly more water and energy than moving from ENERGY STAR Version 6.0 to Version 7.0 Draft 1. Such a campaign could expand and enhance EPA's current messaging on best practices for dishwasher use. EPA already suggests that consumers take advantage of its best practices to save money on utility bills.<sup>7</sup> One of EPA's recommendations for dishwashers is "scrape don't rinse." According to EPA, rinsing dishes can use up to 20 gallons of water before the dishes are loaded in the dishwasher. EPA states, "ENERGY STAR qualified dishwashers and today's detergents are designed to do the cleaning so you don't have to." EPA even suggests that consumers use their dishwasher's rinse feature for dishes that sit overnight instead of hand rinsing.

AHAM agrees that pre-rinsing should be avoided and that today's dishwashers are designed to effectively clean and rinse the dishes without the need for pre-rinsing. It is well understood that consumers still pre-rinse and/or hand wash dishes instead of using their highly efficient dishwasher and that pre-rinsing and handwashing use significantly more water than today's dishwashers. As such, there are significant water (and energy) savings to gain by educating

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<sup>7</sup> [https://www.energystar.gov/products/appliances/dishwashers/best\\_practices](https://www.energystar.gov/products/appliances/dishwashers/best_practices)

consumers to use their dishwashers more often and to use the correct cycle to clean the dishes. There are other recommendations that EPA should make to consumers to further reduce water and energy use and AHAM would be glad to work together with EPA and other stakeholders on those messages.

Additionally, according to RECS 2015 data, only about 66 percent of U.S. households own a dishwasher. This is supported by AHAM's 2015 consumer research, which show that 64 percent of U.S. households own a dishwasher. Dishwashers clean dishes using much less water than hand washing. Thus, promoting dishwasher ownership and the associated significant savings in owning and properly using a dishwasher would result in additional significant energy and water savings.

AHAM believes several stakeholders would have interest in supporting such a campaign. This includes AHAM members and, possibly, detergent manufacturers, and consumer advocacy groups. This type of education campaign could be pursued whether or not EPA decides to sunset the ENERGY STAR specification for dishwashers.

### **III. EPA Should Not Set a Performance Minimum.**

EPA proposes to amend the ENERGY STAR certification scope to exclude residential dishwashers that do not demonstrate a minimum cleaning per-cycle cleaning index score of 70 using the ENERGY STAR Test Method for Determining Residential Dishwasher Cleaning Performance (Rev. Feb-2014) (ENERGY STAR performance test).

**AHAM agrees that product performance must be maintained for the consumer. That is at the heart of our proposal that EPA and DOE sunset the ENERGY STAR specification for dishwashers.** Our view is that because performance for many dishwashers will likely be negatively impacted, and because, as described below, there is little economic or energy savings justification for continuing to revise the ENERGY STAR specification, EPA should claim success and sunset the ENERGY STAR specification.

We appreciate EPA's commitment to ensuring product performance is maintained. But, as we have commented many times in the past, AHAM objects to EPA including cleaning performance minimums in ENERGY STAR specifications as the method for doing so. Instead, in order to ensure that product performance is maintained, EPA should conduct its analysis in the same way DOE conducts analysis in setting energy conservation standards: by assessing performance impacts of more stringent levels in order to ensure performance will not be degraded by the proposed eligibility criteria. EPA should not stray from the approach its sister agency, DOE, takes with regard to energy conservation standards, particularly given that the two agencies are supposed to work together to administer the ENERGY STAR program.

Manufacturers themselves have the most interest in ensuring that consumers receive superior performance, regardless of the energy and water efficiency of the product. It should not be the role of government—especially in a voluntary program operating outside the Administrative Procedure Act protections and authorized for the limited purpose of setting energy efficiency criteria—to set performance requirements.

In this case, as AHAM detailed in Section I above, it is likely that product performance (not limited to cleaning performance alone) at levels beyond the current ENERGY STAR level will be negatively impacted for many models and, thus, rather than set a performance threshold, EPA and DOE should sunset the ENERGY STAR specification for residential dishwashers at this time. As innovation continues and time makes technologies more accessible, it may be possible to bring the specification back at a later date.

EPA proposes to set a cleaning index score of 70 using the ENERGY STAR Test Method for Determining Residential Dishwasher Cleaning Performance (Rev. Feb. 2014) for purposes of determining eligibility. Aside from AHAM's general opposition to EPA setting cleaning performance minimums as part of the ENERGY STAR program and our proposal to sunset the ENERGY STAR specification for residential dishwashers, EPA's proposal is fraught with problems:

1. EPA has not demonstrated that the cleaning index of 70 is consumer relevant. EPA has done no consumer research to show that a cleaning index of 70 reflects consumer expectations of cleaning performance. EPA merely indicated that products in the market at this level all have positive public reviews.<sup>8</sup> But those reviews do not directly correlate to EPA's proposed level of 70—they are not even based on the same test method. Moreover, without surveying consumers on whether they would accept varying levels of product performance, as shown through testing under the ENERGY STAR performance test procedure, EPA cannot know whether consumers would only accept higher performance or could accept lower levels.
2. As discussed above, EPA's proposed criteria ignore all performance aspects other than cleaning performance and EPA made no effort to determine the consumer relevance of the other performance attributes, though its updated data set does give a cursory look at these areas. A performance threshold that addresses only a single performance attribute is not consumer relevant because it ignores the fact that the dishwasher is a holistic system. To decrease energy and water levels and maintain cleaning performance, other attributes such as cycle length will suffer. By requiring energy and water levels and a cleaning performance level, EPA could essentially force manufacturers into sacrificing other performance attributes in order to qualify for ENERGY STAR.
3. The ENERGY STAR performance test procedure continues to be too variable to be used for mandatory eligibility criteria. AHAM has told EPA this before and has previously provided EPA the AHAM round robin testing data to prove that the proposed cleaning performance test simply does not work for the purpose of setting or demonstrating compliance with a minimum performance threshold. The test upon which the performance portion of the ENERGY STAR performance test is based—ANSI/AHAM DW-1—was not designed for regulatory purposes. Manufacturers use it in their product development efforts, which does not require the same precision in repeatability and reproducibility as a performance threshold

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<sup>8</sup> AHAM does not dispute that there are products on the market that appear to be able to offer good cleaning performance at levels beyond the current ENERGY STAR level. However, the number of products is limited and they appear to be mostly niche products. Those models may have unique or costly technology that may not be possible or economically justified to employ more broadly.

does. (Additionally, the AHAM test is not even meant to measure cleaning performance as EPA is trying to do. It is meant to measure redeposition of soils. The soils are designed for that purpose.)

4. AHAM has been working to improve the repeatability and reproducibility of ANSI/AHAM DW-1. In order to assess recent changes the AHAM DW-1 Task Force made to the test to improve repeatability and reproducibility, the Task Force conducted a round robin. Like the previous round robin, the results show that while the changes improved repeatability, there is still significant variation especially lab to lab. The scoring results, using the AHAM scoring method, showed a range of approximately 1.5 standard deviations (94.7 to 57.6 for the soil-sensing units tested and 67.6 to 41.3 for the non-soil sensing unit tested). Accordingly, scores provided using the existing ENERGY STAR performance test would be questionable. It is difficult to compare data accurately and confidently across manufacturers given the concerns raised about reproducibility. If the test results are variable, there is no way to make a meaningful comparison across models or brands.
5. As we have previously commented, scores using the existing ENERGY STAR performance test will be questionable given the level of variation our round robin testing demonstrated, even if EPA were to use the updated version of AHAM's DW-1 (which will be renamed to DW-2). The actual score could be anywhere in the range the standard deviation encompasses meaning that it is possible that a score of 70 could be 96.3 or 65.7. Thus, if a different laboratory conducted the testing, the model might not be eligible. Similarly, a score lower than 70 could actually meet the criteria if tested by another laboratory, but the model would nevertheless be ineligible for ENERGY STAR.
6. EPA seems to suggest that the mere fact that the Most Efficient specification has included a cleaning performance minimum (over AHAM's strong objection) and required performance score reporting means that the repeatability and reproducibility concerns AHAM raised and that ultimately led EPA to step back from requiring a performance minimum, means that the repeatability and reproducibility concerns no longer exist. However, that is a baseless assumption. Manufacturers had extensive experience with AHAM DW-1 long before EPA and DOE adopted it in the ENERGY STAR performance test. Lack of experience is not driving variation. And, the fact that manufacturers seeking the Most Efficient designation have submitted performance data sheds no light on repeatability and reproducibility. EPA has not sought data on several units as part of the Most Efficient requirements, nor have DOE or EPA conducted a round robin. Thus, there is no data AHAM is aware of to indicate repeatability and reproducibility concerns have been addressed. To the contrary, AHAM's test results show that, even with improvements to the clarity of AHAM DW-1, the concerns remain. A highly variable test should not serve as the basis for a mandatory requirement, even for a voluntary program.
7. The fact that the ENERGY STAR performance test has such high variation makes verification virtually impossible. Because the test is not reproducible, it would be highly likely that there would be false findings of non-compliance.

8. EPA states that it has “not and will continue to neither post nor make public the cleaning performance data that can be identified to a specific model, nor will it be subject to verification testing.” AHAM agrees that, should EPA not sunset the ENERGY STAR specification for residential dishwashers and continue with its flawed proposal to require a cleaning performance threshold, any cleaning performance index scores EPA collects should not be posted on the ENERGY STAR qualified products list. Given the inherent variation in the data, it would be confusing and misleading to provide it to consumers.

#### **IV. EPA Should Not Require Soil Sensors.**

EPA is considering requiring dishwashers have a soil sensor and algorithm to qualify for ENERGY STAR. To that end, EPA is requesting information on the impacts of soil sensor systems on cleaning performance.

As discussed above, AHAM proposes that DOE and EPA sunset the ENERGY STAR specification for residential dishwashers. This would be true whether or not EPA limited the specification to dishwashers with soil sensors. Moreover, it is outside the scope of the ENERGY STAR program to determine which features manufacturers provide to consumers. Whether a model is soil sensing is tied to consumer preference that is for the market to determine based on consumer needs. Manufacturers are best situated to make that determination as it is in their best interest to make products consumers will buy. EPA must not stray from its strategic vision for the ENERGY STAR program, which is to reduce greenhouse gas emissions by removing barriers in the market that deter consumers and others from purchasing the most energy-efficient product model that otherwise meets their needs. The ENERGY STAR program must remain squarely focused on energy efficiency and not create design requirements.

#### **V. EPA Improperly Relied Upon A Five Percent “Engineering Factor.”**

EPA indicates they estimated that approximately 15 percent of all standard residential dishwashers on the market meet the proposed criteria based on rated values and 28 percent using measured values with a five percent “engineering factor,” which its consultant, ICF, indicated it determined based on “appliance experience.” EPA and ICF used measured values submitted by manufacturers/Certification Bodies as part of the ENERGY STAR certification process for this analysis.

**AHAM takes strong exception to EPA and ICF using highly confidential, and business-sensitive data—measured values—required to be reported to EPA under the certification process as part of the specification setting analysis.** Manufacturers have an understanding that data and information it submits to EPA will be kept confidential and used only for the purposes for which it is collected.<sup>9</sup> EPA’s decision to use this information to portray marginally more support for the proposed levels is a direct breach of trust. AHAM has previously communicated its concern about throwing data over the transom to EPA without an understanding of how it would be used, and this is a prime example of the reason for that concern.

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<sup>9</sup> To AHAM’s knowledge, EPA has not stated a clear purpose for collecting measured values.

The misuse of this data has made AHAM and its members incredibly wary of providing any unnecessary data to EPA or ICF in response to requests for information in this proposed specification or in any other context. We will also consider requesting that EPA no longer collect measured values—which we have long objected to in the first place—as part of its certification requirements. DOE does not even collect that data for purposes of demonstrating compliance with mandatory standards, so it is unclear why EPA collects it for a voluntary program.

Even if EPA and ICF’s repurposing of and reliance on confidential and highly sensitive business information were not a breach of trust, the use of a five percent engineering factor to increase the number of models that could potentially meet EPA’s proposed level is misguided, and demonstrates a lack of understanding of conservative ratings. Manufacturers typically report conservative values—which are not uniformly five percent less efficient than measured values—in certification reports in order to ensure that consumers always get the represented value or better and to ensure that, upon verification, all products meet the rated value. The reason conservative rating is necessary is to account for statistical variation based on a variety of factors such as variation in supplied components and variation in manufacturing. In fact, conservative rating is a practice DOE has expressly permitted and encouraged.<sup>10</sup> Moreover, ratings are set based on many tests, not just the tests submitted to EPA. Data provided for certification to EPA likely does not take into account the many types of variation for which manufacturers must account. And because these types of variation are inherent in the manufacturing process, manufacturers are not ever likely to rate at measured values. This is relevant because it is the rated value that is used to determine eligibility for ENERGY STAR, not the measured value.

EPA’s reliance on measured values to support its proposed Version 7.0 specification will likely drive manufacturers to even more conservatively rate products to ensure compliance. This could even further risk performance and increase cycle times and it will make it harder for products to qualify for ENERGY STAR because they may not be able to meet the energy, water, and performance criteria, let alone manufacturers’ own requirements for products that will be acceptable to consumers. This shows the error in EPA and ICF’s thinking—the fact that a product’s measured value might meet the proposed level does not mean manufacturers will claim that level and certify the product to ENERGY STAR. As energy requirements get more stringent, the opposite is true—with more stringent standards, there is less room for error and conservative ratings become even more important and, simultaneously, more difficult.

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<sup>10</sup> See Energy Conservation Program: Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment, Final Rule, 76 Fed. Reg. 12422, 12429 (Mar. 7, 2011) (“[M]anufacturers may rate models conservatively, meaning the tested performance of the model(s) must be at least as good as the certified rating, after applying the appropriate sampling plan. *The sampling plans are designed to create conservative ratings, which ensures that consumers get—at a minimum—the efficiency indicated by the certified rating.* In this final rule, DOE allows manufacturers to use conservative ratings beyond those provided by the sampling plans.”) (emphasis added).

## VI. Connected Criteria

Because AHAM proposes that EPA and DOE sunset the ENERGY STAR specification for residential dishwashers, we do not believe it is necessary to update the applicable connected criteria. Nevertheless, we offer the following comments on EPA's proposal.

### A. Cybersecurity and Safety

The draft specification states that EPA is exploring data security reporting requirements for models with connected functionality. EPA should not be engaging in cybersecurity activities. It has neither the resources nor the expertise required to engage substantively on the issue. More importantly, it is completely outside the scope of the mandate of the ENERGY STAR program.

The Consumer Product Safety Commission (CPSC), the Federal Trade Commission, the Federal Communications Commission, the Department of Homeland Security, and DOE have all requested public comment to consider the roles they might play in this area based on appropriate statutory delegations of authority. EPA has no such designation and these other agencies, which are more appropriately situated, can address this issue.

Additionally, a number of entities have published cybersecurity standards and frameworks on cybersecurity. The National Institute of Standards and Technology (NIST) is developing a cybersecurity framework. Standards development organizations, such as UL, CSA, and CTIA (the trade association for the telecommunications industry), have published or are in the process of publishing cybersecurity standards that allow for third party certification. EPA may choose to engage in any interagency task forces that might exist, but any independent action by EPA on cybersecurity is likely to be redundant at best, or ill-informed at worst. The ENERGY STAR program should not go beyond criteria directly relating to energy.

Similarly, the connected criteria in the draft specification makes passing references to safety. Again, the ENERGY STAR program has no mandate or authority to address product safety issues. Further, there is no need for EPA activity in this area. AHAM and other industry partners are already working to update existing safety standards to incorporate provisions to cover connected product. Traditionally, this activity falls within the purview of the CPSC and should remain as such. The ENERGY STAR program should focus on energy-related issues without getting involved in regulatory activities that have existing and well-functioning programs.

### B. Delay Appliance Load Capability; Section 4 – Connected Criteria, Subsection G – Demand Response, 1.b

The draft specification states that “[t]he consumer shall be able to override the product’s DAL response before or during a delay period.” AHAM believes that, if EPA does not adopt AHAM’s recommendation to sunset the dishwasher specification, the specification should go a step further and allow manufacturers to give consumers an option to disable permanently a product’s DAL response without negatively impacting its assessment under the ENERGY STAR program.

ENERGY STAR began using this criterion when EPA and appliance manufacturers believed that time of use pricing would be a widely available option that utilities offered. Currently, only two percent of Americans live in an area where time of use pricing is available, and even many of those consumers do not have the option as initially envisioned. The consumer should not have to deal with the inconvenience of disabling this function for every cycle and should have the option of permanently disabling it until time used pricing becomes widely available. Without this ability, consumers may be less likely to purchase products with DAL response capability, which means that if and when utilities make programs available, fewer consumers will be ready to take advantage of them.

C. Temporary Appliance Load Reduction;  
Section 4 – Connected Criteria, Subsection G – Demand Response, 2.a

The draft specification calls for “default settings that enable a response for a time period of at least 10 minutes.” Should EPA move forward with revising the dishwasher specification over AHAM’s objection, EPA should consider placing a cap on the period of no more than 15 minutes because any longer period may have negative impacts on efficiency. For example, the water the device uses may need reheating after a 15-minute period.

D. Energy Consumption Reporting;  
Section 4 – Connected Criteria, subsection G

Section D, Energy Consumption Reporting requires the product to be capable of transmitting energy consumption data to energy management systems and other consumer authorized devices, services, or applications. EPA recommends that the data be reported in watt-hours for intervals of 15 minutes or less.

Should EPA move forward with revising the dishwasher specification over AHAM’s objection, AHAM seeks to confirm that this requirement is not at odds with DOE’s requirements on reporting energy per the DOE test procedure. We do not believe it is because the communication of this information is not a claim related to energy use, but rather a reporting of real-time energy consumption to the consumer. Nevertheless, it would be helpful to confirm this understanding.

AHAM appreciates the opportunity to submit these comments on the ENERGY STAR Product Specification for Residential Dishwashers, Draft 1, Version 7.0 and would be glad to further discuss these matters should you so request.

Best Regards,



Jennifer Cleary  
Vice President, Regulatory Affairs

# **Exhibit A**



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March 25, 2015

By E-mail

Ms. Brenda Edwards  
Department of Energy  
Building Technologies Program  
Mailstop EE-5B  
1000 Independence Avenue, SW  
Washington, DC 20585-0121

ResDishwashers2014STD0021@ee.doe.gov

Re: AHAM Comments on DOE's NOPR for Energy Conservation Standards  
for Residential Dishwashers; Docket No. EERE-2014-BT-STD-0021; RIN 1904-AD24

Dear Ms. Edwards:

The Association of Home Appliance Manufacturers (AHAM) respectfully submits the following comments to the Department of Energy (DOE or Department) on its Notice of Proposed Rulemaking (NOPR) for Energy Conservation Standards for Residential Dishwashers; Docket No. EERE-2014-BT-STD-0021; RIN 1904-AD24, 79 Fed. Reg. 76,142 (Dec. 19, 2014).

AHAM represents manufacturers of major, portable and floor care home appliances, and suppliers to the industry. AHAM's more than 150 members employ tens of thousands of people in the U.S. and produce more than 95% of the household appliances shipped for sale within the U.S. The factory shipment value of these products is more than \$30 billion annually. The home appliance industry, through its products and innovation, is essential to U.S. consumer lifestyle, health, safety and convenience. Through its technology, employees and productivity, the industry contributes significantly to U.S. jobs and economic security. Home appliances also are a success story in terms of energy efficiency and environmental protection. New appliances often represent the most effective choice a consumer can make to reduce home energy use and costs.

AHAM supports DOE's efforts to save energy and has long engaged with the Department in its process to promulgate energy conservation standards supported by substantial evidence. But, procedurally and substantively, this rulemaking has been badly handled and is fatally flawed. By rushing, for what AHAM believes are political expediency purposes, only to issue a proposed rule without any pre-proposal stakeholder engagement—contrary to the letter and spirit of the Process Improvement Rule, Executive Orders, and good policy and governance—DOE has issued a radical, unsupported, and inappropriate proposed standard. As discussed in these comments, the proposed rule fails to comply with myriad of the specific criteria and relevant

considerations in the Energy Policy and Conservation Act (EPCA), much less DOE's Process Improvement Rule. Ultimately, DOE has failed to show that the proposed standard is technically feasible or economically justified per 42 U.S.C. §§ 6295(o)(2) and (p).

The result is a proposal which, if finalized as proposed over AHAM's strong objection, will be a bad national standard for both consumers and manufacturers. It will threaten the existence of the basic, popularly priced dishwasher in America. In addition, DOE's proposal will not pass judicial muster. Not only must a final rule comply with the numerous procedural and substantive criteria discussed in these comments, but it would be reviewed by a U.S. Court of Appeals under the heightened "substantial evidence" level of review, not the basic Administrative Procedure Act "arbitrary and capricious" review. *See* 42 U.S.C. § 6306(b)(2).<sup>1</sup> DOE's proposal does not even pass muster under the basic arbitrary and capricious review, and certainly not under the substantial evidence review.

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<sup>1</sup> *NRDC v. Herrington*, 768 F.2d 1355, 1369 (D.C. Cir. 1985) ("Although DOE developed the rules under review through informal rulemaking, EPCA expressly provides that the substantial evidence standard guides our review of factual findings." (citing EPCA § 336(b)(2))); *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201, 1214 (5th Cir. 1991) ("The substantial evidence standard mandated by [TSCA] is generally considered to be more rigorous than the arbitrary and capricious standard normally applied to informal rulemaking," *Environmental Defense Fund v. EPA*, 205 U.S. App. D.C. 139, 636 F.2d 1267, 1277 (D.C. Cir. 1980), and 'afford[s] a considerably more generous judicial review' than the arbitrary and capricious test. *Abbott Laboratories v. Gardner*, 387 U.S. 136, 143 (1967), *overruled on other grounds*, *Califano v. Sanders*, 430 U.S. 99 (1977). The test 'imposes a considerable burden on the agency and limits its discretion in arriving at a factual predicate.' *Mobil Oil Corp. v. FPC*, 483 F.2d 1238, 1258 (D.C. Cir. 1973)."); *Industrial Union Department, AFL-CIO v. American Petroleum Institute*, 448 U.S. 607, 705 (1980) (Marshall, J., dissenting) ("This [substantial evidence] standard represents a legislative judgment that regulatory action should be subject to review more stringent than the traditional 'arbitrary and capricious' standard for informal rulemaking. . . . Careful performance of this [inquiry] is especially important when Congress has imposed the comparatively more rigorous 'substantial evidence' requirement.").

## I. DOE's Failure to Follow the Process Improvement Rule and Executive Orders Resulted in Poor and Unsupported Analysis

DOE published the proposed rule for energy conservation standards for residential dishwashers without engaging in any of its usual preliminary rulemaking activities established in its own Process Improvement Rule. For example, DOE did not:

- Contact manufacturers for manufacturer interviews;<sup>2</sup>
- Publish a request for information, notice of data availability, or framework document providing DOE's early plans for analysis and seeking public comment, information, and data; or
- Publish a preliminary technical support document.

Instead, DOE developed the proposed rule behind closed doors, without early engagement from any stakeholders. DOE's failure to consult with stakeholders in developing its proposal means that DOE had no choice but to rely on data from the last rulemaking as updated somewhat by Compliance Certification Database (CCMS) and limited product tear downs. The result is a proposed rule that, because it is based on old and obsolete data, is not only arbitrary and capricious, but is also unsupported by substantial evidence.

AHAM objects to DOE's short-circuiting of the Process Improvement Rule which contemplates the very preliminary rulemaking steps in which DOE neglected to engage. While DOE may rationalize that it is not legally required to follow the Process Improvement Rule, for nearly 20 years DOE and stakeholders have recognized the wisdom in doing so.<sup>3</sup> In fact, the Process Improvement Rule was developed, in large part, in reaction to a 1990s appropriations moratorium on DOE's rulemakings because the Department was conducting non-transparent analyses in isolation from reality, as it has done in this case, which resulted in the need for much more engagement among government, DOE contractors, and industry stakeholders. The process established in that rule provides DOE with a better understanding of the realities of the current market and product mix and could have prevented many of the analytical errors that are strewn

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<sup>2</sup> DOE, through its contractor Navigant Consulting, did reach out to manufacturers for interviews *after* DOE had already sent a proposed rule to the Office of Management and Budget (OMB) for review. That is not the usual order of things, and it obviously deprives manufacturers of meaningful opportunity to impact the proposed rule. Practically, given the time constraints of the post-NOPR period, it handicaps stakeholders severely even to catch up at this stage. This is exactly why the Process Improvement Rule and Executive Orders call for pre-NOPR engagement.

DOE cannot assert that manufacturer failure to engage in after-the-fact interviews affected the quality of the proposed rule. We can only assume that OMB, recognizing the deficiencies in the data upon which DOE relied in the proposed rule, requested more information and that prompted DOE to seek it from manufacturers at that late stage in the pre-proposal process.

<sup>3</sup> It was because of the development of the Process Improvement Rule that AHAM supported removing from EPCA the previous requirement for an advance notice of proposed rulemaking.

throughout the proposed rule. In addition, the pre-proposal steps allow stakeholders time to develop more substantive comments for DOE's consideration.

The Process Improvement Rule, clearly and in detail, provides for early input from stakeholders and those principles are still sound. *See* 10 C.F.R. Part 430, Subpart C, Appendix A, § 1(a). There was no justification for DOE to deprive itself of the benefits it would have obtained if it had been, in the words of the Process Improvement Rule, “informed by comment from interested parties.” DOE would have benefited from input that would have allowed it to “[e]liminate problematic design options early in the process.” *Id.* § 1(d). DOE would, through pre-NOPR engagement with stakeholders, have had a deeper understanding of “the aggregate costs and benefits of standards, . . . the distribution of those costs and benefits among consumers, manufacturers and others, and the uncertainty associated with these analyses of costs and benefits, so that any adverse impacts can be fully considered in selecting a standard.” *Id.* § 1(f). Now DOE must catch up in order to “consider the variability of impacts on significant groups of manufacturers and consumers in addition to aggregate costs and benefits, report the range of uncertainty associated with these impacts, and take into account cumulative impacts of regulation on manufacturers.” *Id.*

The Process Improvement Rule was developed through extensive stakeholder involvement and notice and comment. DOE apparently justifies its actions in this rulemaking through a unilateral statement of its interpretation of the Process Improvement Rule. That interpretation was issued without any notice or opportunity to comment and is so buried on DOE's website that it is not even listed on the Office of General Counsel's or the EERE guidance page—it is instead available only by combing through press releases.<sup>4</sup>

Ironically, DOE's actions in this rulemaking are not even consistent with its *de facto* revision to the Process Improvement Rule. First, DOE justifies expediting and not following all of the steps of the Process Improvement Rule's pre-NOPR engagement on the grounds that DOE may need to do so to prevent it from missing statutory deadlines. But DOE is at no risk of missing a statutory deadline in this case. In fact, AHAM and efficiency advocates presented an agreed-upon dishwasher standard to DOE in 2010, well in advance of the required statutory deadline. Thus, given the timing of events, there is no reason why following the Process Improvement Rule fully would not have allowed for a timely rulemaking in compliance with the review process in 42 U.S.C. § 6295(m). Second, the unilateral guidance states that other pre-proposed rule engagement processes of a more informal nature will be pursued with stakeholders. None were followed here. So, DOE has changed the rules without notice or the opportunity to comment and then has not complied with its own new set of rules.

Here, DOE unilaterally authorized itself, through improper application of its own guidance, to waive portions of the Process Improvement Rule, and then submitted a proposed rule directly to OMB. This is an abuse of proper procedure and has resulted in a poor analysis that industry has had to spend enormous amounts of time and resources attempting to correct. The proposal can

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<sup>4</sup> *See* Press Release, Department of Energy, DOE Announces Changes to the Energy Conservation Standards Process (Nov. 16, 2010), *available at* <http://energy.gov/gc/articles/doe-announces-changes-energy-conservation-standards-process>.

be fixed, but it will take more time and resources, both DOE's and commenters', to do so now than it would have had DOE adhered to the steps laid out in the Process Improvement Rule.

This action is particularly egregious in light of the fact that the current dishwasher energy conservation standard was presented to DOE through stakeholder agreement and that industry agreed to an early compliance date for that standard. EISA 2007 established maximum energy and water use levels for residential dishwashers manufactured on or after January 1, 2010. *See* 42 U.S.C. § 6295(g)(10). Thus, compliance with the next standard for dishwashers would not have been required until 2016. Yet, in the consensus agreement, dishwasher manufacturers agreed to a standard with a compliance date in 2013, almost three years early.

Dishwasher manufacturers and AHAM have worked constructively together with energy efficiency advocates and DOE to develop past dishwasher energy conservation standards (and energy conservation standards for a full suite of other home appliances). And, though we may not always agree with DOE's final decisions, we have placed significant trust, respect, and confidence in the process DOE follows and the data DOE generates. DOE has recently been appropriately commended for its data-driven standards process. But DOE has been eroding this process as evidenced in this rulemaking. It is troubling that DOE has flaunted established procedures and proceeded in this non-transparent, non-data-driven way.

Whatever liberality or discretion DOE has to ignore or unilaterally revise the Process Improvement Rule, it does not have with respect to Presidential Executive Orders. DOE's lack of transparency and failure to engage stakeholders before issuing a proposed rule is contradictory to the White House's Transparency and Open Government Memorandum and does not comply with Executive Orders 12866 and 13563, which direct agencies, before issuing a notice of proposed rulemaking, to "seek the views of those who are likely to be affected, including those who are likely to benefit from and those who are potentially subject to such rulemaking."<sup>5</sup> AHAM urges DOE to carefully review those Executive Orders in order to make sure that its process is compliant. These Executive Orders require early outreach and dialogue to inform the rule development process—that did not occur here. The point of these Executive Orders is to emphasize the importance of meaningful public participation in the rulemaking process and specifically, they direct agencies to seek out dialogue and exchange of information and ideas from and with regulated parties *before* the issuance of any proposed rule.

## **II. DOE's Proposed Rule Relies on Insufficient and Inadequate Data**

As discussed in detail below, DOE's proposed rule suffers from a lack of accurate or adequate data. The "data" upon which DOE relies are not sufficient or adequate to support the proposed standards. For example, DOE:

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<sup>5</sup> *See* White House Memorandum for the Heads of Executive Departments and Agencies regarding Transparency and Open Government, *available at* [https://www.whitehouse.gov/the\\_press\\_office/transparencyandopengovernment/](https://www.whitehouse.gov/the_press_office/transparencyandopengovernment/); Executive Order 12866, Regulatory Planning and Review, 58 Fed. Reg. 51735 (Sept. 30, 1993); Executive Order 13563, Improving Regulation and Regulatory Review, 76 Fed. Reg. 3821 (Jan. 21, 2011).

- Relied on the data that supported the May 2012 Final Rule despite the fact that, as expected, the market has changed significantly since compliance with that standard was required on May 30, 2013;
- “Updated” the data from the last rulemaking only by reviewing DOE’s CCMS as long ago as May 22, 2014, and conducting testing and teardowns on a limited sample of models, some of which are outdated or have been removed from the market;<sup>6</sup>
- Did not seek updated cost data from manufacturers;
- Did not seek updated information from manufacturers on technology options;
- Relied on outdated and incorrect number of annual dishwasher cycles;
- Relied on a product life not supported by data; and
- Relied only on testing one element of dishwasher performance, cleanability.

The result, as is discussed more fully below, is that the proposed rule is based upon the following deficiencies as well as others discussed elsewhere in these comments:

- Incorrect product manufacturing costs;
  - Overstated cost of the Base Case unit at Efficiency Level 0;
  - Understated costs for reaching the higher Efficiency Levels;
- Outdated and incorrect number of annual dishwasher cycles;
- Excessively long expected product lifetime;
- Assumptions, not based on data, about the mass consumer appeal of the few products on the market (or once on the market) that meet Efficiency Level 3;
- Technology options that should have been removed after the screening analysis;
- Products that have been removed from the market; and
- Flawed data on the potential impacts on dishwasher performance and utility.

As discussed in detail below, the correction of this inadequate and outdated data results in significant changes to DOE’s analysis. In fact, relying upon the correct data demonstrates that DOE’s proposed levels are not economically justified for consumers or manufacturers, would negatively impact product performance, and would result in a loss of product utility and features.

The process and data DOE has used raise serious and separate concerns under the Data Quality Act.<sup>7</sup> The law and OMB Guidelines require agency actions aimed at, in the words of the law, “maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by the agency.” *Id.* At § 515(b)(2)(A). As these comments demonstrate, DOE has considerable work ahead to comply with this requirement.

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<sup>6</sup> It is odd that DOE chose to analyze models mere days prior to the June 1 deadline for dishwasher annual certification reports. Reviewing CCMS after that June 1 deadline would have provided a more up to date picture of available models.

<sup>7</sup> Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. Law 106-554; H.R. 5658).

Accordingly, AHAM has requested, by letter dated March 20, 2015, that DOE further investigate the basis for this rule through interviews with manufacturers and publish a Notice of Data Availability (NODA) or a Supplemental Notice of Proposed Rulemaking (SNOPR) when updated, accurate, and reliable data is available. AHAM welcomes DOE's March 20 announcement that it is accepting additional data in this rulemaking. These comments provide preliminary information to update and improve the accuracy of DOE's analysis and underlying data.

### **III. DOE's Proposed Standards Levels Will Negatively Impact Performance and Utility**

#### **A. Performance**

Product performance and the availability of popular models and features consumers desire is at the very essence of the bargain in EPCA between obtaining energy efficiency improvements while protecting American consumers from being deprived of popular products. This is not only meaningful to any commonsense understanding of technical feasibility—such that standard levels are technically feasible if product features and performance are maintained—but is also explicitly a requirement for economic justification under 42 U.S.C. § 6295(o)(2)(B)(IV).

Further, DOE's authority to set standards is restricted in 42 U.S.C. § 6295(o)(4) if DOE finds that the standard "is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding." This "safe harbor rule" is a critical element of DOE's analysis and is particularly important for products, such as dishwashers, which have already been subject to several energy conservation standards and for which, at this point, relatively small energy savings gains are being accomplished. Energy and water savings potential at this stage are more likely to come at the expense of performance and features than in the past.

DOE's sole analysis in this regard was limited testing according to the ENERGY STAR Test Method for Determining Dishwasher Cleaning Performance (ENERGY STAR Performance Test Method). DOE did not address in its discussion or its testing other aspects of performance such as cycle time, drying performance, and noise levels.

DOE cannot focus its attention solely on cleaning performance—there are other performance elements that are important to consumers and that are at risk as DOE proposes more stringent energy conservation standards like those in this proposed rule. The dishwasher is a holistic system—changes in one area impact other areas. The washing process, and ultimately, wash performance, is a function of washing temperatures, length of washing cycles, types and amounts of detergent applied, and mechanics.<sup>8</sup> As each of these factors changes, the other elements must

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<sup>8</sup> See, e.g., Professor Rainer Stamminger, Sustainable use of washing machine: modeling the consumer behavior related resources on consumption in use of washing machines, *available at* <http://hss.ulb.uni-bonn.de/2014/3767/3767.pdf> (2014).

compensate for the change or wash performance will suffer. For example, if washing temperatures and mechanics are decreased to meet stringent energy conservation standards, the length of the washing cycle will have to increase in order for performance to be maintained. And, as DOE's levels become more and more stringent, cycle length will reach a level unacceptable to consumers. It is likely that DOE's proposed levels will have that effect.<sup>9</sup>

AHAM data collected from manufacturers making up over 90 percent of the market show that as energy use decreases, cycle time (including dry time) gets longer. The shipment weighted average cycle time is increased by 12 percent between standard size units meeting Efficiency Level 0 and Efficiency Level 2. The few models meeting Efficiency Level 3 in AHAM's data set suggest that the shipment weighted average cycle time is increased by 37 percent between standard size units meeting Efficiency Level 0 and Efficiency Level 3. As DOE recognized, this increase in cycle time increases the total cycle time and is likely to be unacceptable to consumers: "DOE testing suggested that manufacturers may have to consider extending the cycle time in order to maintain cleaning performance in dishwashers with reduced energy and water use at TSL 3. While DOE did not modify current dishwasher designs in order to assess how long the cycle may need to be extended in order to maintain current cleaning performance, DOE is concerned that current dishwasher designs with TSL 3 energy and water use may result in consumer utility concerns." 79 Fed. Reg. at 76,181. AHAM agrees that cycle time at Trial Standard Level 3 could cause consumer utility concerns. AHAM also believes that cycle times at Efficiency Level 3 could cause those concerns. DOE has not shown why it determined that cycle times would be acceptable at Efficiency Level 3, but not at Efficiency Level 4.

In addition, not all elements of the washing process can be altered. For example, wash temperature can not be decreased beyond a certain point without severely impacting wash performance. Water must be warm enough to activate the detergent, otherwise the dishwasher will lose crucial utility. This is a critical point because water heating is the biggest contributor to dishwasher energy use regardless of the manufacturer. Thus, water heating is an energy efficiency lever that simply cannot be pulled without sacrificing the very intent of the dishwasher. As described more fully below, AHAM is concerned that there may not be enough other options for manufacturers to turn to in an effort to comply with the proposed standards, thus placing water heating and performance at risk.

It is challenging for AHAM to comment on exactly what will happen to performance at DOE's proposed levels because, according to CCMS and confirmed by AHAM data, there are very few models on the market at Efficiency Level 3 produced by only four companies. Those models may have unique, legally protected technology that may not be possible or economically justified to employ across an entire product platform for those or other companies. In addition, we believe that some of the models DOE evaluated have since been removed from the market. It is possible that they were removed due to consumer complaints about performance or loss of features. We expect that individual manufacturers will provide DOE with that information.

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<sup>9</sup> DOE indicated that the average cycle time is one hour. That is not accurate. Data AHAM collected from companies representing over 90 percent of the market indicates that shipment-weighted average cycle time is 1.76 hours. DOE should further study representative cycle times.

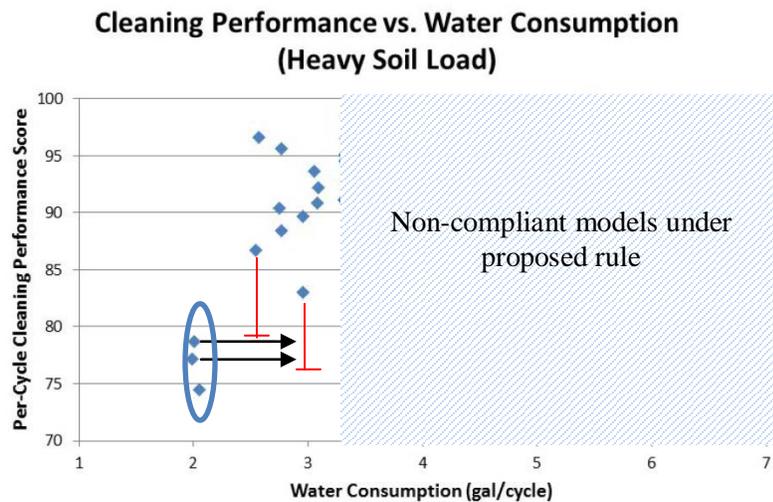
Moreover, DOE has not meaningfully considered other consumer behaviors that dishwashers meeting the proposed levels could drive. At the proposed stringent levels, AHAM believes that consumers may be more likely to select cycles/options other than the “normal” cycle tested under the DOE test procedure. Those cycles/options may use more energy or water and thus, DOE’s projected energy and water savings would be lost. In addition, as a “rebound effect,” consumers could choose to run the dishwasher more than once to reach the desired level of cleanliness which would also negate DOE’s projected energy savings. It is also possible that, at the proposed stringent levels, consumers will pre-rinse dishes before placing them in the dishwasher which will drastically increase water use.

We are surprised that DOE is willing to hang its hat on tests it has conducted on a limited sample of models using a test procedure that AHAM, in coordination with DOE, has shown to have significant variation, especially because DOE did not consider the variation in analyzing its results.<sup>10</sup> AHAM’s round robin, conducted in coordination with DOE during the development of the ENERGY STAR Performance Test Method, demonstrated that the test procedure has a

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<sup>10</sup> See 79 Fed. Reg. 76164-65. AHAM has commented numerous times on the unacceptable variation in the ENERGY STAR Performance Test Method. See, e.g., AHAM Comments on ENERGY STAR Draft 2 Test Method for Determining Residential Dishwasher Cleaning Performance, at 7 (“As AHAM previously commented, and DOE recognizes, the cleanability test procedure must be repeatable and reproducible, especially with increasing enforcement and verification testing. . . . The raw cleaning performance test data DOE provided with Draft 1 of the Draft Procedure show significant variation.”) (Nov. 9, 2012); AHAM Comments on ENERGY STAR Draft Final Test Method for Determining Residential Dishwasher Cleaning Performance, at 3-4 (commenting that DOE should suggest that one grader perform scoring in a given facility and stating that AHAM is “disappointed that DOE, based only on about 250 tests on 12 units, refuses to acknowledge what industry is collectively telling it based on running these tests *every day for more than a decade*. Accordingly, we must re-emphasize that it is critically important that the graders and the facility are consistent and that graders are trained and experienced in order to minimize variation in the test procedure. Introducing multiple graders introduces variation, especially if those graders have varying degrees of knowledge about the test. . . . We do not see any reason why DOE should not want to do what it can to reduce variation.”) (emphasis in original) (March 14, 2013); AHAM Comments on ENERGY STAR Program Requirements: Product Specification for Residential Dishwashers, Eligibility Criteria, Draft 1, Version 6.0, at 4 (“The scoring results, using the AHAM scoring method, from the round robin AHAM conducted showed a[n average] range of two standard deviations . . . It will be difficult to accurately or confidently compare data across manufacturers given the concerns we have raised about reproducibility. . . .[performance] data should not be posted on the ENERGY STAR qualified products list. Given the inherent variation in the data, it would be confusing and potentially misleading to provide it to consumers.”) (March 31, 2013); AHAM Comments on ENERGY STAR Program Requirements: Product Specification for Residential Dishwashers, Eligibility Criteria, Draft 2, Version 6.0, at 2 (reiterating comments on Draft 1) (July 22, 2014); AHAM Comments on ENERGY STAR Most Efficient 2015 Proposed Recognition Criteria, at 3 (“AHAM has commented numerous times (with supporting data from our round robin testing) that the ENERGY STAR Test Method for Determining Residential Dishwasher Cleaning Performance is not sufficiently repeatable or reproducible. And both DOE and EPA have recognized that laboratories need further experience with the test procedure.”) (Sept. 11, 2014).

maximum standard deviation of 6.76 when using AHAM scoring.<sup>11</sup> When that standard deviation is applied to DOE's test results, it is evident that DOE's proposed standard level could just as likely negatively impact performance as be neutral. Specifically, as shown below, Efficiency Level 3 performance may overlap with Efficiency Level 4 performance. The performance differentiation between Efficiency Levels 3 and 4 are not certain.



This is an unacceptable risk to American consumers for energy savings which are grossly exaggerated in any case. DOE is concluding that wash performance will be acceptable at Efficiency Level 3 based on these variable, essentially speculative results. AHAM is not confident that performance will not be negatively impacted, especially because of the miniscule number of models available that meet the proposed levels as compared to the approximately 667 standard size models and 54 compact size marketed models. But DOE seems to believe that its performance test procedure is so reliable that it knows whether consumers will be satisfied with dishwashers at this level. In light of industry's work, reviewed by DOE, what basis is there that DOE has such reliable results that it is willing to gamble with the future American dishwasher? Neither AHAM nor its members are comfortable with that decision.

## B. Utility

As discussed below, many of the technology options DOE has listed for Efficiency Level 3 are already in use today and, yet, extremely few existing models are at Efficiency Level 3. Accordingly, in addition to using all or most of the listed technology options, significant innovation will be required to meet the stringent levels DOE proposed. And that innovation, if it is possible beyond existing technology options, will come with increased cost. In order to offset that cost, manufacturers will be forced to make trade-offs potentially including loss of features

<sup>11</sup> See AHAM Dishwasher Round Robin, Presentation to DOE and EPA, at 8 (Dec. 19, 2013). We note that the AHAM round robin was not conducted on models that meet the proposed levels. But AHAM believes that the standard deviation will not decrease when testing models at more stringent standard levels. In fact, the opposite is likely to be true—variation may increase as the stringency of the standard increases.

that offer utility. In other words, because of the significant cost that will be added to meet the efficiency level, manufacturers will not offer other features. Exactly what those lost features are will vary by manufacturer, and AHAM expects that individual companies will provide confidential comments to DOE on this point.

#### **IV. The Design Changes DOE Identified for Efficiency Level 3 Are Already Being Used to a Significant Extent to Meet Energy Level Two and Are Unavailable to Justify the Proposed Standard**

DOE concluded, in Chapter 5 of the TSD, that in order to reach Efficiency Level 3, a dishwasher would require several major incremental changes, including temperature sensors and hydraulic system optimization. To reach Efficiency Level 4, DOE indicated that manufacturers would employ control strategies. DOE's analysis did not examine individual technology options, but instead rolled them together in a theoretical exercise not based on actual products.

AHAM collected data from manufacturers representing over 90 percent of shipments in 2014. The data show that 92 percent of models that do not reach Efficiency Level 3 already use hydraulic system optimization and temperature sensors. Accordingly, manufacturers will not be able to use those options to meet more stringent levels. In addition, AHAM data show that 70 percent of models in our data set already employ the control strategies DOE described for meeting Efficiency Level 4. In fact, all of the incremental changes DOE concluded manufacturers could use to improve on the design options at Efficiency Level 2 and meet Efficiency Level 3 are already in use in products that do not meet Efficiency Level 3. This is an example of DOE's out of date and inaccurate data leading to poor analysis and unjustified conclusions. DOE must review technology options further with manufacturers in order to understand the design changes manufacturers would make to meet each Efficiency Level and the technologies already in use. After getting up to speed, DOE should update its analysis and issue a NODA, at the very least, or a SNOPR.

It appears that DOE's analysis did not examine individual technology options, but instead rolled them together in a theoretical exercise not based on actual products. And, therefore, DOE does not know the cost or efficiency potential of any of the individual technology options. It is, thus, challenging to comment on DOE's assumptions. But AHAM expects manufacturers will provide, in their individual company comments, comments on the cost and, if possible, efficiency potential of the individual technology options. We also expect that individual manufacturers will comment on their use of those technology options to meet levels less stringent than Efficiency Level 3, thus exemplifying AHAM's point above—products on the market today that do not meet Efficiency Level 3 are already utilizing available technology. After updating its inaccurate analysis, DOE needs to issue a NODA or SNOPR.

## V. Shipments

DOE relied on old shipment data and never sought more recent shipment data from AHAM. Below are total domestic residential dishwasher shipments for years 2010-2014.

Year	Total Domestic Residential Dishwasher Shipments (thousands of units)
2010	5,711
2011	5,535
2012	5,702
2013	6,355
2014	6,965

## VI. The Energy Test Procedure Must Be Amended Before DOE Can Issue a Final Rule Regarding Energy Conservation Standards

Minimally acceptable engineering analysis and sound policy conclusions can only be based on a known and final test procedure which government, manufacturers, and other stakeholders have had the opportunity to use in evaluating design options and proposed standard levels. 42 U.S.C. § 6295(r) requires that an amended standard must include test procedures prescribed in accordance with 42 U.S.C. § 6293. This requirement is meaningless if needed test procedure revisions are not finalized in a sufficient period of time before a proposed rule is issued, much less finalized, so that the government and its contractors, manufacturers, and other stakeholders can evaluate the significance and the meaning of the possible standards. Otherwise, the resulting analysis is chaotic and based on speculation with results that are too similar to the Tower of Babel to be acceptable.

This is acutely important when, as is the case with dishwashers, there already have been several standards so that quantitative analysis and its implication for performance and costs are highly sensitive to even slight modifications of the test procedure. A rational analysis requires DOE to consider whether heightened standards require a modified test procedure to reduce uncertainty and variation and to take into account the much finer and sensitive calculations that will be necessary at the proposed level of stringency.

Surely no standard can pass the substantial evidence test if it is not based on a final revised test procedure, if one is required. And that revised test procedure must have been based on a full and useful opportunity for the public to comment on the procedure and its impact on proposed standards levels. Section 7 of the Process Improvement Rule which part, fortunately, DOE has not yet disavowed, states that DOE will attempt to identify any necessary modifications to establish test procedures when “initiating the standards development process.” Further, section 7(b) states that “needed modifications to test procedures will be identified in consultation with experts and interested parties early in the screening stage of the standards development process.” And section 7(c) states that “final, modified test procedures will be issued prior to the ANPR and proposed standards.”

None of this critical work has been done. The need for modifying the test procedure has been virtually ignored. And, since DOE did not engage stakeholders prior to issuing the proposed rule, there has been no early consultation with experts or interested parties.

AHAM's round robin demonstrated that the DOE energy test procedure's repeatability and reproducibility needs to be improved. This is not a new issue that we raise for the first time in these comments. During our discussion of the AHAM round robin test results, AHAM informed DOE about our concerns regarding repeatability and reproducibility of the energy test procedure and indicated that we would work on identifying potential sources of the variation. And AHAM provided DOE, in October 2013 (updated in December 2013) with raw data from the round robin that included both cleaning performance test data and energy test data. AHAM has been working over the past several years to identify potential sources of variation in the energy test and to develop proposed amendments to the DOE test procedure and ANSI/AHAM DW-1-2010 to address them. In support of that effort, AHAM sought guidance on two test procedure issues on October 15, 2014 and has yet to receive a response.<sup>12</sup> Specifically, to date AHAM has identified the following potential sources of variation in the test procedure and has been working toward a solution to present to DOE (and, in some cases, has sought guidance already):

- The test procedure does not specify whether standby testing is to be conducted with the door open or closed. AHAM believes this will have a significant impact on variation and measured energy. AHAM is working to address this issue and is attempting to understand and quantify the impact of consumer behavior.
- In AHAM's round robin, half of the labs tested with pre-wash detergent and half tested without pre-wash detergent. It also appears that there are different interpretations regarding when to apply pre-wash detergent and the amounts. These varying interpretations exist between laboratories and depend on the type of unit. AHAM believes that this difference in interpretation could be an issue of ambiguous language as well as an increase in the complexity of dishwashing systems. This interpretation will impact both cleaning performance and energy test results.
- The main wash detergent amounts differed during our round robin. For one unit, the round robin results show half of the participating laboratories tested with a pre-wash to main wash detergent ratio of 2:1 and the other three laboratories tested with a pre-wash to main wash detergent ratio of 1:1. AHAM believes that this difference in interpretation could be an issue of ambiguous language as well as an increase in the complexity of dishwashing systems. This interpretation will impact both cleaning performance and energy test results.
- The test procedure does not specify where soiled items should be placed in the rack and in relation to unsoiled items.

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<sup>12</sup> AHAM Request for Guidance on Dishwasher Test Procedure Issues (Oct. 15, 2014) (requesting guidance on the Section 5.7 SLP equation and relative humidity).

- The test procedure does not specify how dishware and flatware should be loaded into the unit under test.
- As discussed in our October 2014 guidance request, section 5.7 appears to have an error in the SLP equation. As written, the procedure will correctly capture the average annual power used by the wash cycle and the rate of power between cycles, but the time over which the low power rate is applied would be incorrect. The equation should account for the actual amount of time, not a standard length of time.
- The test procedure does not specify water hardness.
- The ambient temperature leads to different thermal hold times, which can lead to different measured energy results. AHAM is studying whether it is possible to tighten the ambient temperature range in order to improve repeatability and reproducibility.
- As discussed in our October 2014 guidance request, relative humidity can cause variation. AHAM proposed that DOE expressly state that relative humidity be that specified in ANSI/AHAM DW-1-2010. This is current industry practice.

DOE must not continue with proposed standards until it amends the test procedure to address these and any other problems. (In addition, we note that the consensus standard underlying the DOE test procedure, AHAM DW-1-2010, is currently under revision). Although some of these issues may not have caused serious problems in the past, as standards levels get more stringent, test procedure ambiguities become more acutely impactful, as the ENERGY STAR program has discovered. Without DOE action now, this situation likely will result in a lack of testing uniformity and repeatability and reasonably reliable results as required by 42 U.S.C. § 6293(b)(3). At the stringent standards levels DOE proposes, and at the other Efficiency Levels DOE analyzed, there will likely be increased rates of findings of non-compliance with the standards despite manufacturer good faith efforts.

At Efficiency Level 3, and perhaps even the other Efficiency Levels, manufacturers will have less or no room to conservatively rate in order to account for manufacturing and test procedure variation, which is unacceptable. Manufacturers need to be able to conservatively rate in order to reduce the likelihood of certification violations and ensure that consumers are getting a product at least as efficient as the claimed value. Accordingly, AHAM strongly urges DOE to address these test procedure issues and conduct follow-up testing now to determine whether any needed changes to the test procedure impact measured energy or water, as we expect they will.

DOE must complete the amended test procedure before it or stakeholders can accurately assess standards levels. This is particularly the case because DOE has demonstrated an unfortunate unwillingness to revise standards under 42 U.S.C § 6293(e) when it amends the test procedure, even when the amended test procedure impacts the stringency of the standard.

## **VII. DOE's Economic Analysis Is Based on Inaccurate Data and Is Fatally Flawed**

DOE's analyses contain numerous errors, omissions, outdated data, and logical flaws. Many of these are data errors or misassumptions used in the analyses, some are flaws in the analytical approach. Individually, and in combination, these lead to vastly different conclusions. The proposed standard levels will, in fact, lead to:

- Consumer payback periods of nearly 20 years, which is longer than the expected life of a dishwasher;
- Negative consumer life cycle savings of \$35-40 per consumer;
- National energy savings of less than 0.6 quads (resulting in savings less than would be required to qualify a covered product in the first place under 42 U.S.C. § 6295);
- Increase in water consumption of 63 billion gallons;
- Negative net present value to the economy of \$7 billion; and
- Drastic reduction in industry value of 34.7 percent and, potentially, up to 80 percent.

The incorrect DOE analyses and conclusions are caused by:

- Incorrect product manufacturing costs where manufacturers are now in the process of giving DOE's consultant, Navigant, more accurate data;
- Outdated assumptions on the number of annual dishwasher cycles including disregard for recent RECS data used extensively by DOE in its analyses in favor of 16 year old, less reliable RECS data;
- Overstated water and sewer costs ignoring the effects on average water and sewer costs of households with wells and ignoring the substantial variations in water and sewer costs from community to community;
- Excessively long dishwasher life in conflict with data and analyses published by DOE's contractor, Navigant, and with data published by AHAM;
- Understated consumer cost of capital disregarding the actual amounts and availability of cash or other liquid assets for consumers;
- Continuing reliance on the concept of "incremental" markups, which has had its theory disproved and which is in contradiction to empirical evidence; and
- Underestimate of the cost of developing and tooling new product platforms.

These issues are discussed in detail at Attachment A, where the impact of correcting each error is calculated. The combined effects of the flaws specifically related to the dishwasher analysis are summarized in the below table and further issues are discussed and their impacts shown on an individual and cumulative basis in the attached analysis.

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and Water/Sewer Costs Reduced by 13%, 174 Cycles, 13 Year Life					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	>50	\$(5-10)	11%	89%	0%
EL 2	<25	\$0-5	22%	44%	34%
EL 3 (Proposed)	<20	\$(25-30)	73%	4%	23%
EL 4	Insufficient Data for Analysis				

Given the significant errors in DOE’s economic analysis, DOE must, at a minimum issue a NODA correcting the data or, preferably, issue a SNOPR proposing a level that is economically justified when taking accurate data into account.

### VIII. Installation and Repair Costs Are Likely to Increase

DOE did not include changes in repair and maintenance costs for products more efficient than baseline products. DOE stated that it “requested that manufacturers and other stakeholders assist in developing appropriate repair and maintenance cost estimates, but it did not receive any input.” Residential Dishwasher Technical Support Document at 8-21. AHAM notes that such input was only sought *after* DOE sent a proposed rule to OMB. Thus, we question how much impact any late-provided input from stakeholders on this point could have had on a proposed rule DOE already completed. Nevertheless, AHAM agrees with DOE’s statement that “products having significantly higher efficiencies, compared to baseline products, are more likely to incur higher repair and maintenance costs, because their increased complexity and higher part count typically increases the cumulative probability of failure.” *Id.* The standards DOE proposes for dishwashers are incredibly stringent and will likely increase repair and maintenance costs. The technologies needed to comply with the proposed stringent levels, if they even exist, will likely be more costly and more complicated. The complicated nature of the yet to be developed technologies may make them more vulnerable to failure, which could result in increased repair costs and a shorter product life.

DOE determined in the Technical Support Document that increased standards levels would not increase installation costs. Generally, AHAM has agreed with that conclusion in the past. But, at the stringent levels DOE is proposing for residential dishwashers in this rulemaking, it is possible that installation costs will also increase. The more complicated technologies needed to comply with the proposed standards could make dishwashers more costly to install.

DOE should further investigate this as manufacturers engage in interviews with Navigant.

## **IX. DOE Should Not Rely on the Controversial 2013 Social Cost of Carbon**

In its estimate of the monetary value of benefits resulting from reduced emissions of CO<sub>2</sub>, DOE should rely on the values in the *Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, Interagency Working Group on Social Cost of Carbon, United States Government, 2010 (2010 Interagency Working Group Report). DOE indicated that it plans to rely on the 2013 version of that report, which has been questioned by commenters regarding accuracy and transparency. In late 2013, OMB requested comments on the technical support document that explains the derivation of the social cost of carbon estimates. That comment period closed at the end of February 2014 and over 100 comments were submitted. DOE should wait for these comments to be resolved before it relies on the 2013 estimates. Until that time DOE should rely on the 2010 estimates as it has done in rulemakings prior to May 2013.

## **X. The Regulatory Burden on Dishwashers and Appliances is Significant**

The Process Improvement Rule in sections 1(f) and 10(g) requires consideration of cumulative regulatory burden. DOE does attempt to quantify regulatory burden in its analysis. But it does not seem to consider the resources and time required to address proposed rules, test to provide data to DOE in support of rulemakings, and to comply.

A review of DOE's semi-annual regulatory agenda shows an uptick in DOE's energy efficiency regulatory actions in 2013 (at least 10 rules impacting AHAM members) and 2014 (about 13 rules impacting AHAM members) even compared to 2010 (about 12 rules impacting AHAM members) and 2011 (about 6 rules impacting AHAM members) after AHAM and efficiency advocates presented DOE with a package of agreed upon standards and test procedure amendments which DOE implemented through rulemaking. DOE has not taken this increase in regulatory activity into account in any meaningful way.

DOE should consider not only the sheer number of rulemakings to which appliance manufacturers are subject, but also the timing of those rulemakings. For example, DOE's recent practice of amending the test procedure parallel to proposing amended standards increases the burden on manufacturers in responding to DOE's proposed rules. As described in Section VI above, when the rulemakings parallel each other, it is difficult to comment on the proposed energy conservation standard because the test procedure is not yet settled.

In addition, because of the large impact the proposed dishwasher standards will have on manufacturers, manufacturers will likely need to divert other costs to dishwashers in order to comply with the proposed standards. That will likely limit innovation in other areas. And the added investment, due to minimal consumer payback, will not drive additional purchases, whereas innovation in other areas may have.

As DOE is aware, there is a flurry of activity leading up to the compliance date of a new or amended standard. This activity includes adding new capital equipment, sourcing new and sometimes more costly materials, redesigning products, retooling factories, etc. And it seems that we are now in an endless cycle of regulation where as soon as this compliance effort ends or is near completion, another round of regulation to change the standard again begins. That is

certainly the case for dishwashers and, it seems it will be true for other home appliances AHAM members make. In fact, the day before these comments were submitted, DOE issued a pre-publication request for information on energy conservation standards for residential clothes dryers. The most recent standard for clothes dryers became effective only a few short months ago in January 2015. There is no time for manufacturers to catch their breath. And there is no time for DOE, manufacturers, or efficiency advocates to assess the success of standards. It would seem that, as part of DOE's retrospective review, including its review of the current dishwasher standard with this rulemaking, DOE should not be so politically motivated to issue standards that it does not take into account whether an amended standard is justified, and also, whether the existing rule successfully achieved the benefits contemplated by the rule.

AHAM appreciates the opportunity to submit these comments on DOE's NOPR for Energy Conservation Standards for Residential Dishwashers and would be glad to discuss these matters in more detail should you so request.

Respectfully Submitted,

A handwritten signature in cursive script that reads "Jennifer Cleary". The signature is written in black ink and is positioned above the printed name and title.

Jennifer Cleary  
Director, Regulatory Affairs

# **Attachment A**



Comments on Notice of Proposed Rulemaking for  
Energy Conservation Standards for Residential  
Dishwashers

EERE-2014-BT-STD-0021

Submitted on Behalf of the Association of Home Appliance  
Manufacturers



March 25, 2015  
Submitted by:  
Everett Shorey  
Shorey Consulting, Inc.

Shorey  
Consulting,  
Inc.

Comments with Regard to Dishwasher Minimum Standards,  
EERE-2014-BT-STD-0021  
March 25, 2015

## Situation and Approach

The Association of Home Appliance Manufacturers (AHAM) has asked Shorey Consulting, Inc., to review the currently proposed DOE standards for residential dishwashers. Shorey Consulting has reviewed multiple DOE standards in the past, both for AHAM and for other associations. In this instance, Shorey Consulting has reviewed the Notice of Proposed Rulemaking, the associated Technical Support Document (TSD) and the underlying Life Cycle Cost, National Impact Analysis and Government Regulatory Impact models. Shorey Consulting has also interviewed manufacturers on a confidential basis to develop data on their actual production costs and investments as relevant to the DOE analysis and has reviewed survey data developed by AHAM on dishwasher performance. In addition, Shorey Consulting has interviewed on a confidential basis appliance retailers on their markup practices as relevant to the DOE analysis.

## Summary

The US Department of Energy has proposed a revised energy standard for dishwashers that claims:

- Consumer payback of 9.0 years and a life cycle cost savings of \$21 for standard dishwashers,
- Savings in energy of 1.06 quads and 240 billion gallons of water for standard and compact dishwashers together,
- Positive net present value to the US economy as a whole of \$0.23 to \$2.14 billion depending on discount rate chosen, and
- Loss of manufacturer shareholder value of \$121.4 to 203.7 million (20.7-34.7% of current shareholder value) depending on cost recovery assumptions.

DOE's analyses contain numerous errors, omissions, outdated data, logical flaws and other factors. Many of these are data errors or misassumptions used in the analyses, some are flaws in the analytical approach. Individually and in combination, the appropriate corrections lead to vastly different conclusions. The proposed standard levels will, in fact, lead to:

- Consumer payback periods of nearly 20 years, longer than the expected life of a dishwasher,
- Negative consumer life cycle savings of \$35-40 per consumer
- National energy savings of less than .6 quads (resulting in savings less than would be required to qualify a covered product in the first place under 42 USC 6295),

- Increase in water consumption of 63 billion gallons,
- Negative net present value to the economy of \$7 billion, and
- Drastic reduction in industry value of 34.7% and, potentially, up to 80%.

These comments will focus on standard dishwashers, which represent the vast bulk of the products and account for most of the economic and energy impacts. The comments cover:

1. Consumer Life Cycle Cost Analysis
  - a. Issues specific to the current dishwasher proposed rule
  - b. Issues common across DOE rulemaking analyses
2. National Impact Analysis
  - a. Effects on the National Impact Analysis based on changes in the Life Cycle Cost Analysis
  - b. Additional errors in the National Impact Analysis
3. Manufacturer and Employment Analyses

## Consumer Life Cycle Cost Analysis

The DOE consumer Life Cycle Cost (LCC) Analysis has four major errors specific to the dishwasher rulemaking and two additional errors that occur broadly across this and other DOE consumer product analyses. The dishwasher specific errors are:

- Incorrect product manufacturing costs
- Outdated and incorrect number of annual dishwasher cycles
- Excessively long expected product life
- Overstated water and sewer costs

In addition, DOE incorrectly uses “incremental” markups rather than consistent markups at the retail level to project manufacturer costs to consumer prices. Conversely, DOE uses average consumer costs of capital, rather than marginal ones, for its consumer discount rate. Both of these later two issues are at odds with actual experience.<sup>1</sup>

Simply correcting the manufacturing costs leads to a consumer payback period of over 10 years and LCC savings of under \$5 to the average consumer, with over 60% of consumers having net costs from the new standard. Including any one of the other factors leads to negative LCC savings to the average consumer. In total combination of the dishwasher specific issues, the consumer payback is nearly 20 years (versus a product lifetime of 13) and a negative savings of \$25-30 (rather than a positive savings of \$20). Over 70% of consumers have net costs.

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<sup>1</sup> References to DOE analyses and data refer to the US Department of Energy, Assistant Secretary, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, *Technical Support Document: Energy Efficiency for Consumer Products and Commercial and Industrial Equipment: Dishwashers*, December 2014, and associated computer models available at: <http://www.regulations.gov/#!docketBrowser;rpp=25;po=0;dct=N%252BFR%252BBPR%252BO%252BSR;D=EERE-2014-BT-STD-0021>

## *Manufacturer Costs*

DOE and its consultant Navigant Consulting, Inc., estimated the cost of manufacturing (ex-plant costs) for dishwashers at various efficiency performance levels based on engineering analyses and “tear downs” of example dishwashers. From this, Navigant and DOE estimated the cost of achieving different future performance levels. This is a well-established methodology for DOE and Navigant in the standards process. Absent direct manufacturer data, this is probably the best approach available to DOE and Navigant.

Since the publication of the proposed rule and Technical Support Document (TSD) in December 2014, some manufacturers have met with Navigant to review actual cost and performance data. In addition, Shorey Consulting, Inc., has reviewed data the manufacturers have provided Navigant and conducted its own interviews with manufacturers.<sup>2</sup> The focus of the data collection has been on identifying the lowest cost approaches to meet the Energy Levels defined in the TSD.

The manufacturer data indicates that Navigant has substantially overstated the cost of the Base Case unit at Energy Level 0 and understated the costs of reaching the higher efficiency levels. It appears that Navigant combined product characteristics into the Base Case unit that are not required for efficiency and, thus, overstate the cost.<sup>3</sup> Based on Shorey Consulting’s interviews with manufacturers, the Navigant Base Unit cost estimate is too high by \$45 to \$60 per unit from the original Navigant estimate of \$203.72.

As a result, DOE and Navigant have understated the cost of moving from EL 0 to EL 1. Navigant’s estimate of the cost of an EL 1 unit is reasonably accurate at \$213.24, but the incremental cost to reach that EL is \$60-80, rather than \$9.32.

Once manufacturers have invested in reaching EL 1, which virtually all have since that EL and higher now represent the bulk of the current market, the cost of reaching EL 2 is less than DOE and Navigant estimate. This step is relatively small and within the range of accuracy that can be reported for reasons of data confidentiality.

Moving from EL 2 to EL 3, on the other hand, involves significant redesign and cost. There are no EL 3 products in the US market today for retail prices under approximately \$1000 versus the retail price projected by DOE of \$446. . The likely cost to reach EL 3 from EL2 is \$55 to \$70 versus the \$38.19 forecast by Navigant.

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<sup>2</sup> Conducted during March 2015. For data confidentiality reasons, Shorey Consulting, Inc., cannot report the details of these interviews. The resulting calculations will be presented in ranges.

<sup>3</sup> As DOE notes in Table 3.9.3 on page 3-16 of the TSD, approximately 80% of dishwasher shipments meet the EnergyStar standards, essential EL1 or higher in the DOE analysis, thus there are few Base Case products in the market at this time.

Products meeting EL 3 represent 4% or less of the current US market. Expanding production would yield lower costs, however most production cost gains would come in reduced overhead since the basic components of a dishwasher platform are well understood and in production. Since Navigant estimates that depreciation and factory overhead represent approximately 25% of the cost of a dishwasher (TSD Table 12.4.7, page 12-14)<sup>4</sup>, the opportunity for cost savings from volume production are small.

As of March 20, 2015 there are no products in the DOE compliance database referenced in the TSD that meet both the energy and water consumption levels of EL 4.<sup>5</sup>To the extent that products approaching this level exist, they have retail prices at over \$1000 per unit. Manufacturers have difficulty estimating the actual cost of these units and the cost of reaching that level is entirely theoretical. There is no evidence to support Navigant’s estimate that EL3 and EL 4 dishwashers would have equal costs or even that it can be done with acceptable cleaning performance.

Adjusting only for actual costs yields a payback at EL 3 of over 10 years and LCC savings of under \$5 per unit with over 60% of consumers having a net cost. The paybacks at ELs 1&2 are longer than DOE’s projected life of an average dishwasher and all are longer than the life projected in other Navigant studies and as reported in the AHAM database (see below).

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	<40	\$(5-10)	11%	89%	1%
EL 2	<20	\$5-10	17%	44%	39%
EL 3 (Proposed)	<15	\$0-5	61%	4%	35%
EL 4	Insufficient Data for Analysis				

*Dishwasher Usage*

DOE is projecting that average dishwasher utilization will be 215 cycles per year. This is based on an Arthur D. Little report from December 2001.<sup>6</sup> The Arthur D.

<sup>4</sup> This estimate overstates actual manufacturer overhead costs. Correspondingly, the rest of Navigant’s calculations understate labor and purchased materials.

<sup>5</sup> DOE’s Compliance Certification Database is accessible at <http://www.regulations.doe.gov/certification-data/>, accessed March 18, 2015

<sup>6</sup> Arthur D. Little, Inc., *Review of Survey Data to Support Revisions to DOE’s Dishwasher Test Procedure* for U.S. Department of Energy, Energy Efficiency and Renewable Energy, Office of Building Technology, State and Community Programs, December 18, 2001. Everett Shorey of Shorey Consulting was an employee of Arthur D. Little, Inc., from 1977 to 1994 and had left the firm before

Little report estimated dishwasher usage from four surveys and the 1997 RECS data.<sup>7</sup>

	Range of Average-Use Cycles / Year for a Dishwasher		
	Low Category Values	Average Category Values	High Category Values
Survey A	162	181	201
Survey B	153	191	230
Survey G	155	189	224
Survey H	225	225	226
1997 RECS	207	245	282
Average of Averages	180	206	233

Surveys A and B are rated by Arthur D. Little as 8,000 and 11,000 respondents respectively and high quality of information while Surveys G and H have 500 and 1000 respondents and moderate quality information. The 1997 RECS data represents 5,900 houses and has high quality data. The Average of Averages computed by DOE is driven upwards by smaller surveys with lower quality data and by the 1997 RECS data.

Since the 2001 Arthur D. Little study, there are several new generations of RECS data, including most recently from the 2009 RECS survey, which serves as the basis for DOE's household data in its LCC model. DOE recognizes that the 2009 RECS data is more recent than the Arthur D. Little study but continues to use the Arthur D. Little data "because the survey is more comprehensive than the RECS data."<sup>8</sup> This ignores that a crucial part of the Arthur D. Little study is the 1997 RECS data. The 2009 RECS data includes 12,100 households with 7,382 dishwashers<sup>9</sup> as compared to the 5,900 households in the earlier survey. In addition, the Energy Information Agency has instituted a number of improvements to its methodology to increase the sample size and data accuracy of the 2009 survey.<sup>10</sup> As a result, the 2009 RECS data should be considered superior to the 1997 RECS data. Indeed, DOE uses the 2009 RECS data extensively in its own technical analyses: "DOE used (2009) RECS to establish the variability in annual energy use, energy pricing, annual water use, and

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the preparation of this report. The Arthur D. Little group that produced this report is now part of Navigant. Table from page 18.

<sup>7</sup> RECS refers to the Energy Information Agency Residential Energy Consumption Survey used by DOE in many aspects of its data analysis.

<sup>8</sup> TSD page 2-7.

<sup>9</sup> TSD page 7-4.

<sup>10</sup> Energy Information Agency, Residential Energy Consumption Survey (RECS) 2009 Technical Documentation Summary, January 2013, p.2.

water pricing.”<sup>11</sup> In fact, DOE even uses the 2009 DECS data to set the distribution of cycles while deliberately ignoring it in determining the number of cycles.<sup>12</sup>

The 2009 RECS data estimates that the average household uses 174 dishwasher cycles per year. Based on this data, DOE has two options:

- Use the 2009 RECS data of 174 cycles per year since the Arthur D. Little study is dated. Average household sizes have declined since the 1960s and old date may overstate the number of people and therefore the number of dishes per household. In addition, the quantity of food eaten away from home has been increasing since 1970.<sup>13</sup> Therefore, it is quite likely that the 2009 RECS survey has captured a real trend towards fewer dishwasher cycles.
- Substitute the 2009 RECS data for the 1997 data in the Arthur D. Little study, leading to an “Average of Averages” of 192 cycles per year.

There is no reasonable justification for relying on the Arthur D. Little study as published 13 years ago with outdated data.

Correcting for the number of cycles per year and for the manufacturing costs leads to consumer economics of:

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and 192 Cycles Per Year					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	>45	\$(5-10)	11%	89%	1%
EL 2	>20	\$5-10	18%	44%	37%
EL 3 (Proposed)	>15	\$(5-10)	65%	4%	31%
EL 4	Insufficient Data for Analysis				

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and 174 Cycles Per Year					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	>50	\$(5-10)	11%	89%	1%
EL 2	<25	\$0-5	20%	44%	36%
EL 3 (Proposed)	<20	\$(15-20)	68%	4%	28%
EL 4	Insufficient Data for Analysis				

<sup>11</sup> TSD page 8-12

<sup>12</sup> TSD page 7-8

<sup>13</sup> Economic Research Service (ERS), US Department of Agriculture (USDA), Food Expenditures.

## Water Costs

DOE bases its water costs on surveys conducted by Raftelis Financial Consulting for the American Water Works Association (AWWA).<sup>14</sup> These are derived from a non-random sampling of participating water and sewer organizations covering approximately 81 million people for the water survey and 57 million for the sewer survey (25% and 18% of the US population). DOE then computes regional water rates using the Raftelis data combined with the 2009 RECS data. However, it does not use its Crystal Ball randomization process to test the variation in combined water and sewer rates even though the Raftelis water rate data has a standard deviation of 46% relative to its mean and 75% for the sewer data, indicating wide variation in rates.<sup>15</sup>

More significantly, 13-14% of households in the US are on wells or other private water systems.<sup>16</sup> These households have very low water and, usually, no sewer costs. Water costs are only the electricity to run a well pump. Therefore, at the very least, DOE's water costs are overstated by 13%. It is not practical to modify DOE's LCC model to include a Monte Carlo simulation of water/sewer costs and the 13% with no cost without potentially disrupting the rest of the model and its associated VBA macros. The most practical correction is to reduce the average water and sewer cost used by DOE by 13%

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and Water/Sewer Costs Reduced by 13%, 215 Cycles					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	<45	\$(5-10)	11%	89%	1%
EL 2	>20	\$0-5	18%	44%	37%
EL 3 (Proposed)	>15	\$(0-5)	62%	4%	34%
EL 4	Insufficient Data for Analysis				

## Equipment Life

DOE assumes an equipment life based around a distribution with a mean of 15.4 years.<sup>17</sup> This is in contradiction to the mean life of 12.6 years found in Navigant's 2010 study for ACEEE<sup>18</sup> and AHAM's data<sup>19</sup> showing a lifetime of 13 years. Reducing

<sup>14</sup> Raftelis Financial Consulting, *2012 RFC/AWWA Water and Wastewater Rate Survey*. 2013. Charlotte, NC.

<sup>15</sup> Based on the 2013 RFC/AWWA Water and Wastewater Rate Survey.

<sup>16</sup> USGS: water.usgs.gov, accessed March, 2015.

<sup>17</sup> TSD page 8-21.

<sup>18</sup> Welch, Cory and Brad Rogers, Navigant Consulting, "Estimating the Remaining Useful Life of Residential Appliances", *ACEEE Summer Study on Energy Efficiency in Buildings*, p. 2-320.

the equipment life has no effect on computing a payback, but does reduce the LCC savings. However, each correction identified here pushes the payback for EL 3 past the expected lifetime of a dishwasher.

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and 13 Years Lifetime, 215 Cycles					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	<45	\$(5-10)	11%	89%	1%
EL 2	>20	\$0-5	20%	44%	35%
EL 3 (Proposed)	>15	\$(10-15)	68%	4%	29%
EL 4	Insufficient Data for Analysis				

### Combined Effects

Combining the effects of the correction to the manufacturing costs, adjusting to 174 (2009 RECS cycles), well water correction to the water and sewer rates and adjusting to a 13 year lifetime yields a more accurate assessment of the effects of the proposed standards on consumers. Those effects are, in a word, dismal. Payback periods are well beyond the expected life of a dishwasher (even the lifetime used by DOE), the negative LCC savings are greater than the positive savings originally predicted by DOE and nearly 75% of consumers experience net costs. There is no interpretation of these results that would meet DOE’s statutory requirement that standards will be economically advantageous to consumers. This is before any discussion of changes in dishwasher performance (lessening of utility or performance) that would result from operations at the proposed water and energy levels.

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and Water/Sewer Costs Reduced by 13%, 174 Cycles, 13 Year Life					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	>50	\$(5-10)	11%	89%	0%
EL 2	<25	\$0-5	22%	44%	34%
EL 3 (Proposed)	<20	\$(25-30)	73%	4%	23%
EL 4	Insufficient Data for Analysis				

<sup>19</sup> AHAM Average Useful Life data conducted in 2011

## *Retailer Markups*

DOE uses a concept of “incremental markups” to translate the increased costs of meeting standards into estimated consumer prices. Shorey Consulting has commented in the past on the deficiencies in the DOE incremental markup concept.<sup>20</sup> In particular, DOE requires a strong form of economic theory, since it is saying that something will happen solely because theory says it should. This approach fails unless DOE can demonstrate that:

- *All* of the characteristics of perfect competition exist in a specific situation
- Perfect competitions *always* leads to profitability at the long-term cost of capital
- *No* countervailing factual situations demonstrate that the conditions predicated by DOE occur

As demonstrated in the comments to the previous rulemaking, past studies on industry structure and profitability do not show that industries naturally gravitate to a stasis where profitability is equal to the long-term cost of capital. Therefore, DOE’s normative claim fails. It is not sufficient for DOE to contend that an industry *will naturally* reach the situation it predicts. DOE must show that any particular industry *actually does* act in this fashion. DOE does not provide an iota of factual support for this position. It has never provided any data on the actual pricing and margin practices of any organization.

The hypothesis of perfect competition does not appear valid on its face. It must be demonstrated in actual practice. The market dynamics are complex. An *a priori* resort to economic theory without clear empirical support is highly problematic. In order to fill this void, Shorey Consulting interviewed separately a sample of local/regional and national appliance retailers. With very few exceptions, they reacted to the DOE concept that percentage margins will be lower in a post-standards situation with incredulity. In particular, the DOE theory would predict that the percentage gross margin on refrigerators would have declined relative to other major home appliances in the period from September 2014, when new minimum efficiency standards went into effect, to now (March 2015). The comments from local/regional retailers, those who could be considered under the most pressure from the small number of large, national chains, were:

*‘We must get our margin to stay in business. By this I mean our percentage margin. We maintain that even after price changes from the manufacturers.’*

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<sup>20</sup> Shorey Consulting, Inc., Incremental Markups, A Critical Review of Theory and Practice, Comments on *An Analysis of Price Determination and Markups in the Air Conditioning and Heating Equipment Industry* - LBNL- 52791, 2014, submitted as comment to Notice of Proposed Rulemaking for Energy Conservation Standards for Small, Large, and Very Large Commercial Package Air Conditioning and Heating Equipment, Docket EERE-2013-BT-STD-0007.

*“It is all about percentage margin. If the Manufacturers cannot meet the margin percent, we take them off the floor. We just did that to a major manufacturer for one post-standard product line. We are going to keep making our percentage margin.”*

*“There have been no noticeable changes in margin percentages on refrigerators in the last six months relative to other products. There are continuing margin pressures, but nothing special about refrigerators in the last six months.”*

*“We have to get our percentage margin. The minute it costs us money to do something, we take it off the floor. There have been not noticeable changes in percentage margins in the after standards.”*

*“We need to stay competitive but we also need to stay in business. National retailers whose business is on the skids can be a problem. We try to stay away from price battles with the national retailers when they are trying to buy share. We work to keep our margins constant.”*

Therefore, the DOE concept of incremental margins fails both in theory and in actual practice. DOE needs to abandon the incremental margin approach and revert to the standard, average margin approach that corresponds to actual industry practice.

When combined with the corrections to the manufacturing costs, annual cycles, water/sewer costs and appliance lifetimes, reversion to DOE’s previous practice of average margins makes the consumer economics even worse. The average savings at TLs 1-3 are all negative and the paybacks range from over 20 years to over 60.

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and Water/Sewer Costs Reduced by 13%, 174 Cycles, 13 Year Life, Average Margins at Retail					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	>60	\$(5-10)	11%	89%	0%
EL 2	<30	\$(0-5)	25%	44%	31%
EL 3 (Proposed)	>20	\$(40-50)	79%	4%	17%
EL 4	Insufficient Data for Analysis				

#### *Consumer Discount Rates*

Oddly, given DOE’s standard practice of seeking marginal costs for all items, it has chosen to use an average, not a marginal, consumer cost of capital for its discount rate. It states: “The approach assumes that, in the long term, consumers are likely to draw from or add to their collection of debt and asset holdings approximately in proportion to their current holdings when future expenditures are required or

future savings accumulate.”<sup>21</sup> Nowhere does DOE analyze whether consumers’ actual long-term marginal cost of funds approximates their current mix of funds.

In its analysis, DOE looks at the percentage share of consumer balance sheets made up of different types of assets.<sup>22</sup> It does not consider whether consumers could add to any of these asset or liability classes and/or what it would mean in the savings/consumption trade-off to do so. In reality, the actual amount of low cost funds (such as checking accounts) is effectively finite or can be replenished only by the consumer adjusting the savings/investment decision. For example, consumers in Income Group 3 have 33.1% of their financial debt and equity in home mortgages, another 31.7% in other forms of debt, 16.7% in relatively liquid account (Savings and Money Market Accounts) and the remainder in longer term assets and stocks and other investments.

What these percentages obscure is the absolute magnitude of the amounts available to consumers and the relative ability to generate additional funds from the various sources. In reality, except for minor purchases, most households’ access to additional funds comes from credit card debt.

- The average household in Income Group 3 has \$2912 in cash and other immediately liquid assets.<sup>23</sup> This is the entire cushion available to a household for any emergencies and can be replenished only by extra savings. The small amount of cash and immediately liquid assets in household accounts is testament to the difficulty in generating additional savings.
- Mortgages comprise the bulk of consumer debt, however, refinancing a mortgage to purchase a new dishwasher is impractical. The transaction costs for a refinancing are greater than the cost of a new dishwasher.
- Other Equity covers the totality of a household’s non-liquid financial assets including retirement savings. Assuming that a household can tap its retirement funds to pay for a new dishwasher seems to be an extremely aggressive and unwarranted assumption.

This leaves other forms of consumer debt as the only marginal source of funds.

Based on the costs and proportions in the DOE analysis, the weighted average real cost of credit card, other installment loan, other residential loan, other line of credit would be 10-12% depending on income group. A more accurate estimate of the marginal cost of capital to consumers is, thus, 11.6% (the cost of short term debt in Income Group 3) rather than the 4.5% used by DOE for dishwashers used as replacements and retrofits. As a result, the LCC costs for consumers are strongly negative even further, even without accounting for a change from incremental to average markups.

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<sup>21</sup> TSD page 8-24.

<sup>22</sup> TSD Table 8.2.1.6, page 8-25.

<sup>23</sup> Federal Reserve Board, 2013 Survey of Consumer Finances, Tables 6-13 and 13-13.

Consumer Financial Results – Standard Dishwashers with Actual Manufacturing Costs and Water/Sewer Costs Reduced by 13%, 174 Cycles, 13 Year Life, Incremental Margins, 11.6% Replacement Discount Rate					
	Payback (Years)	LCC Savings (Average)	Net Cost	No Impact	Net Benefit
EL 1 (EnergyStar)	<60	\$(5-10)	11%	89%	0%
EL 2	<30	\$(0-5)	25%	44%	310%
EL 3 (Proposed)	<20	\$(35-40)	79%	4%	17%
EL 4	Insufficient Data for Analysis				

### Conclusion

The DOE analysis is highly sensitive to corrections in the values that DOE assumes for several key variables, some of which it considers in the LCC analysis simulations and several of which it does not. Simply correcting for actual manufacturing costs yields minimal LCC savings at EL 3 and a payback period at or beyond the expected life of a dishwasher. Incorporating ANY ONE of the other corrections to DOE's analysis leads to negative results for consumers, often substantially negative, and to a substantial majority of consumers with a Net Cost. DOE's approach to select EL 3 as the basis of a standard is not supported by reasonable consumer economics.

### National Impact Analysis

The National Impact Analysis depends upon the consumer prices, equipment lifetimes, sewer and water costs and other variables from the LCC analysis. Correcting these values leads to significantly different conclusions than those drawn by DOE in its TSD. Revising for actual manufacturing costs, 2009 RECS dishwasher usage, well usage water and sewer cost adjustment, actual equipment life and average retail markups results in:

<i>Standard Dishwashers</i>			
<i>Based on 3% National Discount Rate</i>	TSD	Revised	Unit
Source Energy Saving (2019 to 2097)	0.998	0.520	<i>quad</i>
Water Saving (2019 to 2097)	0.236	-0.063	<i>trillion gal.</i>
Disc. Incr. Equip. Cost (2019 to 2048)	7.061	11.649	<i>billion \$</i>
Disc. Oper. Cost Saving (2019 to 2097)	9.194	4.571	<i>billion \$</i>
NPV	2.133	-7.078	<i>billion \$</i>

In particular, the energy savings drop by 32%, water usage actually increases and the national NPV is negative. While the proposed standard may save energy, it does

so at the expense of increased water consumption and negative economic impacts.<sup>24</sup>

These results are obtained by:

- Substituting actual manufacturing costs and average retail markups for the prices in cells S52 to S56 in Input and Summary sheet of the NIA
- Using 174 cycles in cell E7 of the Input and Summary sheet and correcting the mistake in cells E52-56 and H52-56 where the per cycle energy consumption is derived by dividing the annual consumption rather than computing the annual consumption by multiplying the per unit consumption by the annual number of cycles.
- Substituting the actual expected equipment life of 13 years for lambda in cell C7 of the Lifetime sheet
- Reducing water and sewer prices by 13% to account for wells in cells AK and AL15 of the Fuel and Water Prices sheet

The NIA model is sufficiently complicated and the precedents and dependents capabilities of Excel are disabled frequently enough by the modeling approach so that this nontransparency makes it impractical for an outside analyst to audit exactly why changes in inputs result in the changes in results. This raises serious issues of the capability of the public to comment. Unfortunately, the NIA model is set up to test for changes in relatively inconsequential assumptions and not in key variables that actually drive the analysis such as equipment costs.

## Manufacturer and Employment Impact

DOE has estimated that meeting a minimum efficiency standard based on EL 3 will result in:

- Loss of between 17% and 34% of industry value, depending on cost and cost recovery assumptions
- Required industry investment \$230 to \$250 million to meet the proposed standards
- Reduction in shipments of 2 million units over thirty years
- Increase in 186 domestic production workers

The loss in industry value (as a percentage of total value) is among the highest of any recent DOE standards. These projections underestimate the actual negative impacts on manufacturers and employment.

Since the analysis as fundamental errors in the estimated manufacturing costs and retail markups, DOE has underestimated the retail price increase for dishwashers. As a result, the actual decline in shipments will be closer to 4.5 million units over the 30 years. This will reduce the number of needed manufacturing employees. In

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<sup>24</sup> It is not clear why the water consumption increases. The NIA is sufficiently opaque that Shorey Consulting has not been able to trace through the reasons behind the changes in water consumption in a reasonable amount of time.

addition, the lower number of units shipped will reduce a manufacturer’s ability to recover their investments costs.

Manufacturers estimate that it will cost nearly \$100 million in development and capital expenses to redesign and retool a full platform. Some existing platforms may be adaptable to reach EL 3 and these would take modifications of approximately \$10 million each. There are at least 12-15 non-conforming platforms supplied by current dishwasher manufacturers. It is not clear at this stage how many would need a full redesign and retooling. A more likely estimate of the total capital and product conversions costs is conservatively \$500 million rather than the \$250 million estimated by DOE.

Therefore, the decline in industry value forecast by DOE will be approximately \$350-\$500 million rather than the \$100-\$200 estimated by DOE.<sup>25</sup> This amounts to a decline in industry value of over 50% to nearly 80%. Only two recent DOE rulemakings have proposed declines in industry value of this percentage magnitude at the High Impact and none at the Low Impact. Further none have remotely proposed this magnitude of loss in value with revised investment levels.

Changes in Industry Value Due to DOE Standards				
	Value (\$ Millions)		Percent	
	Low Impact	High Impact	Low Impact	High Impact
Residential Dishwashers - TSD	\$(103.6)	\$(203.7)	-17.7%	-34.7%
Residential Dishwashers - Revised	\$(300.0)	\$(500.0)	-50%	-80.0%
Commercial Warm Air Furnaces	\$(0.2)	\$(0.5)	-11.1%	-43.3%
Fluorescent Lamp Ballasts	\$(74.5)	\$(268.6)	-11.1%	-43.3%
Small, Large, Very Large Air-Cooled Commercial Packaged Air Conditioning and Heating Equipment	\$(88.5)	\$(311.6)	-7.2%	-24.7%
General Service Fluorescent Lamps	\$426.8	\$(330.0)	27.5%	-21.3%
External Power	\$(9.1)	\$(51.2)	-3.3%	-18.7%

<sup>25</sup> In another example of inappropriate nontransparency, it is not feasible to define accurately the effects of any changes in assumptions on the industry net present value (INPV) since DOE/Navigant have locked all of the worksheets in the GRIM model published on the dishwasher regulation website. This makes effective public review and comment or any reanalysis impossible.

Changes in Industry Value Due to DOE Standards				
	Value (\$ Millions)		Percent	
	Low Impact	High Impact	Low Impact	High Impact
Supplies				
Residential Furnace Fans	\$48.2	\$(59.0)	15.1%	-16.9%
Commercial and Industrial Electric Motors	\$392.6	\$(347.7)	11.3%	-15.8%
Automatic Ice Makers	\$(12.1)	\$(15.1)	-10.1%	-12.5%
Single Packaged Vertical Air Conditioners and Heat Pumps	\$1.5	\$(3.3)	4.1%	-9.0%
Metal Halide Lamp Fixtures	\$44.2	\$(31.9)	9.8%	-7.7%
Commercial Refrigeration Equipment	\$(93.9)	\$(165.0)	-3.5%	-6.2%
Walk-In Cooler and Freezer Refrigeration	\$19.5	\$(25.4)	4.6%	-6.0%
Walk-In Cooler and Freezer Doors	\$60.7	\$(27.5)	12.5%	-5.7%
Commercial Clothes Washers	\$(6.6)	\$(6.6)	-5.3%	-5.3%
Packaged Terminal Air Conditioners and Heat Pumps	\$0.0	\$(0.1)	0.5%	-1.3%

The GRIM as structured does not consider well multiple rounds of standards. Since it is a forward-looking model, it does not consider the effects of past investments and whether they have been recovered fully. It incorporates “Stranded Assets” as a tax benefit in the INPV calculation. There is an implicit assumption in the GRIM that either there will be no future rulemakings or that those rulemakings will correspond with normal investment cycles. Therefore, there are not estimates of when major redesigns will take place in the future.<sup>26</sup> This is of relatively minor consequence if future regulations do, in fact, come at either sufficiently long intervals or are in line with the standard product cycle. In the case of this dishwasher rulemaking, the implementation is intended to be at the minimum time

<sup>26</sup> Everett Shorey, of Shorey Consulting, is the original author of the GRIM on behalf of AHAM and the predecessor to AHRI some 20 years ago. It is not possible to reconstruct precisely why this decision on how to treat future investment was made.

between rulemakings allowed by law. It is clear from interviews with manufacturers that the cycle time is too short for full recovery of investments. DOE should reconsider the structure of the GRIM to account for future rulemakings and their effects on industry value.

## Everett Shorey

Everett Shorey is President of Shorey Consulting, Inc. that works with for profit and nonprofit organizations to build strategies to grow with financial sustainability and with commercial client teams to identify strategies for profitable growth. He is also a founding partner of The Orchard Group, Inc., advisors to emerging businesses and a strategic partner with Fletcher Spaght, Inc., a strategy and marketing consulting firm serving the venture capital industry and related new ventures.

One of Everett's practice areas is assisting associations and companies understand and participate in the appliance energy conservation regulatory process. He brings a general business perspective to the regulatory process, helping associations and companies identify the actual business effects of potential regulations while also working within the confines of the regulatory process. He is the author of the Government Regulatory Impact Model (GRIM) now used by DOE as part of the assessment of the potential impact of regulations on manufacturers. He has provided comments to DOE on its use of incremental markups and its use of experience curves and on the causes and costs of cumulative regulatory burden. In this arena, he has worked for over 20 years with the Association of Home Appliance Manufacturers (AHAM) as well as with the Air-Conditioning, Heating and Refrigeration Institute (AHRI) and has provided guidance to the National Electrical Manufacturers Association (NEMA).

In the nonprofit sector, Everett has worked with Root Cause, a research and consulting firm dedicated to mobilizing the nonprofit, public and business sectors to work together in a new social impact market. At Root Cause, he managed client engagements creating strategies that helped nonprofits move to the next level of social impact. He also served as a coach for emerging nonprofits as part of Root Cause's Social Innovation Forum, and as a judge in the Louisiana Office of Social Entrepreneurship business plan contest. In addition, he served as head of business development, creating the internal marketing and business development plan and instituting a business development management and tracking process.

In the for profit sector, he has worked with a wide range of companies to find paths for profitable growth across a wide range of industries. His client engagements have covered business strategies, diversification plans, acquisition reviews and comparative activity-based cost analyses. His clients have included industrial products manufacturers, high technology companies and entrepreneurial organizations.

Immediately prior to forming Shorey Consulting, he was a member of Corporate Decisions, Inc., a consulting firm focusing on developing customer-based strategies for profitable growth. At Corporate Decisions, he helped develop the basic conceptual framework in Business Design, developed client training programs and

led projects in a variety of industries. Earlier, he was at Arthur D. Little from 1977 to 1994, serving as a Vice President of Arthur D. Little, Inc., Director in North America Management Consulting, and leader of the Manufacturing and Construction Industries, the Strategy and the Organization Practices. His work experience covers a wide range of industries including energy related businesses, utilities, regulatory support, and emerging businesses. He has functional experience in strategy development, financial analysis where he has qualified as an expert in litigation, and organizational structure. Clients have included traditional manufacturing companies, start-up technology ventures, electric and gas utilities, industry associations and governments.

Everett has spoken on a number of occasions on how to become a High Performance Business and on the integration of technology into process redesign. He served as a member of the editorial board of *Prism*, Arthur D. Little's quarterly journal. He developed a series of articles on achieving competitive advantage through sales and distribution channels and he is co-author of an article on *Global Warming and Appliances: Increasing Consumer Participation in Reducing Greenhouse Gases* for the Pew Center on Global Climate Change. He serves or has served on the advisory board of Data Collaborative, Inc., of Medical Legal Partnership | Boston, as co-chair of the board of CAP, the non-profit consulting organization sponsored by the Harvard Business School Alumni Association of Boston, and on the advisory board and has taught business strategy for The Commonwealth Institute's eMerging Women Entrepreneurs program. He has also served on the board of the Belmont Day School. He co-created a field study course and supervised the participating student consulting teams for the Harvard Business School. He serves as an advisor to Block Island, RI on utility and ferry regulatory matters, including serving as the town's representative supervising a long range plan for the island's electric utility and as a member of its Electric Utility Task Group.

Prior to joining Arthur D. Little, Everett worked as a part of a development team for a new town near Dayton, Ohio. He received an M.B.A. degree, with Distinction, in 1977, from the Harvard Business School and a B.A. *Cum Laude*, in 1973, from Yale University.

# **Exhibit B**



# Memo

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*to:* Department of Energy *via email:* [expartecommunications@hq.doe.gov](mailto:expartecommunications@hq.doe.gov)

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*from:* Jennifer Cleary

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*date:* July 31, 2015

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*subject:* Ex parte Communication, NOPR for Energy Conservation Standards for Residential Dishwashers, Docket No. EERE-2014-BT-STD-0021

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This memo memorializes the meeting between the Association of Home Appliance Manufacturers (AHAM) and the Department of Energy (DOE) on July 8, 2015, for inclusion in the public docket on the Notice of Proposed Rulemaking (NOPR) for Energy Conservation Standards for Residential Dishwashers, Docket No. EERE-2014-BT-STD-0021; RIN 1904-AD24; 79 Fed. Reg. 76,142 (Dec. 19, 2014).

AHAM requested a meeting with DOE to present the results of some dishwasher performance testing members conducted in order to demonstrate ongoing concern that DOE's proposed standards for dishwashers will negatively impact performance. AHAM raised concern in our written comments, dated March 25, 2015, regarding several performance issues.<sup>1</sup> Specifically, AHAM argued that cycle length will unacceptably increase. Moreover, AHAM indicated that it is difficult, if not impossible, to assess DOE's proposed levels because there are few models on the market at that level. AHAM believed, and continues to believe, that the standards DOE proposed will negatively impact performance and, thus, drive use of more energy and water due to pre-rinsing, additional dishwasher cycles, etc. In addition, we argued in our comments that the ENERGY STAR test method, which is the method DOE used to assess the proposed standards' impact on performance in the NOPR analysis, is too variable to reliably determine that performance would not be negatively impacted at the proposed levels. In fact, our analysis demonstrated that DOE's proposed levels are just as likely to negatively impact performance as be neutral—Efficiency Level 3 performance may overlap with Efficiency Level 4 performance.

Since the submission of AHAM's written comments, AHAM and its members have been working to further understand the performance implications of DOE's proposed levels. In addition, it has come to our attention that Navigant is analyzing an additional Efficiency Level of 255 kWh/year and 3.1 gallons/cycle and, thus, we and members have been working to understand the performance implications of that level. Given the fact that the water level remains unchanged in the newly analyzed Efficiency Level (Efficiency Level 2.5), manufacturer knowledge of the consumer indicated that this level would not alleviate the performance

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<sup>1</sup> To be clear, this ex parte filing supplements our written comments. AHAM continues to have the performance concerns described in our March 25, 2015 written comments.

concerns AHAM raised in our written comments. Accordingly, AHAM members have been investigating the extent of those concerns.

The proposed levels will negatively impact performance by making it more difficult for dishwashers to remove adhered soils and grease and will result in buildup over time. DOE's data did show a performance drop, but in the NOPR, DOE determined that there was not a performance problem at Efficiency Level 3. AHAM and its members were previously unable to qualitatively demonstrate performance concerns due to the lack of models on the market meeting DOE's proposed levels. But some members have since been able to modify existing dishwashers to perform at DOE's proposed levels.

AHAM organized and members performed investigative testing to demonstrate the impact DOE's proposed standards would have on dishwashers' ability to remove adhered soils and grease. Members conducted the ENERGY STAR performance test with slight variations. No scoring was performed—the results were reviewed qualitatively.

One set of testing focused on grease and buildup over time. Three dishwashers were tested:

1. 307 kWh/year; 4.1 gallons/cycle targeted;
2. 255 kWh/year; 3.1 gallons/cycle targeted; and
3. 234 kWh/year; 3.1 gallons/cycle targeted.

For this set of testing, eight place settings were used, four of which were soiled. Clear plates were used to better show the grease on the plates. The soils called for in the DOE test method were applied and a small amount of animal and vegetable fats were also applied. Three normal cycles were run without filter cleanout between runs. Figure 1 shows the items soiled per the requirements in the DOE test procedure using clear plates. Figure 2 shows the additional fat/grease loads.

**Figure 1—DOE (AHAM DW-1) Soil Using Clear Plates**

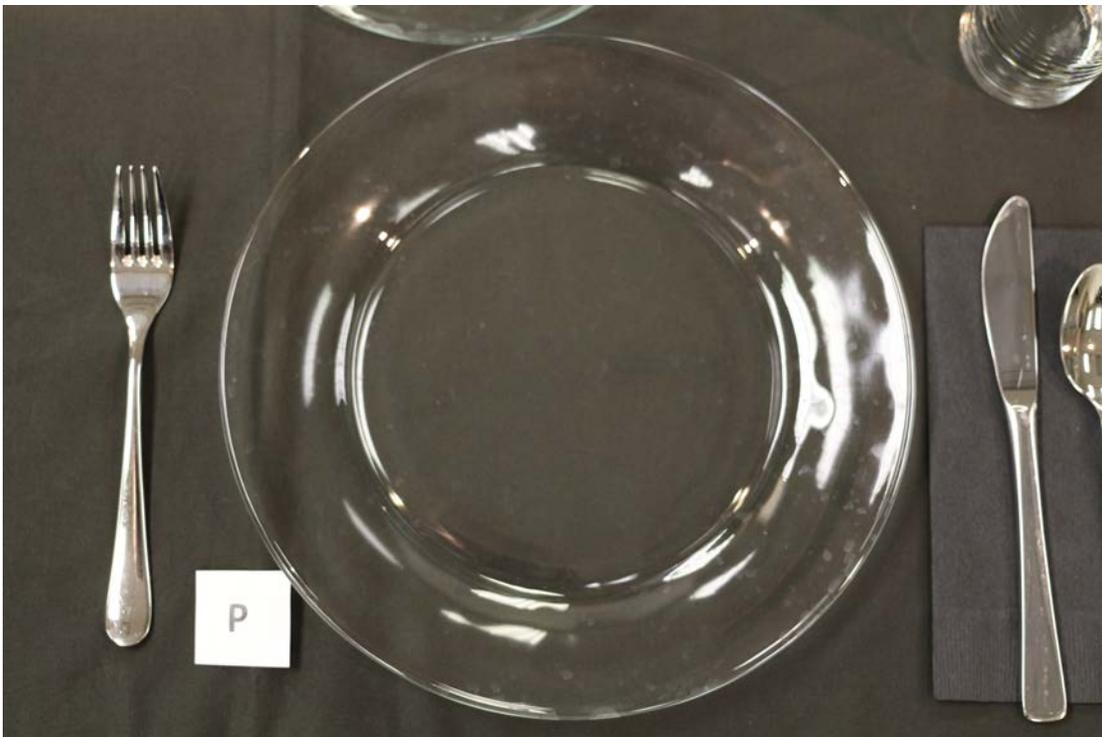


**Figure 2—Additional Fat/Grease Load**

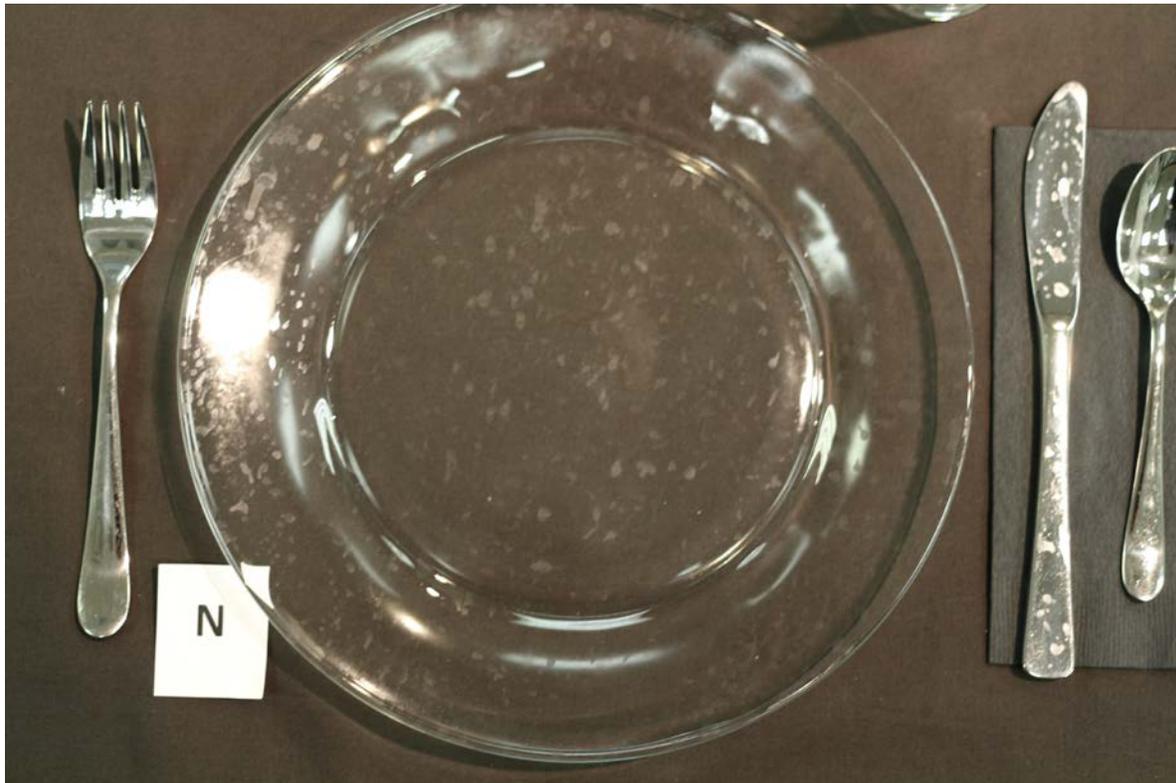


AHAM displayed one place setting from each dishwasher after that place setting had run through the normal cycle three times. Photographs of those place settings are displayed below in Figures 3-5. DOE and Navigant were asked to consider whether, as consumers, they would eat off of the dishes or would serve friends/family from the dishes. As the pictures show (and is more evident when viewed in-person), there is some residue on the place setting cleaned in the 307 kWh/year dishwasher. But the 255 kWh/year and 234 kWh/year dishes contain significantly more greasy residue.

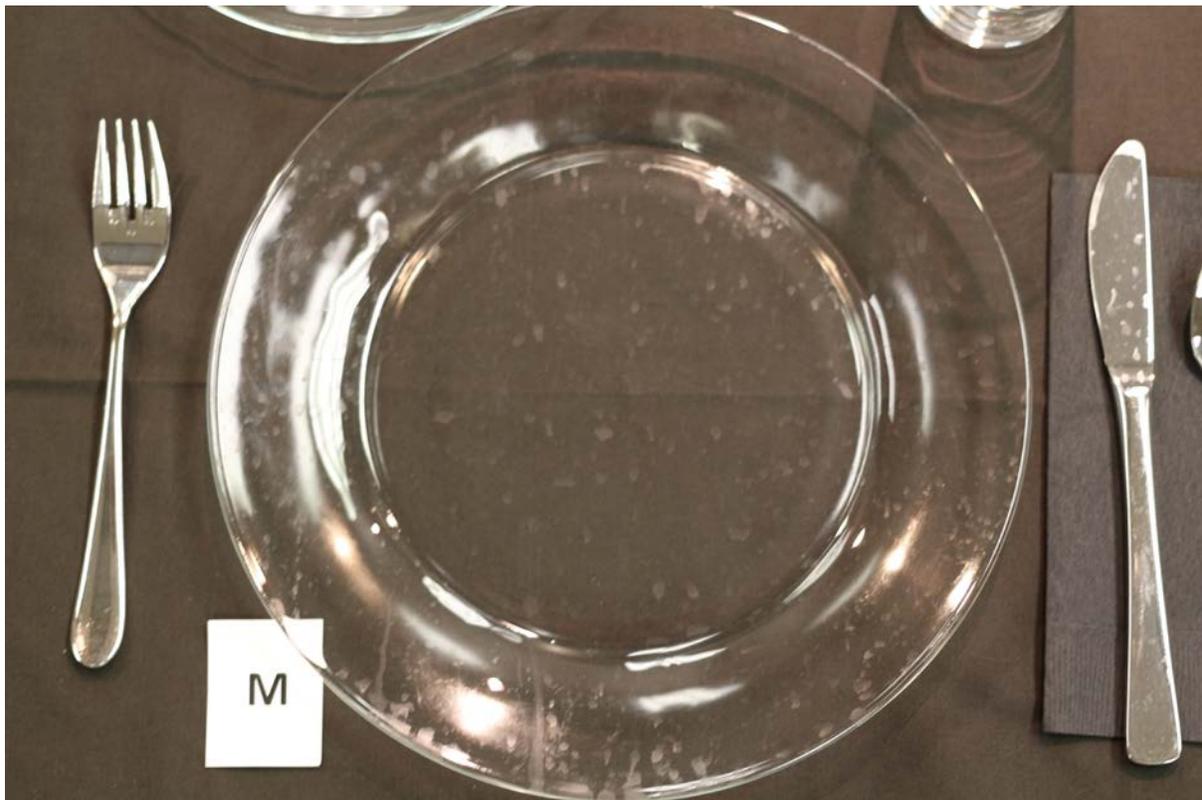
**Figure 3—307 kWh/year Results**



**Figure 4—255 kWh/year Results**



**Figure 5—234 kWh/year Results**



In order to provide a consumer perspective on the performance results, company employees not connected to the dishwasher product category and without knowledge of the objective were asked to examine the place settings. The participants answered questions regarding their level of acceptance of the cleaning performance of the three dishwashers. During the meeting with DOE, AHAM showed a video of the consumer feedback. That feedback is summarized in Table A.

**Table A—Consumer Feedback, Grease and Buildup Testing**

307 kWh/year	255 kWh/year	234 kWh/year
I would eat off of this	It seems dirty	I'm not going to eat off of that . . . You can see the grease on them
It just looks like water spots to me	It seems unsanitary	I would be bothered that I'm having to take the extra step to clean something when I'm paying for a machine that is supposed to clean them
I would probably bear with these	Not aesthetically pleasing	It's yucky
I don't think this is unacceptable	I wouldn't eat off of it because it's dirty / it looks like it has food film on it	Looks like it has grease / food still on it

This feedback shows that consumers generally accept performance of today's dishwashers, but some do have some concerns with performance—this is true across dishwasher brands. Conversely, consumer feedback on the proposed level and on Efficiency Level 2.5 was overwhelmingly negative. Consumers viewed the place settings that were “cleaned” in dishwashers using 255 kWh/year and 234 kWh/year as unsanitary and were not willing to eat off of them. In addition, when asked what they would do if their dishes looked like the sample place setting after a second or third wash, consumers responded that they would get a new dishwasher, that it was not normal for dishes to look like that, that they would call a repair person, and that they would find the results unacceptable and would be angry. When asked if they would accept the performance if the dishwasher cost less to run, consumers responded that performance is top of mind when they think of their dishwasher, not cost to operate. These responses are provided in further detail in the July 8, 2015 meeting slides attached as Appendix A.

The second set of investigative testing focused on adhered soils and particulates. Two standards levels were tested on two different units:

1. 307 kWh/year and 5.0 gallons/cycle targeted; and
2. 234 kWh/year and 3.1 gallons/cycle targeted.

For this set of testing, ten place settings were soiled according to the AHAM DW-1 soiling method. The soil in one bowl was replaced with adhered soil. The soil in one glass was replaced with a milk glass soiled according to IEC Standard 60436. The tomato juice glasses were replaced with buttermilk glasses from an NSF test procedure in one of the dishwashers. Photographs of the bowl with adhered soil and the IEC milk glass prior to the cycle being run are in Figures 6 and 7.

**Figure 6—Bowl with Adhered Soil**



**Figure 7—IEC Milk Glass**



AHAM displayed all of the dishes from one of the 307 kWh/year and 5.0 gallons/cycle dishwashers and one of the 234 kWh/year and 3.1 gallons/cycle dishwashers on the table. Photographs of those place settings are displayed below in Figures 8-13. DOE and Navigant were asked to consider whether, as consumers, they would eat off of the dishes or would serve friends/family from the dishes. As the pictures show (and is more evident when viewed in-person), there were some particles remaining on the dishes that were cleaned in the dishwasher that targeted 5.0 gallons/cycle (307 kWh/year). But the dishes that were “cleaned” in the dishwasher targeting 3.1 gallons/cycle (234 kWh/year) still looked dirty. Meeting participants responded with a chorus of “eww” and “gross” when the dishes that were “cleaned” in the 3.1 gallons/cycle (234 kWh/year) dishwasher were revealed.

**Figure 8—307 kWh/year; 5.0 gallons/cycle**



**Figure 9—307 kWh/year; 5.0 gallons/cycle**



**Figure 11—234 kWh/year; 3.1 gallons/cycle**



**Figure 12—234 kWh/year; 3.1 gallons/cycle**



**Figure 13—234 kWh/year; 3.1 gallons/cycle**



Although the dishes were dirty enough to speak for themselves, in order to provide a consumer perspective on the results, 16 consumers who were not connected to appliance retailers, repair stores, or manufacturers, were asked to review the results from both the current and proposed energy and water levels. The consumers were asked to describe what they saw, what they would do if their dishwasher provided those performance results, and whether they would use the dishes. AHAM showed a video of one of four focus groups asked these questions. The focus group responses are summarized below in Table B.

**Table B—Consumer Feedback, Adhered Soils Testing**

307 kWh/year and 5.0 gal/cycle	234 kWh/year and 3.1 gal/cycle
Pretty clean	Couldn't handle it
No water spots	Feel like I got "punked"
Inefficient	Unsanitary
85% good	Unappetizing
Redo dirty ones	Not washed / not working
Caked on / stuck on / spotty	Everything was dirty
Acceptable	Dirty/filthy/gross/disgusting
Dull	How old is that dishwasher
Shiny	Not working
Residue / stained	Need a new dishwasher
Not clean/ not sanitized	Nasty / yuck
Not loaded correctly / overloaded	Hadn't run through dishwasher
Lots of capacity	Useless

Again, this feedback shows that consumers generally accept performance of today's dishwashers, but some do have some concerns with performance—this is true across dishwasher brands. But the results were overwhelmingly negative at the proposed level. Consumers indicated that the dishes from the 3.1 gallons/cycle (234 kWh/year ) dishwasher were unsanitary, unappetizing, filthy, and gross. Some even indicated that the dishwasher was useless or that it seemed to be old or not working. In fact, almost 70 percent of the consumers surveyed were somewhat, very, or extremely likely to serve family and friends from the dishwasher at the current standard level. But not one person would serve family or friends from the dishwasher at the proposed levels.

These performance tests and consumer studies demonstrate that performance will be negatively impacted by DOE's proposed energy conservation standards for residential dishwashers. In fact, AHAM believes that anything more stringent than the upcoming ENERGY STAR level of 270 kWh/year and 3.5 gallons/cycle for standard size dishwashers will negatively impact performance. As discussed above, manufacturers report, and consumer feedback shows, signals of consumer dissatisfaction even at less stringent levels, such as at today's standard.

Product performance is at the very essence of the bargain in EPCA between obtaining energy efficiency improvements while protecting consumers from being deprived of products that work

well and perform the desired function. This is not only meaningful to any understanding of technical feasibility, but is also explicitly a requirement for economic justification under 42 U.S.C. § 6295(o)(2)(B)(IV). DOE's authority to set standards is restricted in 42 U.S.C. § 6295(o)(4) if DOE finds that the standard "is likely to result in the unavailability in the United States in any covered product type (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding." AHAM's testing demonstrates that the performance of models at the proposed levels (and Efficiency Level 2.5) will be substantially different—worse—than performance of products available today. Accordingly, DOE must promulgate less stringent standards than those proposed in the proposed rule and, in no case, can go beyond the upcoming, already aggressive ENERGY STAR level.

The attendees at the meeting were as follows:

Ashley Armstrong, DOE  
John Cymbalsky, DOE  
Judith Reich, Navigant  
Troy Watson, Navigant

Jennifer Cleary, AHAM  
Rehan Ehsan, AHAM  
Robert McArver, AHAM  
Joseph McGuire, AHAM  
Charles Samuels, Mintz Levin Cohn Ferris Glovsky and Popeo, P.C. (AHAM Counsel)

Karin Svantesson, Asko (phone)  
Mike Edwards, BSH  
Manfred Staebler, BSH  
George Hawranko, Electrolux (phone)  
Paul Richter, Electrolux (phone)  
Kelley Kline, GE Appliances (phone)  
Paul Newsom, GE Appliances  
Steve Polinski, Miele  
Jenni Chun, Samsung (phone)  
Ravee Vaidhyanathan, Samsung  
Tom Haft, Subzero Group, Inc. (phone)  
Jim Pelkey, Subzero Group, Inc. (phone)  
Brian Wylie, Subzero Group, Inc. (phone)  
Nick Gillespie, Whirlpool (phone)  
Wayne Klug, Whirlpool  
Sean Southard, Whirlpool

# Appendix A

# Dishwasher Performance

## AHAM Meeting with DOE

July 8, 2015



# AHAM Performance Concerns—NOPR

- Could not fully assess proposed level because very few models on the market at that level
  - Drive use of more energy/water (pre-rinse, run dishwasher again, etc.)
- Cycle length will unacceptably increase
  - Shipment weighted average cycle time increased by 12% between EL 0 and EL 2 and 37% between EL 0 and EL 3

# AHAM Performance Concerns

- ENERGY STAR test method too variable to reliably determine that performance would not be negatively impacted at the proposed levels
  - Just as likely to negatively impact performance as be neutral
  - EL 3 performance may overlap with EL 4 performance

## Additional Analysis

- Navigant is analyzing an additional EL of 255 kWh/year and 3.1 gallons/cycle
  - Water level has not changed from EL 3
- Manufacturer knowledge of the consumer indicated that this level would not alleviate performance concerns

# Performance Concerns

- Specific concerns:
  - Adhered soils
  - Grease
  - Buildup over time
- AHAM organized and members performed investigative testing to demonstrate these concerns
  - ENERGY STAR performance test/DW-1 with slight variations
  - No scoring—qualitative review of results

# Investigative Testing

- One set of testing focused on grease and buildup over time
- 3 dishwashers tested
  - 307 kWh/year; 4.1 gal/cycle targeted
  - 255 kWh/year; 3.1 gal/cycle targeted
  - 234 kWh/year; 3.1 gal/cycle targeted
- 8 place settings; 4 soiled
  - Clear plates to better show grease on plates
  - DOE soil plus small amount of animal/vegetable fats
  - 3 DOE normal cycles without filter cleanout between runs

# Place Settings—Before

DOE  
(AHAM  
DW-1)  
Soil using  
clear  
plates



Additional  
fat/grease  
load

# Place Settings--After

- Place settings displayed on AHAM conference room table
- Consider:
  - As a consumer, would you eat off of these dishes?
  - As a consumer, would you serve your friends/family from these dishes?

# Consumer Feedback

- Company employees not connected to dishwasher product category and without knowledge of the objective
- Participants examined the place settings and answered questions regarding level of acceptance regarding cleaning performance
- **Video**

# Consumer Feedback

307 kWh/year	255 kWh/year	234 kWh/year
I would eat off of this	It seems dirty	I'm not going to eat off of that . . . You can see the grease on them
It just looks like water spots to me	It seems unsanitary	I would be bothered that I'm having to take the extra step to clean something when I'm paying for a machine that is supposed to clean them
I would probably bear with these	Not aesthetically pleasing	It's yucky
I don't think this is unacceptable	I wouldn't eat off of it because it's dirty / it looks like it has food film on it	Looks like it has grease / food still on it

# Consumer Feedback

What if your dishes looked like this a 2<sup>nd</sup> or 3<sup>rd</sup> time?

➤ 255 kWh/yr

➤ “If this were the usual result, I would probably get a new dishwasher”

➤ “I would not be happy with that ... It’s not normal for them to look like that”

➤ 234 kWh/yr

➤ “I would call a repair person and hope it’s still under warranty ... If it’s not under warranty, I would call the company and complain”

➤ “It would make me angry”

➤ “I would call the store saying it’s not acceptable”

# Consumer Feedback

## Would you accept this performance if your dishwasher cost less to run?

- **307 kWh/yr**
  - “If this actually cost less, I could put up with this”
  - “I don’t think about the cost of running the dishwasher ... I think about the performance”
  
- **255 kWh/yr**
  - “You’re talking about such a small amount of energy over a span of a year that it’s not a factor”
  - “It would not be acceptable even if it were free”
  - “I would pay more per year to have my dishes coming out clean”
  
- **234 kWh/yr**
  - “Regardless of the cost, I would not want this dishwasher”
  - “The cost to run the dishwasher is immaterial ... The performance would be disappointing”

# Investigative Testing

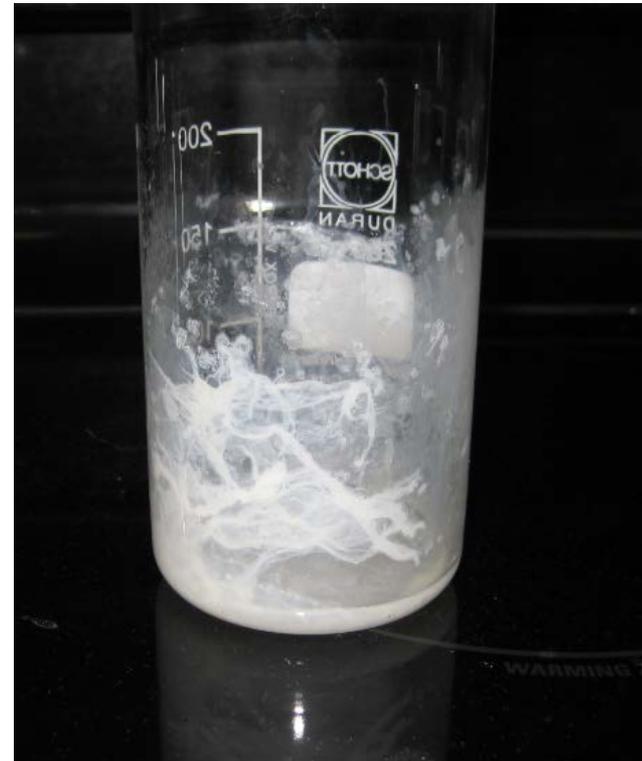
- Second set of testing focused on adhered soils and particulates
- Two levels tested on two different units
  - 307 kWh/year and 5.0 gal/cycle targeted
  - 234 kWh/year and 3.1 gal/cycle targeted
- AHAM DW-1, 10 place settings fully soiled
  - Replaced soil in one bowl with adhered soil
  - Replaced one glass with IEC milk glass
  - Replaced tomato juice glasses with buttermilk glasses from NSF procedure in one dishwasher

# Place Settings—Before

Soils different from DW-1:



**Bowl**



**IEC Milk Glass**

# Place Settings—After

- Place settings displayed on AHAM conference room table
- Consider:
  - As a consumer, would you eat off of these dishes?
  - As a consumer, would you serve your friends/family from these dishes?

# Consumer Feedback

- 16 consumers reviewed results from both energy/water levels (current and proposed)
  - None employed by appliance retailers, repair stores, or manufacturers
- Asked to describe what they saw, what they would do, and whether they would use the dishes
- **Video**

# Consumer Feedback

- Current DOE standards
  - Almost 70% were somewhat, very, or extremely likely to serve family and friends from the dishes
- 234 kWh/year; 3.1 gal/cycle
  - 100 % were not at all likely to serve family or friends from dishes

# Consumer Feedback

Current Standard	234 kWh/year/3.1 gal/cycle
Pretty clean	Couldn't handle it
No water spots	Feel like I got 'punked
Inefficient	Unsanitary
85% good	Unappetizing
Redo dirty ones	Not washed / not working
Caked on / stuck on / spotty	Everything was dirty
Acceptable	Dirty/filthy/gross/disgusting
Dull	How old is that dishwasher
Shiny	Not working
Residue / stained	Need a new dishwasher
Not clean/ not sanitized	Nasty / yuck
Not loaded correctly / overloaded	Hadn't run through dishwasher
Lots of capacity	Useless

# Conclusion

- These tests and consumer surveys demonstrate the performance will be negatively impacted by the proposed and subsequently analyzed levels
- Any DOE standard level beyond the next ENERGY STAR level of 270 kWh/year and 3.5 gal/cycle for standard size dishwashers will negatively impact performance