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May 18, 2020

Via Email

Ms. Ga-Young Park
Product Manager for Appliances
Environmental Protection Agency
ENERGY STAR Products Program
1200 Pennsylvania Avenue, NW
Washington, DC 20460
park.ga-young@epa.gov

Re: Whirlpool Supplemental Comments to AHAM - ENERGY STAR Dishwashers Version 7.0 Draft 1 Specification

Dear Ms. Park:

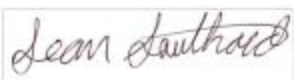
Thank you for the opportunity to comment on the Environmental Protection Agency's (EPA) Draft 1 Version 7.0 ENERGY STAR Dishwasher Specification, published on March 10, 2020 .

Whirlpool Corporation (NYSE: WHR) is the leading major appliance manufacturer in the world, with approximately $20 billion in annual sales, 77,000 employees and 59 manufacturing and technology research centers in 2019. The company markets Whirlpool, KitchenAid, Maytag, Consul, Brastemp, Amana, Bauknecht, JennAir, Indesit and other major brand names in nearly every country throughout the world. Additional information about the company can be found at whirlpoolcorp.com.

As a very active member of the Association of Home Appliance Manufacturers (AHAM), Whirlpool Corporation has worked closely with them in the development of the industry comments they submitted (under separate cover) on this draft specification. **Please be advised that we support and echo the AHAM positions, particularly that we support the proposed sunset of the ENERGY STAR dishwasher program, the documented performance concerns with the proposed requirements, the connected criteria comments, issues with the cleaning performance test method and minimum cleaning index, and the proposal to focus program resources on a campaign to increase dishwasher ownership and proper use. Our comments supplement the AHAM positions and add additional context.**

Thank you again for your consideration and we look forward to continued discussion on this proposal.

Sincerely,



Sean Southard
Senior Manager, Regulatory Affairs
Whirlpool Corporation

Program Sunset is Needed

In 1995, an average dishwasher sold in the U.S. used about 445 kWh/yr.[1] In 2018, an average dishwasher met or exceeded the Version 6.0 ENERGY STAR criteria of 270 kWh/yr.[2] This is an energy savings of nearly 40% from before the ENERGY STAR dishwasher program was created.[3] When accounting for the impact of the U.S. Department of Energy (DOE) energy conservation standards and ENERGY STAR together, dishwashers have saved well over 50% of the energy consumption from before the first federal standards were developed. This doesn't even account for the significant and comparable water savings in dishwashers over this time.

This is to say that the ENERGY STAR dishwasher program has been an immense environmental success story. That success should be celebrated by EPA and its partners. A program sunset is the natural ending point for any successful ENERGY STAR program. A sunset is the recognition that all feasible improvements in energy and water efficiency have been achieved. It is not something negative or viewed as an anti-environmental outcome, and should instead be the program goal.

Fortunately, we are now at a point where after nearly 25 years of the ENERGY STAR dishwasher program and six specifications, a sunset is the best path forward. Most dishwashers already use far less than $0.25 of energy and water per cycle, not to mention the enormous time-savings that dishwashers offer families, and increasing capacities which mean even less energy and water per place setting to clean them. In many cases, consumers actually pay more for the detergent than they do for the energy and water to run their dishwashers. Continuing to lower the energy and water consumption of dishwashers in a Version 7.0 specification could actually lead to adverse consequences. The most environmentally-sound and sustainable choice is to sunset the ENERGY STAR dishwasher program.

Fewer than 15% of models will qualify for the Version 7.0 specification, and as we detail below, many of those are high-price and low-volume models. With many models unable to meet the proposed Version 7.0 requirements, some significant portion of current Version 6.0 ENERGY STAR models may drop back to just meeting the DOE federal minimum standard (since over 75% of models on the market today that are Version 6.0 ENERGY STAR certified do not meet the proposed Version 7.0 requirements). Manufacturers may do this in order to offer enhanced performance to consumers. In our 2015 performance testing highlighted in a proceeding section, we document that some performance degradation has already taken place among dishwashers meeting the current ENERGY STAR specification. It would only be natural to assume that some manufacturers may drop models back to the

[1] 2017 Trends in Energy Efficiency - Association of Home Appliance Manufacturers
[2] ENERGY STAR Unit Shipment Data Reporting 2018
[3] Savings may be greater, due to a test procedure revision that added standby energy use in 2013 (among other changes).

DOE federal minimum in order to recoup some of that lost performance. This could be an increase of energy and water across these models, many of which are higher-volume models than those meeting the Version 7.0 proposal, which actually leads to a loss of national energy and water savings. While EPA could claim savings from this specification, there may be a net loss of energy and water savings for consumers and utilities.

Consumers may also shift their behavior to use additional energy and water if they are unhappy with the performance of dishwashers meeting the proposed requirements. They may pre-rinse more often, use more energy- and water-intensive cycles, rewash dishes, or even abandon using the dishwasher in favor of hand washing instead. All of these behavioral shifts lead to additional energy and water consumption, which could erase any savings claimed by this specification revision.

Finally, we do not see ENERGY STAR as a differentiator for consumers purchasing dishwashers anymore, as it may have been through the program's history. Our consumer studies all consistently show much more important features and attributes that they look for and consider important when purchasing a dishwasher, than resource efficiency. As a manufacturer, we try to focus on those features and attributes that consumers consider important and/or are deficient in our current products. We have limited resources to invest in innovation, and those limited resources are better served focusing on those things consumers care about, and not something they simply do not care that much about and is not considered a deficiency in today's product. We believe that most consumers understand that their dishwashers are already very efficient today, as evidenced by very low annual energy costs listed on EnergyGuide labels and the prevalence of the ENERGY STAR label on most dishwashers.

We believe that the only logical outcome at this point is a program sunset for dishwashers. This outcome appears to be in line with the factors that EPA typically considers when deciding whether to sunset, including additional, cost-effective efficiency gains are not available or anticipated. We provide further detail supporting this below, and offer a few opportunities for collaboration in dishwashers that could actually lead to further energy and water savings.

Minimum Cleaning Index Requirement

EPA has proposed a minimum cleaning index requirement of 70 for dishwashers to certify as ENERGY STAR. EPA also proposed to not make the minimum cleaning index a verified requirement. We strongly oppose a mandatory cleaning index requirement, even if it will not be verified.

This is a situation where we can't have a minimum cleaning performance requirement with or without verification. With verification, we run into repeatability and reproducibility issues causing potential disqualifications from ENERGY STAR. Verification can only be done on a performance measure that does not have large variation like we see here on the cleaning performance test method. Without verification, we would expect a wide range of cleaning index scores from different manufacturers, since one manufacturer's lab performing the same exact test will likely score a much different result than another manufacturer's lab.

This could become a competitive advantage or disadvantage, depending on how a manufacturer's lab scores a dishwasher. For example, "Manufacturer A" may score a 65 on the same dishwasher that meets ENERGY STAR water and energy levels that "Manufacturer B" would score a 75. "Manufacturer A" would not be able to certify the dishwasher to ENERGY STAR, and possibly lose significant competitive footing to "Manufacturer B", who would certify the dishwasher to ENERGY STAR. Multiplied over many models and manufacturers, this becomes a significant problem and creates unfair competitive advantages for some manufacturers, solely based on how their lab grades under the cleaning performance test method and not due to any inherent performance-related differences between models offered by manufacturers.

Additionally, we believe that the 70 minimum cleaning index is determined arbitrarily as a level of consumer-acceptable cleaning performance. We have not seen appropriate evidence from EPA that this is actually a good predictor of consumer satisfaction. There would need to be further evaluation of an appropriate minimum cleaning index that represents consumer satisfaction. However, even with further evaluation, we still believe that there is a large disconnect between the optimal loading configuration used during the cleaning performance test method and a consumer-loading configuration. As anyone who lives in a multi-person household can attest, there is huge variation in how individuals load a dishwasher. Few consumers actually follow manufacturer's recommendations for loading the dishwasher. It should go without reminding, but the loading configuration has a huge impact on the cleaning performance. Loading configuration impacts how and where the water hits dishes and silverware.

So a consumer-acceptable level of minimum cleaning performance under the ENERGY STAR cleaning performance test method may bear little resemblance to the cleaning performance that consumers may experience with the countless loading configurations used in homes. This presents a risk to the ENERGY STAR brand as energy and water levels are lowered as proposed. Even with a minimum cleaning index that is a good predictor of consumer satisfaction using a dishwasher's optimal loading configurations, consumers may still be very unhappy with the performance of their dishwasher if they don't load their dishwasher in the same exact manner used under testing. Consumers may equate this poor performance with the dishwasher's brand and to the ENERGY STAR brand, which is a problem for us and for EPA.

Given these challenges with the minimum cleaning cleaning index requirement, we don't believe it serves its purpose as a backstop to guaranteeing a minimum level of cleaning performance for dishwashers meeting ENERGY STAR energy and water consumption requirements. Without that guarantee and with the challenges described below in lowering energy and water consumption in today's dishwashers, we recommend a category sunset.

Cleaning Performance Test Method

We strongly support the comments submitted by AHAM about past issues and concerns that our industry has cited with the cleaning performance test method. We also add that we do not believe it is fair for EPA to cite that repeatability and reproducibility are acceptable because they haven't heard

issues from manufacturers submitting models for Most Efficient certification. According to the Most Efficient website, of the 78 dishwashers currently certified as Most Efficient, only a handful of manufacturers are represented. Many of the major manufacturers are not represented.

So it is not accurate to cite the lack of issues raised by these manufacturers as representative of all manufacturers. In fact, many other manufacturers appear to have models in the ENERGY STAR certification database that could meet ENERGY STAR Most Efficient criteria for energy and water consumption, but have not been certified to Most Efficient. This could perhaps either be that these models cannot meet the minimum cleaning index requirement, or that these manufacturers have various issues with using the cleaning performance test method, like we do.

If the cleaning index were a verified requirement for Most Efficient, there might have been much more negative feedback from manufacturers about the test method. Due to the high level of lab-to-lab variation, we would expect manufacturers to face possible disqualifications just from this uncontrolled variation.

The cleaning performance test method also does not accommodate testing of dishes and silverware in the third-level rack. Many dishwasher models can now fit silverware in the third-level rack, and some of our new dishwasher models can even fit glasses. The test method would not accurately evaluate performance of these models that are becoming more prevalent in the U.S. market. So the test method would not accurately evaluate the performance of third-level rack models using an optimal loading pattern.

Technology Options

Among the technologies identified by EPA to meet the revised levels, we already use all available technologies that are technologically-feasible and cost-effective in today's dishwashers. We have previously commented to DOE in their previous dishwasher standards rulemaking that all available technologies have already been maximized to meet existing DOE and ENERGY STAR standards.

As an example, there is nothing inefficient about the water heating process in today's dishwashers. They are nearly 100% efficient, and further efficiency improvements are simply not feasible. Variable-speed motors could offer some efficiency improvement, but it is likely not a cost-effective technology option. Drying could be made more efficient, but only at the expense of increased cost, lower drying performance, and lower consumer satisfaction.

One path to meet the proposed energy levels without using any of the technology options would be to lower the rinse and drying temperatures. This would, however, lead to low cleaning and drying performance, and consumer dissatisfaction. Another path using one of the listed drying efficiency options not used today across most or all models, would be to implement an automatic door release system, and increase rinse temperatures to accomplish drying through "flash drying". The theory is that opening the dishwasher door as soon as the final rinse is finished will help evaporate the water from dishes and the steam simply escapes through the open door.

Not only would a door opening system add product cost, if a heater is retained for heated drying in cycles other than the "Normal" cycle, but it could also present several risks. First, because the hot and moist air is released from the dishwasher as soon as the final rinse ends, and the vast majority of dishwashers are built-in, this hot, moist air could feasibly damage the cabinets and countertops, or create mold. This is a potential legal and safety liability for manufacturers. Second, an open door presents an opportunity for a small child to more easily access a very hot dishwasher that just completed the rinse cycle. All of these risks would need to be evaluated further by EPA and manufacturers before considering this a feasible technology option to improve drying efficiency.

An alternative drying approach is a closed loop condenser drying system. Such systems have a heat exchanger which cools the moist air from inside the dishwasher with dry, ambient air, which effectively removes the moisture from inside the dishwasher. These systems, however, are not yet cost effective in the North American market.

EPA needs to also evaluate the impact of the proposed standard on plastic tub models, which are lower-price models that would need significant investments to meet the proposed levels. Plastic tubs also take more energy to heat the tub mass than stainless or hybrid tubs do, which is an inherent energy disadvantage. This specification could effectively end the ability of low-cost plastic tub dishwasher models to meet the ENERGY STAR specification, which may put ENERGY STAR out of reach for many households purchasing a dishwasher.

2015 Whirlpool Investigative Performance Testing

The only cost-effective and technologically-feasible option for lowering energy and water consumption to meet the proposed levels would be to exchange that efficiency improvement for reduced performance. In fact, this tradeoff was studied in detail in the 2015 DOE rulemaking on the dishwasher energy conservation standards.

In our 2015 testing, we used three dishwashers with varying main wash temperatures, final rinse temperatures, and cycle times to explore the impacts of wash/rinse temperatures and cycle times required to meet lower energy and water consumption levels. The three dishwashers used were identical except for these temperatures, cycle times, and their estimated annual energy and water consumption. These dishwashers represented those using 307 kWh/yr and 4.1 gal/cycle, 255 kWh/yr and 3.1 gal/cycle, and 234 kWh/yr and 3.1 gal/cycle, which approximate the current DOE federal minimum energy conservation standard, and the Version 6.0 and proposed Version 7.0 ENERGY STAR levels (with a rating safety factor applied).

We did three rounds of testing. One round was with various plant and animal fats and greases to assess the impact of lower temperatures on the melting points of these soils, and their accumulative effect over multiple cycles, representing longer-term consumer use. The second round of testing was with seven Normal test cycles run without filter cleaning in-between, to assess spotting impacts on clear

glasses. The third and final round of testing simply used a single cycle of the grease and fat soils to collect final rinse drain water samples, and measure how clean or dirty the water is.

For the first round of testing, cleaning was markedly better under the 307 kWh/yr dishwasher, and was much worse for the other two dishwashers. We led a consumer feedback study with twelve employees not connected to the dishwasher category and no knowledge of the experiment or our objective. Participants were filmed and asked to give their opinion about the cleaning performance of the three dishwashers and evaluate cleaned items from each dishwasher. We used this qualitative feedback to get a sense of how our consumers might perceive the impact of lower energy and water consumption on performance, even if it was only under an optimal loading configuration.

The feedback was clear that consumers weren't overwhelmingly happy about the performance of any of these dishwashers. But they were very clear in their preferences towards the 307 kWh/yr dishwasher. One of the questions asked which place setting they would choose to eat from, and every person indicated the preference for the 307 kWh/yr dishwasher.

We also asked a question about whether they would accept the performance of the dishwashers if the energy cost were cut 50% or 100% from today (e.g., $15 or $0 instead of an average dishwasher costing $30/yr). Over 70% of the participants would not trade off energy savings (even 100% savings) if they had to accept the performance at 255 kWh/yr and 234 kWh/yr.

Finally, we asked participants follow-up questions to get further qualitative feedback. One question asked what they would do if they had the observed results just one time. Participant responses varied from hand wash, pre-rinse, check the rinse aid, wipe off the dishes, or use vinegar in the dishwasher. We then asked if this were a repeated occurrence with these results what they would then do. Feedback was that they would call service, try other detergents, hand wash, try different cycles, try different rinse aids, and even replace/return the dishwasher. It was clear that these participants simply wouldn't accept poor performance and would try compensating behavior in many cases if it meant getting the results they desire. Some of these compensating behaviors could mean additional energy and water consumption, in the case of using heavier cycles, pre-rinsing, and hand washing.

For the second round of testing, we evaluated dish spotting. We use spot testing to evaluate the impact of cleaning performance and rinsing on clear dishes. In this testing, we scored spotting using a visual scale and viewing light box, and then presented these glasses to the participants from the consumer feedback study. In our scoring, the 234 kWh/yr dishwasher consistently scored 4/10, while the 307 kWh/yr dishwasher scored 9/10. The participant feedback was consistent with our expectations. Participants overwhelmingly favored the 307 kWh/yr glass, and thought that the 234 kW/yr glass is dirty and would need to be re-washed.

The dish spot testing is particularly important because cleaning and rinse performance issues are especially pronounced on clear or very dark dishes, where soils are harder to hide from visual inspection. A white or light colored plate, for example, might hide leftover white residue or spots, while a clear glass will not.

In the final round of testing, we evaluated the final rinse drain water samples from Normal cycle for turbidity, total organic carbon, and total dissolved solids. These are all different measures of the amount of residual detergent and soils leftover in the final rinse. The higher the measures, the dirtier the final rinse water, and the more likely detergent and soils are redeposited on dishes during rinse. Again, we saw clear differences between the three dishwashers. All three measures were roughly double for the 255 kWh/yr dishwasher, compared to the 307 kWh/yr dishwasher; and roughly double to triple for the 234 kWh/yr dishwasher. The reason the numbers are higher for the lower energy and water dishwashers is because there aren't enough water exchanges to dilute the leftover soils to get the final rinse water clean. Clearly, that is not ideal to have dirty water rinsing dishes. No one at their home would wash their hands or laundry with untreated greywater, and clearly many wouldn't accept rinsing dishes from which they eat with cloudy and dirty rinse water, as indicated in our other testing above.

We are fortunate enough to have this testing already completed, which fairly closely mimics the performance impacts going from the current DOE federal minimum standard to a Version 6.0 dishwasher, and then to a dishwasher that would meet the Version 7.0 proposed specification. We take all this testing and evaluation from 2015 as a strong signal that we may already be beyond the ability to offer consumer-acceptable cleaning performance using an optimal loading pattern with today's ENERGY STAR dishwashers, and this will only be exacerbated by a new specification. Lower energy and water levels will force lower wash and rinse temperatures, and fewer water exchanges, which will impede the ability to effectively clean dishes in a consumer-acceptable manner.

Detergent Effectiveness

The detergent type and amount has a huge impact on cleaning performance. The effect of detergent type on performance is not studied in the ENERGY STAR cleaning performance test method, as a single powder detergent is used. With lower wash and rinse temperatures, and fewer water exchanges, as highlighted above, we expect that certain detergents may struggle to perform adequately in a dishwasher meeting the proposed specification. In particular, low-end detergents may have an amplified impact and not perform well.

Using Consumer Reports' database of gel and single-dose dishwasher detergent performance testing, scores range from 92 to 47. While the Consumer Reports' detergent testing doesn't replicate the ENERGY STAR cleaning performance test method, it serves as an unbiased comparison of the many dishwasher detergents on the market today, tested using baked-on foods in the Normal cycle.

Price doesn't always correlate with performance (the top detergent only costs $0.10 per dose), but the cheaper single-dose detergents ($0.21/dose and below) generally perform worse than the higher-end Consumer Reports "recommended" detergents ($0.26/dose and above). This is particularly pronounced with the gel detergents, which all perform worse than all but a few single-dose detergents, and are generally cheaper. None of these low-end detergents score an "excellent" for cleaning dishes, and many of the gels score a "good" or "fair".

We expect a degradation to the effectiveness of the detergents that already score below an "excellent" on their cleaning performance, simply due to the proposed changes to the specification and the resulting changes in water temperature and fewer water exchanges. Of course, this should be studied further to confirm this assumption, but it could be a significant real-world implication for consumers purchasing an ENERGY STAR dishwasher. These consumers may be forced to only use the higher-end detergents in an attempt to balance out the degradation to cleaning performance that we highlight above. This obviously would have cost implications over time if they move from a detergent costing $0.08/dose to one costing $0.30/dose. Over 215 cycles/year and an extra $47 annually in detergent cost, this could completely cancel out any annual energy and water savings from owning a dishwasher meeting the proposed ENERGY STAR Version 7.0 specification.

The other implication is a shift to heavier, more energy-intensive cycles. Our internal testing shows that good detergents can perform well with lower-energy cycles, but lower-end detergents need higher energy and water cycles to perform similarly. So consumers sticking with their lower-end detergents with a new dishwasher meeting ENERGY STAR Version 7.0 may need to shift to a more energy- and water-intensive cycle to get performance they desire. This would also wipe away any potential savings from the proposed specification revision.

Non-Cleaning Performance Issues

Beyond the cleaning performance impacts detailed above, we expect other non-cleaning performance impacts in dishwashers meeting the proposed Version 7.0 specification. We expect impacts to cycle time and drying performance.

To meet the proposed Version 7.0 specification, lower wash and rinse temperatures may be a widely-used strategy by manufacturers, as described in our 2015 testing. Correspondingly, we see an increase in cycle time of 20-40 minutes to compensate in a small part for the lower water temperatures and water levels. This will mean that a significant number of dishwasher models will have a Normal cycle well over three hours, which may discourage dishwasher use or require many households to adjust their schedules to unload the dishwasher.

Drying performance will also be negatively affected by this specification. The two paths mentioned above in the Technology Options section to meet the proposed specification will mean lower drying scores for dishwashers. While drying performance may not be a top priority for consumers when purchasing a dishwasher, it still remains an issue that they are concerned about after the purchase and often call our call center to complain or troubleshoot issues with drying performance. We expect to have more of these complaints and calls from consumers if drying performance were further lowered by the proposed specification.

Data Analysis

We greatly appreciate that EPA has published the data and analysis used to develop this draft proposal. EPA has not always been consistently done in the past, but it serves everyone to share it, as we and

other stakeholders can give higher quality comments if we have visibility to this data and analysis. We have a few comments on this analysis.

First, the "pass rate" in Table 5 for the percentage of models meeting the proposed Version 7.0 levels is likely overstated at 15%. The analysis appears to only consider the number of models in the meeting the proposed energy and water levels, but doesn't consider whether all of those models could meet the proposed minimum Cleaning Index score of 70. Unless EPA has data indicating otherwise, it should be assumed that all models not certified as Most Efficient do not meet this minimum Cleaning Index score, and EPA should accordingly adjust their analysis to reflect this.

Second, the incremental cost and payback on Table 7 should consider the difference in annual operating cost between models that meet ENERGY STAR Version 6.0 and Version 7.0, instead of calculating the difference between a federal standard model and ENERGY STAR Version 7.0 model. The approach to evaluate a federal standard model with one meeting proposed ENERGY STAR criteria might make sense for many ENERGY STAR specification revisions without very high ENERGY STAR market penetration. However, with ENERGY STAR market penetration around 90%, it doesn't seem to make sense to focus on the 10% of shipments for the baseline efficiency, instead of the 90% of shipments. Focusing on the 10% of shipments does not seem to be an accurate representation of possible energy savings moving from an average dishwasher today to a model meeting the proposed Version 7.0. EPA needs to consider whether this common-sense approach changes the average payback period to an unacceptable level for consumers.

Third, EPA also needs to consider shipment volume instead of just a model count pass rate when evaluating the percent of models meeting the proposed criteria. We suspect that the models currently meeting ENERGY STAR Most Efficient criteria are low-volume and high-price niche models. According to the ENERGY STAR Most Efficient Dishwasher website, the vast majority of models with pricing listed, have an online price of well over $500. In contrast, more popular non-Most Efficient dishwasher models found at major retailers have listed prices of $300-500. We welcome further discussion with EPA about how to account for shipment volume when evaluating "pass rate" and determining an accurate average purchase cost that feeds into the incremental cost and payback analysis.

Specification Revision in the Context of Other U.S. and International Regulatory Action

Of course, EPA's proposed decision to revise this specification does not happen in a vacuum. We must put it into context of other past and on-going regulatory action. In the U.S. energy conservation standards rulemaking that concluded in 2016, DOE concluded that "more stringent residential dishwasher standards would not be economically justified, and, thus, does not amend its energy conservation standards for residential dishwashers." DOE also acknowledges that there could be performance and consumer utility impacts under revised standards in the test methods used in the 2015 industry testing that we mention above.

DOE also has an on-going rulemaking to consider establishing a new product class for residential dishwashers with a normal cycle of 60 minutes or fewer, from washing through drying. DOE initiated this

rulemaking in response to a 2018 petition from the Competitive Enterprise Institute, highlighting the impacts of energy and water conservation standards on the increase in dishwasher cycle times over the last 35 years. According to the data CEI presented, average cycle times have increased from about 70 minutes to over 140 minutes, and many more dishwashers have cycle times longer than that. CEI petitioned DOE to establish a third product class for standard dishwashers with a cycle time of 60 minutes or fewer. Thousands of comments were submitted to the DOE docket, including many from consumers already concerned about the cycle times in today's dishwashers. DOE published a Notice of Proposed Rulemaking proposing to grant the petition in July 2019.

While industry has not supported the petition and proposed grant of petition by DOE, the point remains that there are serious concerns by many people and groups, including DOE, about the impact of lower energy and water requirements on cycle time. Since ENERGY STAR has nearly a 90% market penetration, this indicates that the cycle time concerns mentioned above are not just about the minimally-compliant dishwasher models, but about ENERGY STAR-certified dishwasher models.

It certainly seems odd for EPA to pursue a dishwasher specification revision in light of DOE's concerns over the last 4-5 years about the impact of more stringent energy/water standards on cost-effectiveness, cleaning performance, consumer utility, and cycle time. For EPA to move forward with a specification revision would be counter to these impacts and conclusions cited by DOE. Regardless of ENERGY STAR technically being a voluntary program, two U.S. federal agencies should come to the same conclusions about predicted impacts of increasing energy and water efficiency standards.

EPA should also put this specification revision in the context of the proposal under consideration by Natural Resources Canada (NRCan) to make ENERGY STAR the Canadian federal minimum efficiency standard (MEPS) for all appliances by 2022.[4] Since most manufacturers have combined North American operations and supply chains in both the U.S. and Canada to leverage regulatory cooperation,[5] and there is a very strong similarity between American and Canadian consumers, we offer identical dishwasher models across both countries. EPA should be cognizant that the Dishwasher Version 7.0 proposal would raise Canadian MEPS by 21.8% for energy and 38% for water. Currently, 85% of standard dishwasher models and 72% compact dishwasher models available for sale in the U.S and Canada today would be precluded from entering Canada by 2022. This in all likelihood would result in a significant reduction of dishwasher models being made available for sale in Canada. According to 2019 Canada Trade Data, Canada imported $133 million (USD) in U.S. manufactured dishwashing machines, approximately 3.5 times more than China, its nearest rival.[6] Canada's intent contravenes the newly ratified USMCA free trade agreement[7] that commits to voluntary approaches to promote energy efficiency that will negatively impact U.S. manufacturing exports, Whirlpool and North American retailers, and consumers.

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[4] Liberal party 2019 Full Campaign platform page 33 *"To help Canadians save more on their monthly energy bills, we will also move forward with making Energy Star certification mandatory for all new home appliances starting in 2022."*
[5] U.S. - Canada regulatory cooperation (RCC) framework
https://www.energy.gov/sites/prod/files/2015/05/f22/RPS%20PDF.PDF
[6] Hs 842211 - dishwashing machines - household type
[7] Article 12.D.5 USMCA Voluntary Approaches to Promote Energy Efficiency

We must face tradeoffs between consumer choice, maintaining a simplified North American supply chain, and adding cost to our products.

Absent an updated analysis from the one DOE does during a standards rulemaking process, it would be difficult for EPA to justify the proposed Version 7.0 requirements as a possible MEPS for Canada.

Future Collaboration Opportunities

Instead of focusing limited resources from manufacturers and EPA on a Version 7.0 specification, we believe that these resources are better served in promoting other sustainability and resource efficiency measures for dishwashers. There are many studies that show the enormous savings from owning a dishwasher, frequently using that dishwasher, and eliminating pre-rinsing. A partnership between EPA, dishwasher manufacturers, detergent manufacturers, and other stakeholders to educate consumers about the importance of dishwasher ownership and proper usage offers enormous environmental benefits, without the negative consequences described in detail above that come with revising the ENERGY STAR dishwasher specification.

According to EPA's own estimates, a dishwasher certified to ENERGY STAR Version 6.0 saves over $1,330 during its lifetime compared to hand washing.[8] This doesn't count the possible cost savings of over 230 hours of personal time saved by not hand washing, or other benefits offered by a dishwasher, like sanitization.

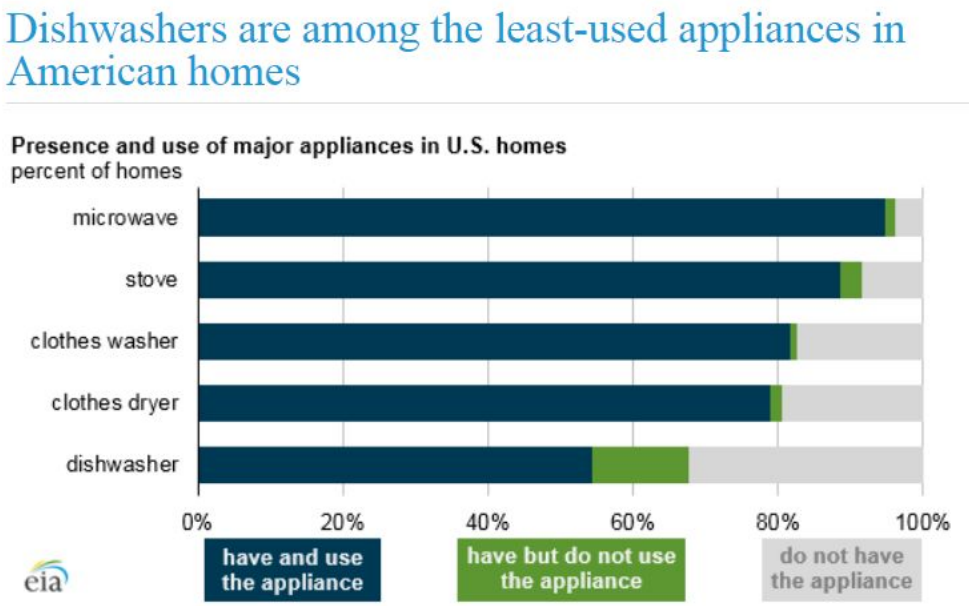
In a 2019 study done between Whirlpool and the University of Michigan,[9] we evaluated these environmental and energy impacts of hand washing compared to using a dishwasher, but with some adjustments not previously studied, such as looking at multiple cycles, assessing pre-rinsing behavior, and the total life-cycle impacts of owning a dishwasher. We found that approximately 33% of U.S. households hand wash their dishes and that this uses about 400% more energy and 50% more energy than using a dishwasher. Another 33% of U.S. households do not use the dishwasher they own or pre-rinse before running those dishes through the dishwasher, which doubles the water usage and increases energy consumption by 33%. Only about the remaining third of households use their dishwasher in the optimal method without pre-rinsing. This is an opportunity to save about 160 billion gallons of water per year just from getting the other two-thirds of U.S. households to own a dishwasher and use it optimally.

This is a savings opportunity of 62% of total national dishwashing annual water consumption to get that two-thirds of U.S. households to use a dishwasher and use it optimally. There is an additional energy savings potential of 22%. Compared to one of our new dishwashers, hand washing can use four times the water and 1.5 times the energy to wash the same load.

We also observe that dishwashers have the lowest penetration of any major household appliance. They also have the lowest use out of the major household appliances, for those homes with a dishwasher.

[8] https://www.energystar.gov/products/appliances/dishwashers
[9] https://news.umich.edu/fighting-climate-change-at-the-sink-a-guide-to-greener-dishwashing/

Together, this means that just a little over half of all U.S. households even have and use a dishwasher, regardless of whether they are pre-rinsing. There is an enormous opportunity to promote broader ownership of dishwashers and to educate consumers of the environmental and cost benefits of using the dishwasher they already own.



Proctor and Gamble (P&G), one of the leading dishwasher detergent manufacturers, has a "Do It Every Night" campaign that claims similar savings for using a dishwasher.[10] In fact, they claim water savings by washing as few as eight dishes in a dishwasher, compared to hand washing. The multi-faceted campaign tries to tackle misconceptions about dishwashers, including that they are wasteful to use when the load isn't full, and that it takes more time to use a dishwasher (loading and unloading) than it does to hand wash.

There are huge opportunities in educating consumers about the environmental benefits of using a dishwasher nightly, even when it is not full. Some smaller households may not use their dishwasher often or at all because it takes a long time to fill the dishwasher and they may not want dishes to sit that long in the dishwasher, so they hand wash dishes instead. Other households may not have enough dishes to fill up the dishwasher, so instead choose to hand wash instead of perceiving a waste of energy and water to run the dishwasher on a small load.

There is a ripe opportunity here for EPA, manufacturers, and other stakeholders, like P&G, to collaborate on a new consumer-targeted education campaign about the benefits of using a dishwasher and how to use them optimally. The savings are already well-researched. It's just a matter of developing unified

[10] https://news.pg.com/press-release/cascade-comes-clean-about-dishwashing-habit

messaging so consumers are hearing the same story from everyone, instead of fragmented messages they may be hearing today. The savings potential from this could be much greater than the savings potential from revising the specification. It would be a win all-around for dishwasher manufacturers, detergent manufacturers, EPA, consumers, and many other stakeholders. We welcome further discussion with EPA and collaboration on this exciting opportunity.

Conclusion

We commend EPA's continued search for energy and water savings in the dishwasher category. However, we believe that these specification development efforts are misplaced. Focusing on incremental changes to the dishwasher specification through a Version 7.0 specification may actually lead to adverse consequences, such as consumer compensating behavior that increases energy and water consumption, negative impacts to cleaning performance, and some portion of the 75% of ENERGY STAR-certified models on the market today dropping back to federal minimum requirements.

Together with EPA, we have solved the problem of dishwasher efficiency. Dishwashers are over 40% more energy efficient than they were before the ENERGY STAR was created, and now about 90% of dishwashers sold in the U.S. are ENERGY STAR-certified. It's a success story that would make nearly any global environmental program jealous. But we are at a point where we can't make dishwashers more efficient without these adverse consequences mentioned above.

While we should all take the time to applaud this success and give it the recognition it deserves, this is not to say that we are done with improving efficiency in the dishwasher category. We need to focus our collective efforts where huge savings are still possible, which is educating consumers about the benefits of owning and optimally using their dishwasher. We have an opportunity in front of us to cut national dishwashing water consumption by 62% if these efforts are successful. It is certainly counter-intuitive to think that the best environmental and sustainability outcome would be to sunset an ENERGY STAR program, but we believe it is very much justified in this case.