



Pacific Gas and
Electric Company®



SDGE

A Sempra Energy utility®



SOUTHERN CALIFORNIA
EDISON®

An EDISON INTERNATIONAL® Company

April 7, 2020

Ms. Ga-Young Park
U.S. Environmental Protection Agency (EPA)
Climate Protection Partnership Division
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Subject: ENERGY STAR® Version 7.0 Draft 1 Residential Dishwashers Product Specification.

Dear Ms. Park:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE) in response to the United States (U.S.) Environmental Protection Agency (EPA) Draft 1 of the Residential Dishwashers Version 7.0 Product Specification.

The signatories of this letter, collectively referred to herein as the California Investor-Owned Utilities (CA IOUs), represent some of the largest utility companies in the Western U.S., serving over 32 million customers. As energy companies, we understand the potential of appliance efficiency standards to cut costs and reduce consumption while maintaining or increasing consumer utility of the products. We have a responsibility to our customers to advocate for standards that accurately reflect the climate and conditions of our respective service areas, so as to maximize these positive effects.

The CA IOUs appreciate this opportunity to provide comments on the Version 7.0, Draft 1 Specification for Residential Dishwashers. We are supportive of energy and water requirement adjustments throughout this specification, including the addition of soil sensors if consumer benefit can be demonstrated from product data. We also support the incorporation of the Cleaning Index (CI) as a requirement in concept, but recommend that additional public data is made available to ensure that the metric is robust with current products and correlates with user experience, significant interdependencies with other requirements are known and addressed, and both the metric and test procedure are re-affirmed as part of this development process. Lastly, we are supportive of the revisions to the connected criteria and development of the demand response validation test method. In support of our positions, we strongly urge EPA to consider the following comments.

1. The CA IOUs are supportive of Version 7.0, Draft 1 requirements for energy and water performance.

The CA IOUs have examined the Version 7.0 Draft 1 Dataset, current Qualified Products List, and ENERGY STAR Most Efficient (ESME) 2020 products and confirm that the level

reductions set by the Version 7 specification for yearly energy consumption and water consumption per cycle are supported by product data. We appreciate the clarification on the Version 7 Draft 1 webinar that the five percent engineering margin used in the dataset was not a nominal value, but instead based on raw product data. We recommend adding this information to the dataset as a note.

Regarding number of brands and models of passing products, we recommend a revisit of this analysis with CI incorporated, to ensure that there is sufficient representation of manufacturers and brands. We also recommend an additional efficiency criteria chart is made available to stakeholders that only shows products that have a known passing CI.

2. The CA IOUs are supportive of the inclusion of requirements for soil sensors if supported by industry test data.

We are highly supportive of EPA’s intent to incorporate requirements for soil sensors if available data is able to justify this requirement. We note that energy savings from soil sensors is very relevant to performance in the field as consumers often run partial loads with moderate to light soil.¹ The U.S. Department of Energy (DOE) test procedure in 10 CFR 430 Appendix C1 to Subpart B, incorporating ANSI/AHAM DW-1 2010 by reference, performs a weighted calculation over three soil levels (five percent heavy, 33 percent medium, and 62 percent light sensor response) to calculate the performance of soil sensing dishwashers, at a nominal eight place settings.² There may be additional energy and water savings available for a consumer home that runs a standard sized dishwasher frequently with partial loads under the nominal eight place settings.

We note that washing cycle performance on a soil sensor equipped dishwasher can have a large variance in ability to adjust to partial loads and light soil.³ In a 2013 report by Bruckner and cited by the European Commission, four sensor equipped dishwashers were tested in the automatic cycle over a variety of partial loads with and without soil to measure the sensor response compared to the “eco” cycle. When compared to the eco cycle, three of four models did not exceed the eco cycle performance when ran empty. Two of these machines and the machine exceeding its eco cycle performance did scale successfully between the soiled and unsoiled version of the loads, using an average of 80 percent of the energy of the soiled cycle for the unsoiled case. The product that scaled energy consumption the least and product exceeding its eco cycle performance were compared side by side, demonstrating that: the high performing product could be seen to adjust to both partial load and no soil cases, with a max reduction of 28 percent of full load with soil consumption; the least scaling product had a max reduction of 16 percent of full load with soil consumption.⁴ As this study was

¹ Joint Research Centre (JRC) Technical Report: [Ecodesign and Energy Label for Household Dishwashers](#), 2017. 4.3.6.3 Combination of Sensors, p. 199.

² 10 CFR 430 Appendix C1 to Subpart B, sections 2.6.3.1-2.6.3.3, loading directions for sensor heavy – light responses. Eight place settings and six service pieces are loaded in each, with four, two, and one plate soiled according to AHAM DW-1-2010 respectively. Note in the light soil load, the single plate is given half the soil load in DW-1.

³ JRC Report. 4.3.6.3 Combination of Sensors, p. 200.

⁴ Results in kWh/cycle for: Product exceeding eco mode cycle: eco cycle: 1.11; full load with soil: 1.24; no load and no soil benchmark: 0.89. Product with least effective scaling between soil and no soil: eco cycle: 1.09; full load with soil: 1.64; no load and no soil benchmark: 1.37.

conducted in 2013, we anticipate improved machine response in current generation products and encourage EPA to obtain and publish new manufacturer product performance data.

The DOE test method does compute the energy use per cycle for three soil levels prior to the weighting calculation. This information may provide some insight on how much a dishwasher is able to scale the automatic wash cycle to the condition of the dishware, such as the per cycle energy consumption ratio between a high soil and low soil load. We encourage EPA to work with manufacturers to obtain intermediate test data points from the DOE test procedure if this information is available and determined to be a useful approach to benchmarking soil sensor response.

We also note that in addition to soil sensors, load sensors are also available, where the weight of the dish load is measured and used to scale down the water fill level. An Ecodesign JRC report estimated that 40 percent of European Union (EU) models were equipped with soil sensors and 20 percent of EU models were equipped with load sensors, many of which were using both sensors simultaneously to better predict the dish load cycle requirements.⁵ This report also outlined how soil sensors can respond incorrectly to heavily baked on soil. In cases where the soil remains attached to the surface during a wash and sensing cycle, the water cleanliness (turbidity) estimate can indicate the ware is clean and recommend completing the wash cycle.⁶ In light of the cleaning performance implications of this programming, it may be beneficial to incorporate a worst case soil test into the heavy load scenario of the CI test method, where the sensor response can be evaluated.

As data for soil sensor and load sensor prevalence in the U.S. dishwasher market is limited, we recommend soil and load sensors be added to the Qualified Products List as public product information.

3. The CA IOUs are supportive of the CI requirement; however, we recommend more public data is made available in support of the requirement.

We are supportive of the assertion that cleaning performance is an important factor of product performance and should be accounted for quantitatively for consumer benefit. We note that making the CI a requirement will add a third core parameter to this specification and may impact projected pass rates and number of manufacturers represented. As ENERGY STAR is a data driven development process, we recommend that an anonymized dataset and or plot is made available to demonstrate the implications of this requirement alongside energy and water performance for potential Version 7.0 products.

We appreciate the confidential internal analysis run by EPA as mentioned on the Version 7.0 Draft 1 webinar relating to CI, including: CI vs. energy consumption, CI vs. water consumption, CI vs. product category, CI vs. soil sensor, and CI vs. consumer acceptance values (product rating for cleanliness). We are cognizant of data confidentiality concerns but consider this analysis to be a key foundation for this specification development regarding CI requirements. We recommend that as much of this analysis as possible is released in

⁵ JRC Report. 4.3.6.1 – 4.3.6.2 p. 198-199.

⁶ JRC Report. p199.

aggregate, or other method of anonymization, to provide a public record and useful dataset which demonstrates that there is no functional relationship between CI and energy/water use, product types (i.e., standard size), and sensor use, and that CI and consumer acceptance values are correlated⁷, at least for $CI \geq 70$ and <70 .

We note that past comments recommended revisiting the test procedure to improve repeatability and recommend that this test procedure is made available for revision and public comment during this specification development process, ensuring that the test procedure is either re-affirmed by industry stakeholders, or is updated to improve accuracy and repeatability.

4. The CA IOUs are supportive of the adjustments to residential dishwasher connected criteria.

We support the notion that non-large load equipment such as residential dishwashers would not need to connect directly to a Demand Response Management System, such as through OpenADR 2.0b, but instead would communicate to a Home Energy Management System via a conventional network protocol. We are especially supportive of functionality that would initiate a load when energy pricing is extremely low or delay a load during peak events, such as the Delay Appliance Load command; the Temporary Appliance Load Reduction command is also useful in aggregate.

We note that the current connected allowance equates to approximately 1.4 watts (W) average load in standby power demand.⁸ In 2019, Ecodesign best on the market network enabled dishwashers have been shown to use 0.2 W in conventional standby, and 0.7 W in Wi-Fi network standby⁹, so a 1.0 W standby power allowance may be feasible, and is within a reasonable margin of the current requirement. We recommend not adjusting this requirement. While more difficult energy and water performance requirements appear to eliminate current connected products, manufacturer engineering margin may result in this not being the case.

5. The CA IOUs recommend minor clarifications to the specification, and appreciate the clarifications made during the March 26, 2020, webinar hosted by EPA.

- We recommend that the test methods for CI and method to validate demand response are added to Table 5, Test Methods for ENERGY STAR Certification.
- We appreciate the clarifications to the CI requirement on the Version 7.0 Draft 1 webinar. We request the specification is updated correspondingly such that the CI requirement is based on a ≥ 70 CI for a low, medium, and high soil load test.

⁷ For example: T-test of the consumer acceptance values of the $CI \geq 70$ and <70 groups, or performing a Spearman rank correlation of the data between the CI score and consumer acceptance values.

⁸ Standby power consumption calculated based on a 5% connected credit on proposed 240 kWh/year requirement for standard dishwasher, which is: 12 kWh/year. Converting this value to average load at an estimated duty cycle of 24/7/365 idle results in: 12 kWh/year * (1000 [W/kW] / 8760 [hr/year]) = 1.37 W.

⁹ EU Ecodesign requirements for household dishwashers (Directive 2019 / 2022), Annex V, Indicative Benchmarks 2. Indicative Benchmarks for household dishwashers on power consumption in low power modes.

- We appreciate the clarification on the Version 7.0 Draft 1 webinar that EPA/DOE is updating the *Test Method to Validate Demand Response for Residential Dishwashers* during this specification revision.

In conclusion, we would like to reiterate our support to EPA's Draft 1 of the Residential Dishwashers Version 7.0 Product Specification. We thank EPA for the opportunity to be involved in this process and encourage EPA to carefully consider the recommendations outlined in this letter.

Sincerely,



Patrick Eilert
Manager, Codes & Standards
Pacific Gas and Electric Company



Michelle Thomas
Manager, Energy Codes & Standards and ZNE
Engineering Services
Southern California Edison



Kate Zeng
ETP/C&S/ZNE Manager
Customer Programs
San Diego Gas & Electric Company