Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
National Consumer Law Center
Natural Resources Defense Council
Northwest Energy Efficiency Alliance

January 17, 2023

Mr. Jeremy Dommu
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-2J
1000 Independence Avenue SW
Washington, DC 20585

RE: Docket Number EERE-2022-BT-STD-0025: Energy Conservation Standards for Portable Electric Spas

Dear Mr. Dommu:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), National Consumer Law Center (NCLC) on behalf of its low-income clients, Natural Resources Defense Council (NRDC), and the Northwest Energy Efficiency Alliance (NEEA) on the notice of data availability (NODA) for energy conservation standards for portable electric spas. 87 Fed. Reg. 69082 (November 17, 2022). We appreciate the opportunity to provide input to the Department.

Although more than a dozen states have adopted portable electric spa (PES) standards, PESs are not currently subject to DOE regulation. We are therefore pleased that DOE has published this NODA, which shows that potential national standards for PESs could achieve large energy savings. While we are generally supportive of the Department's analytical approach presented in the NODA, we encourage DOE to incorporate both cover design and air leakage into the engineering analysis. We are also concerned that assumptions made in the NODA are underestimating PES annual operating hours and energy usage. Each of these topics is discussed in more detail below.

We encourage DOE to include cover design in the engineering analysis. A portion of spa heat loss, which drives energy consumption, occurs through a spa's cover. While DOE's preliminary analysis estimates the standby loss reductions from improved cover insulation (e.g., thicker foam), cover design was not analyzed. For hinged spa covers, there are two designs available on the market with potentially different heat loss characteristics. The most common design has two sections of foam with a gap between the two pieces that allows one of them to be folded back onto the other.[1] As DOE describes in the NODA, to address heat losses through the hinge, manufacturers may insert a third piece of foam to fill the hinge gap between the two cover pieces. This hinge seal is not connected to either section, which maintains the folding capability of the hinged design. We encourage DOE to compare the standby loss between a spa with a one-piece cover (i.e., no hinge) and the same spa and cover insulation with a

[1] 87 Fed. Reg. 69088.

double-hinged cover; this comparison would help elucidate the overall magnitude of potential standby loss improvements achievable with improved hinge design.

Further, another available cover discussed in the NODA is a "single-hinged" folding design, in which there is no space gap between the vertical edges of each spa cover section. Instead, the edges of each section of the cover are angled, with one overlapping the other. We suspect this type of design may reduce heat loss relative to the double-hinged design. We therefore encourage DOE to consider incorporating hinge design into the engineering analysis.

We encourage DOE to incorporate air leakage in the engineering analysis. While DOE did analyze improved cover insulation, the ability of a spa and its cover to create an airtight seal from the ambient environment was not evaluated.[2] As DOE notes in the NODA, inadequate cover sealing permits an excessive exchange of air, resulting in heat loss through convection and evaporation.[3] Although a spa will never be perfectly sealed, it may be possible to engineer the interface between the spa cover (e.g., vinyl) and the spa shell (e.g., acrylic) to reduce air leakage. We thus encourage DOE to explore how reduced air leakage could be incorporated in the engineering analysis.

We are concerned that assumptions made in the NODA are underestimating PES annual operating hours and energy usage. DOE used 2015 RECS data, including a data field quantifying the number of months per year an installed spa was in use (MONTUB), to estimate the typical annual operating hours of PESs. DOE's analysis of the 2015 RECS data resulted in a probability that a spa would be in use *X* months per year as a function of climate zone that is then used in the downstream analysis. Given the sparsity of data for PES installations, DOE made assumptions in their analysis of the 2015 RECS data to estimate the probability a spa would be used *X* months per year as a function of climate zone.[4]

However, it appears DOE's assumptions result in a meaningful underestimation of the annual operating hours of PESs. Figure 1a plots the fraction of homes in the cold/very-cold climate zones, representing 45% of total installations,[5] assigned a given months per year of operation. We understand that the yellow bars, copied from Table III.17 of the NODA and based on 2015 RECS data, represent the values used in the downstream energy and economic analysis. The purple and green bars represent the raw 2015 and 2020 RECS data, respectively.[6] The two key takeaways from Figure 1a are: 1) DOE is significantly understating the number of spas that run twelve months a year and 2) DOE's average months of operation, 7.3 months, is less than that calculated from the raw 2015 RECS data (8.0 months). While we acknowledge the sparsity of spa installation data in the 2015 RECS, we encourage DOE to use the raw 2020 RECS data, which features a much larger consumer sample,[7] in determining the months per year of PES operation.

[2]87 Fed. Reg. 69089.
[3]87 Fed. Reg. 69088.
[4]DOE first binned the recorded value of MONTUB into 3 bins: 1-4 months/year, 5-8 months/year, and 9-12 months per year. Then, DOE calculated the percent of RECS households falling in each bin for each climate zone. Finally, DOE assumed that each of the 4 months/year of spa use in each bin are equally probable.
[5]Table III.15. 87 Fed. Reg. 69098.
[6]For the raw RECS data presented, we calculated each months/year of operation separately rather than binning them into discrete bins (e.g., 9-12 months) and assuming each month in the bin was equally probable. Similar results were observed for the other climate zones.
[7]2020 RECS data has over 700 spa installations compared to about 200 in the 2015 RECS data.

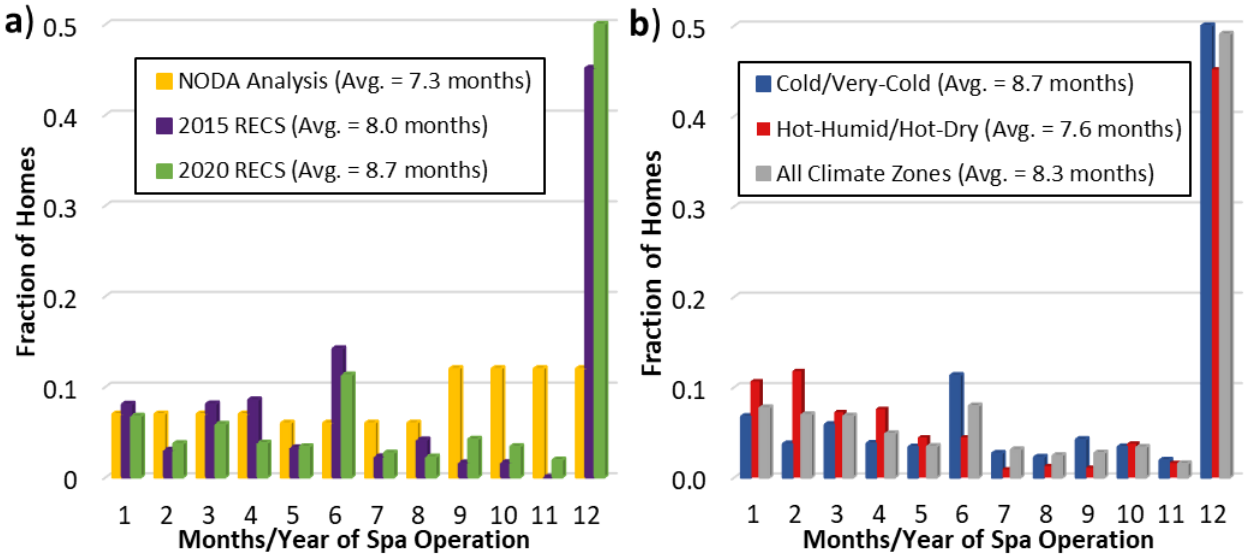

Figure 1: a) The fraction of homes in the cold/very-cold climate zones with a given months/year of spa operation based on the NODA (yellow bars), the raw 2015 RECS data (purple bars), and the raw 2020 RECS data (green bars). b) The fraction of homes with a given months/year of spa operation in the 2020 RECS data for the cold/very-cold climate zones (blue bars), the hot-humid/hot-dry climate zones (red bars), and all climate zones (gray bars).

Concurrently, the 2015 and 2020 RECS data specify only the quantity of months the spa is in use, not which calendar months it is in use. Thus, DOE assumes in the NODA that spas will be operated during the warmest months of the year.[8] We are not aware of any evidence that would support DOE's assumption and are concerned this assumption underestimates annual energy usage.[9] Figure 1b plots the months per year of operation for spas in the cold/very-cold, hot-humid/hot-dry, and all climate zones based on the 2020 RECS data. The primary takeaway from Figure 1b is that spas in cold climates are used more on average than all installations and spas in hot climates are used less on average. These results could suggest a consumer preference towards using spas in cooler weather, which appears inconsistent with DOE's assumption that spas would be used in the warmest months of the year. Thus, absent additional data, we encourage DOE to assume a spa used only part of the year has an equal probability of being used during any portion of the year. For example, DOE should assume that a spa used six months per year would be just as likely to be used from November through April as May through October.

Thank you for considering these comments.

Sincerely,

[8]87 Fed. Reg. 69098.

[9]Spa energy usage is proportional to ambient temperature. Thus, a spa operating during the warmest six months of the year will use significantly less energy than that same spa being operated during colder months of the year.

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