Appliance Standards Awareness Project
Consumer Federation of America
National Consumer Law Center, on behalf of its low-income clients

November 30, 2020

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–2020–BT–STD–0013/RIN 1904–AE50: Request for Information for Energy Conservation Standards for Battery Chargers

Dear Mr. Dommu:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), Consumer Federation of America (CFA), and National Consumer Law Center, on behalf of its low-income clients (NCLC) on the request for information (RFI) for energy conservation standards for battery chargers. 85 Fed. Reg. 57787 (September 16, 2020). We appreciate the opportunity to provide input to the Department.

DOE should conduct a full analysis to evaluate potential amended standards for battery chargers. Available data from DOE's Compliance Certification Database (CCD) show that there is significant potential for efficiency improvements beyond the current DOE standards. As shown in Table 1,[1] depending on the product class, currently available battery chargers achieve savings between 14% and 59% on average relative to models just meeting the current DOE standards. Furthermore, for most product classes, the most efficient model achieves savings of more than 90% relative to a model just meeting the current standards.

Table 1. Comparison of models in the DOE CCD to the current DOE standards

Product Class	Product Class Description	Average % Savings Relative to Current DOE Standard	Max % Savings Relative to Current DOE Standard
1	Low-Energy	46%	98%
2	Low-Energy, Low-Voltage	59%	99.8%
3	Low-Energy, Medium-Voltage	44%	97%
4	Low-Energy, High-Voltage	36%	95%
5	Medium-Energy, Low-Voltage	32%	87%
6	Medium-Energy, High-Voltage	49%	98%
7	High-Energy	14%	74%

[1] Models in the DOE Compliance Certification Database as of 9/18/20.

In addition, as shown in the graphs below, there are numerous models in the DOE CCD that significantly exceed the "max-tech" levels from the 2016 final rule.[2]

Figure 1. Unit energy consumption of PC2 battery chargers

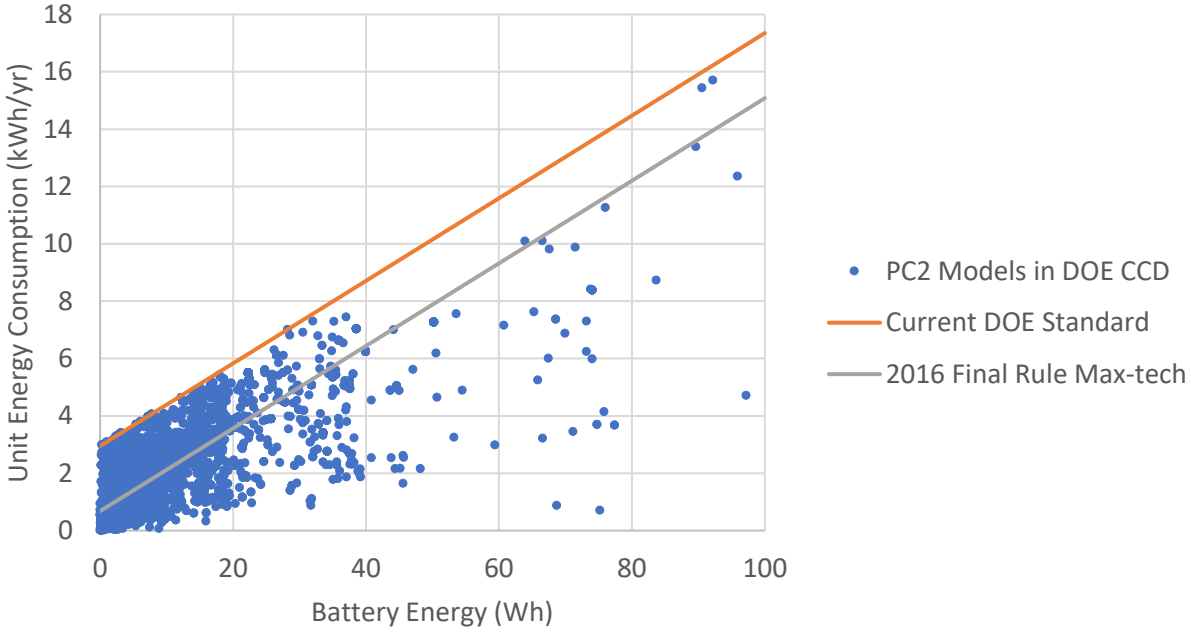
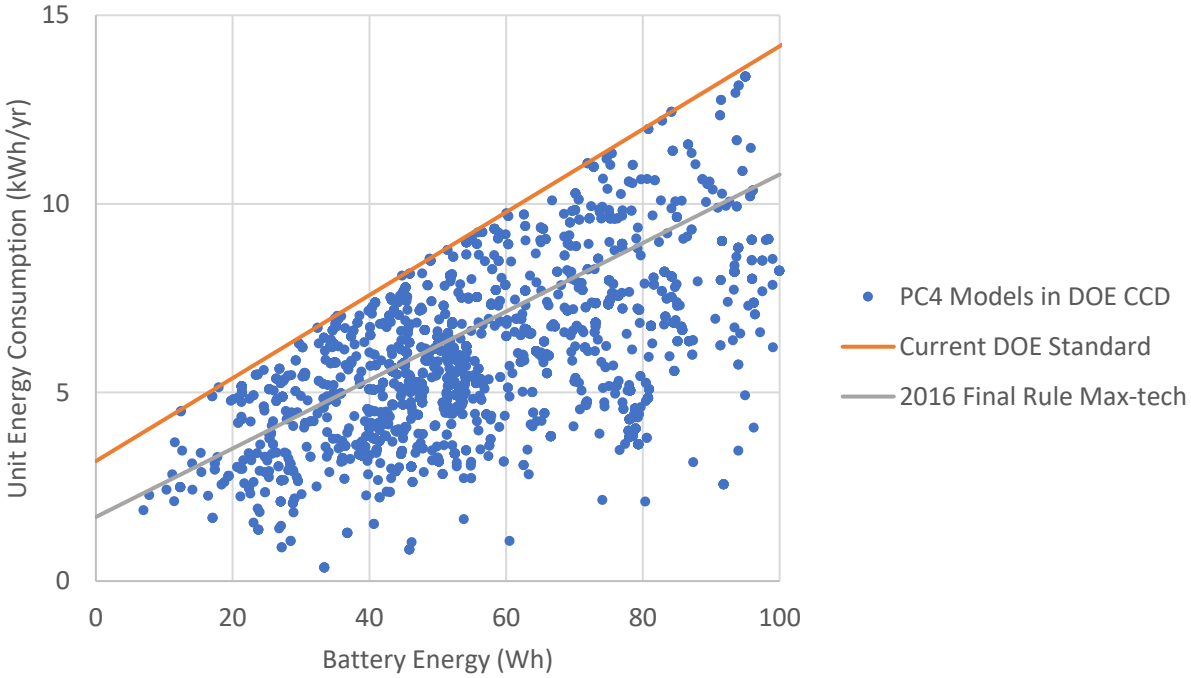


Figure 2. Unit energy consumption of PC4 battery chargers



[2] https://www.regulations.gov/document?D=EERE-2008-BT-STD-0005-0257. p. 5-68.

The efficiency levels of current models on the market today suggest that amended standards for battery chargers have the potential to achieve large energy savings. Furthermore, as described below, establishing standards for wireless chargers offers the potential for additional savings.

DOE should investigate wireless charging technology and market data to establish standards for all wireless chargers. Wireless charging is a growing market as it is increasingly being adopted for phones, headphones[3], power tools[4], personal grooming devices[5], and even electric vehicles[6]. According to IHS, global shipments of wireless receiver and transmitter devices reached 600 million in 2018, up 37% from 2017.[7] The global wireless charging market is projected to have a compound annual growth rate (CAGR) of 14.5% between 2020 and 2026.[8]

Setting efficiency standards for wireless chargers is essential because wireless chargers, regardless of technology type, are significantly less efficient than wired chargers. For example, using a wireless charger for a phone can consume nearly 50% more energy than using a charging cable.[9] Wireless chargers can also consume a significant amount of energy even with no device in contact. For example, the standby power for a wireless phone charger can be around 6 Wh/day.[10]

As with wired charging, wireless charging efficiency can be improved by increasing the efficiency of the ac-dc power conversion and reducing no-battery mode and standby power.[11] Additionally, energy losses in the receiver and transmitter coils can be reduced with the use of thicker wires, and energy that is leaked when a device is not placed on the charger properly can be reduced by physically or magnetically restricting the placement of the device on the receiver.[12]

We encourage DOE to investigate the various technology options for battery chargers that are listed in Tables II.2 and II.3 of the RFI. In particular, we encourage DOE to consider alternative semiconductor materials as a potential technology option. Gallium Nitride (GaN) is emerging as an efficient alternative to the traditional silicon semiconductor technology for battery charging devices. GaN can conduct current one thousand times better than silicon, which allows it to charge batteries faster and more efficiently while taking up less space.[13] GaN technology has the potential to cut energy usage in data centers, electric cars, and consumer devices by 10-20% globally by 2025,[14] and it is currently available from companies like Navitas Semiconductor. According to Navitas, this technology can assist in reducing power losses in wireless charging by over 50% and can provide 40% greater energy savings compared to

[3] https://www.apple.com/shop/product/MR8U2AM/A/wireless-charging-case-for-airpods.
[4] https://shop.bosch-professional.com/gb/en/products/wireless-charging--2499994/.
[5] https://www.usa.philips.com/c-p/SP9860_86/shaver-s9000-prestige-wet-dry-electric-shaver-series-9000.
[6] https://www.caranddriver.com/news/a15344660/no-strings-2018-mercedes-benz-s550e-plug-in-hybrid-to-add-wireless-charging/.
[7] https://news.ihsmarkit.com/prviewer/release_only/slug/technology-global-shipments-wireless-power-receivers-and-transmitters-reach-21-billion/.
[8] https://www.gminsights.com/industry-analysis/wireless-charging-market.
[9] https://www.techspot.com/news/86271-wireless-charging-has-efficiency-issue.html.
[10] Ibid.
[11] Rubin, Eric. Et al. "Global Forecast for Energy Use for Wireless Charging." Electronic Devices and Network Annex (EDNA) of Technical Collaboration Programme on Energy Efficient End-use Equipment (4E TCP) of International Energy Agency (IEA). July 2019.
[12] Ibid.
[13] https://charbycharge.com/how-gallium-nitride-transforms-chargers/.
[14] https://www.weforum.org/agenda/2015/07/could-gallium-nitride-electronics-cut-global-energy-consumption/.

silicon technology.[15] The global market for GaN semiconductor devices is expected to have a CAGR of 19.8% from 2020 to 2027.[16]

DOE should reevaluate how shipment projections are estimated. In the 2016 final rule, DOE took a conservative approach to estimating the growth of battery chargers over time by assuming the overall number of individual units that use battery chargers will grow slowly. Specifically, DOE utilized the population growth rate as the expected market progression.[17] However, this approximation likely significantly underestimates future battery charger shipments. Recent technology advancements and cost reductions have allowed batteries to be used more frequently in all types of consumer products and especially in larger consumer devices where it was previously not cost effective. According to a Freedonia Group report, demand for rechargeable batteries in consumer products is projected to increase 4.6% per year.[18] The rise in battery-powered consumer electronics and household products like power tools, lawn and garden equipment, and cordless vacuums will contribute to growth in the battery charger market.

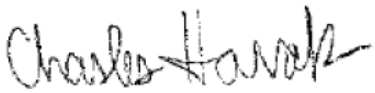
DOE should examine the accuracy of the manufacturer-provided data in the compliance database. We calculated the UEC per the battery charger test procedure for the products listed in the CCD using the reported power and energy values. We found that some of the calculated values differed from the manufacturer reported UEC values, and it appears that in some cases the calculated UECs do not meet the DOE standards. We encourage DOE to examine the quality of information in the database to help enable stakeholders to have confidence in the data provided.

Thank you for considering these comments.

Sincerely,

Kanchan Swaroop
Technical Advocacy Associate
Appliance Standards Awareness Project

Richard Eckman
Energy Research Associate
Consumer Federation of America



Charles Harak, Esq.
National Consumer Law Center
(On behalf of its low-income clients)

[15] https://www.navitassemi.com/.
[16] https://www.grandviewresearch.com/industry-analysis/gan-gallium-nitride-semiconductor-devices-market.
[17] https://www.regulations.gov/document?D=EERE-2008-BT-STD-0005-0257. p. 9-2.
[18] Rechargeable (Secondary) Batteries: United States. The Freedonia Group. (2018).