October 29, 2010

Ms. Brenda Edwards, EE–41
Office of Energy Efficiency and Renewable Energy
Energy Conservation Program for Consumer Products
U.S. Department of Energy
1000 Independence Avenue, SW.
Washington, DC 20585–0121

Docket Number: **EERE-2008-BT-STD-0005**
Regulatory Information Number (RIN): **1904–AB57**

Dear Ms. Edwards:

This letter comprises the comments of the Pacific Gas and Electric Company (PG&E), Southern California Gas Company (SCGC), San Diego Gas and Electric (SDG&E), Southern California Edison (SCE), American Council for an Energy-Efficient Economy (ACEEE), Appliance Standards Awareness Project (ASAP), Natural Resources Defense Council (NRDC), Northeast Energy Efficiency Partnerships, and the Northwest Energy Efficiency Alliance in response to the Department of Energy (DOE, the Department) preliminary technical support document for the Battery Charger and External Power Supply Rulemaking (Docket Number EERE-2008-BT-STD-0005, RIN# 1904-AB57).

With the global proliferation of electronic and battery-using products, external power supplies and battery chargers have become ubiquitous. DOE estimates that 300 million external power supplies and 400 million battery chargers were sold in the U.S. in 2008 alone. Curbing energy wasted by these products has become a global concern. As DOE continues its rulemaking process for external power supplies and battery chargers, we strongly urge the Department to consider our four main recommendations:

The proposed annual energy use metric for battery chargers is not feasible due to a lack of data and significant variations in duty cycles. Battery chargers are a component of other plug load products. Like external power supplies, their usage cycles tend to be dictated by the products they power. DOE itself identified more than 80 different end-use products for battery chargers. There are very limited data on duty cycles for battery chargers, and even if DOE had an opportunity to collect detailed statistically significant data on each product end use, we expect the standard deviation of such data to be quite wide. Therefore, while it is mathematically possible to combine charge, battery maintenance, and no-battery mode into a single energy use metric, combining the three modes together to develop energy conservation standards necessarily emphasizes the energy use and savings of one mode of operation over others. This emphasis may be appropriate for one particular end-use application within a product class, but will not represent other very different end-use products within the same class.

For example, product class 2 includes both mobile phones and portable (cordless) phones. Mobile phone chargers are likely to be unplugged for substantial portions of time during a given year. On the other hand, cordless phones are rarely, if ever, unplugged because they must remain plugged in to receive calls on the landline. If DOE employs the average usage profile for the product class in its analysis, which includes more than 9 hours of time unplugged, DOE deemphasizes the importance of reducing battery maintenance power for cordless phones. Employing a usage profile that aligns with that of mobile phones for all the products is likely to lead to the conclusion that significant improvements to battery maintenance mode for cordless phones are not warranted. PG&E research suggests cordless phones are one of the most important consumer battery charger opportunities for energy savings[1], specifically because of high battery maintenance mode power and low active mode energy efficiency. This example is one of many where duty cycle variation is very wide, leading to challenges when selecting duty cycles even within DOE's narrowly defined product classes.

Instead of trying to account for all the possible duty cycle variations for more than 80 end-use applications, we recommend that DOE group products into one of two possible general duty cycles: "charged some of the time" and "almost always in maintenance mode" and adopt appropriate efficiency metrics for each product group. For emergency battery backup applications (product class 10), battery maintenance mode power could be used as the efficiency metric since these products are in maintenance mode virtually all of the time. For the remaining products that provide portable power, and are therefore charged some of the time (product classes 1 to 9), the 24-hour charge and maintenance efficiency could be used to characterize active mode and battery maintenance efficiency. In addition, we recommend that DOE adopt a separate standby (no-battery mode) metric for portable power battery chargers under section 325(gg)(3) of EPCA that directs DOE to prescribe a separate standard for standby mode and off mode energy consumption if it is "not feasible" to incorporate standby mode and off mode into a single standard.

Product Group	**Product Examples**	**Duty Cycle Characteristic**	**Proposed Metric(s)**
Most battery charger products (product class ID 1 to 9)	Mp3, laptops, power tools, shavers, toys, golf carts	Charged some of the time	24-hour charge and maintenance energy (%); no-battery mode (W)[2]
Emergency backup systems (product class 10)	Computer UPSs, security systems	Almost always in maintenance mode	Battery maintenance mode (W)

In the event the Department rejects the efficiency metrics proposed above, we encourage the Department to consider a weighted annual energy use metric that gives equal consideration to all modes of operation (charge, battery maintenance, and standby), so that not all efficiency improvements (and savings) are focused on one mode of operation (such as battery maintenance). This approach would help mitigate our concern that potential savings opportunities could be lost if a standard focuses efficiency improvements in one mode while in the field there is actually significant variation in the amount of time spent in different modes within and among end-use applications.

We recommend that DOE reduce the number of battery charger product classes and develop candidate standard levels within each product class that are continuous functions. As described in the table below, we propose that DOE reduce the number of product classes from ten to four by combining product classes 2-7 into a single product class, while keeping product classes 1, 8-9, and 10 separate to account for products with different types of power conversion and the special requirements of

[1] Porter, S. F. et al. Analysis of Standards Options for Battery Charger Systems. Prepared for Pacific Gas and Electric, Southern California Gas Company, San Diego Gas and Electric, and Southern California Edison, October 2010. Available on the California Energy Commission website: http://www.energy.ca.gov/appliances/battery_chargers/documents/2010-10-11_workshop/2010-10-11_Battery_Charger_Title_20_CASE_Report_v2-2-2.pdf.

[2] A "matched pairs" approach to the engineering analysis could be taken to evaluate no battery mode and 24 hour charge and maintenance energy together as one CSL level, similar to what DOE undertook in its EPS engineering analysis. The 24 hour charge and maintenance energy could scale with battery energy capacity. This could be "matched" with no-battery mode.

inductive chargers. Within each of the four product classes, we suggest that DOE develop CSLs that are a function of battery energy (the product of battery charge capacity and battery voltage). While it is fine to use ten representative products for engineering and cost analysis, we recommend no more than four final product classes (as shown in the table below) be developed.

Product Class	Utility rationale
Ac-dc inductive (DOE product class 1)	***Chargers provide portable power using alternating current source, with safety and longevity concerns associated with wet environments.*** Use in wet environments (bathrooms) warrants a separate product class allowing lower efficiency of inductive chargers because of the safety and corrosion requirements.
Ac-dc (DOE product classes 2 to 7)	***Chargers provide portable power using alternating current source.*** These products are generally used to power portable products that operate detached from the wall plug outlet. Although they vary greatly in battery energy capacity (the product of voltage and battery charge capacity), they serve the same general function to the consumer, to provide portable power for a device.
Dc-dc (DOE product classes 8 to 9)	***Chargers provide portable power using direct current source.*** These chargers perform a different function than ac-ac chargers because power conversion from ac to dc is not a required function. It is possible that higher levels of efficiency could be cost-effective than for ac-dc chargers.
Ac-ac (DOE product class 10)	***Chargers provide backup stationary power using alternative current source.*** These stationary battery chargers have the primary purpose of providing short-term battery power backup in the event of an electric utility power outage.

This proposal would simplify standards for battery chargers, be more transparent to stakeholders, and make compliance and verification easier. This approach also builds on the representative product groups that DOE has already developed for its engineering analysis; they would not need to be changed. In addition, having a smaller number of product classes would reduce potential boundary condition issues. Because battery energy capacity and voltage are somewhat continuous functions across the range of ac-dc chargers, it is possible that some products that lie near the boundaries of product classes 2 to 7 could be redesigned or minimally changed to enable compliance within a different product class, which could result in lower-than-expected energy savings. Examples of products where product class migration could potentially occur, from the PG&E data set, are summarized in the table below.

Battery Energy (Wh)	Battery Voltage	Battery Chemistry	Product Class ID	Adjacent Boundary Class ID	Application
2	3.7	Li-Polymer	2	3	Cordless phone w/ answering machine
1	3.7	Li-Polymer	2	3	Remote control helicopter
6	4.8	NiMH	3	2	2-way radio
5	4.8	NiCd	3	2	Rechargeable flashlight
13	7.4	Li-Ion	3	4	Digital camera
33	7.4	Li-Ion	3	4	Portable DVD player
14	10.8	Li-Ion	4	3	Power tool charger
28	10.8	Li-Ion	4	3	Netbook computer
120	12	SLA	5	4	12 V Charger
2520	12	AGM	5	7	12 V Charger

Adding or deleting a single cell or using a slightly larger capacity battery could cause a change in product class.

We strongly support DOE's proposed approach for wall adaptors that power battery charging systems. We continue to support the framework document "approach A," where a wall adaptor is always considered part of the battery charger and a wall adaptor is also considered an EPS only if it does not perform charge control. Although this approach would require some products to comply with both external power supply and battery charger standards, technical research documents that improving the efficiency of a power supply helps improve the efficiency of a battery charger.[3] In addition, a single definition for external power supplies would reduce the complexity of compliance and enforcement as well as the potential for loopholes. We also support DOE's proposal to adopt the ENERGY STAR criteria for identifying the presence of charge control in wall adaptors.

In conclusion, we thank DOE for the opportunity to be involved in this rulemaking process and encourage DOE to consider the recommendations outlined in this letter.

Sincerely,

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[3] Geist, T. et all. Designing Battery Charger Systems for Improved Energy Efficiency, a Technical Primer. Prepared for the California Energy Commission, 2006. Available at http://www.efficientproducts.org/reports/bchargers/1270_BatteryChargerTechincalPrimer_FINAL_29Sep2006.pdf