Appliance Standards Awareness Project
Alliance to Save Energy
American Council for an Energy-Efficient Economy
Consumer Federation of America
National Association of State Energy Officials
Natural Resources Defense Council
Northeast Energy Efficiency Partnerships
Northwest Energy Efficiency Alliance

July 16, 2012

Ms. Brenda Edwards
U.S. Department of Energy
Building Technologies Program
Mailstop EE-2J
1000 Independence Avenue, SW
Washington, DC 20585-0121

RE: Docket Number EERE-2008-BT-STD-0005: Notice of Proposed Rulemaking for Battery Chargers and External Power Supplies

Dear Ms. Edwards:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), Alliance to Save Energy (ASE), American Council for an Energy-Efficient Economy (ACEEE), Consumer Federation of America (CFA), National Association of State Energy Officials (NASEO), Natural Resources Defense Council (NRDC), Northeast Energy Efficiency Partnerships (NEEP), and Northwest Energy Efficiency Alliance (NEEA) in response to the Department of Energy (DOE) notice of proposed rulemaking (NOPR) for battery chargers and external power supplies. 77 Fed. Reg. 18478 (March 27, 2012). This letter is intended to supplement the comments that we previously submitted on May 29, 2012.[1] We appreciate the additional opportunity to provide input to the Department.

In our previous comments on the NOPR, we explained that by relying solely on teardowns to develop most candidate standard levels (CSLs) for the major battery charger product classes, DOE has likely missed low-cost options for improving efficiency such as high-efficiency power supplies and simple improved charge control strategies. We continue to believe that DOE's analysis has overestimated the cost to improve efficiency. Given the significant national energy savings at stake, we strongly urge DOE to conduct additional analysis to allow the Department to determine the standard levels that represent the maximum levels that are technologically feasible and economically justified.

If DOE continues to rely solely on teardowns to develop most CSLs for the battery charger engineering analysis, DOE must revise its analysis to rely exclusively on the lowest-cost chargers identified through teardowns. For Product Classes 2, 3, 4, 5, 7, and 8, DOE relied on

[1] Comment ID: EERE-2008-BT-STD-0005-0136.

teardowns to develop cost-efficiency information.[2] DOE tore down battery chargers meeting different efficiency levels, developed a bill of materials (BOM) for the components found in each charger, and used these BOMs to project the incremental cost of meeting individual CSLs. In some cases, one teardown unit was used as the basis for a CSL, while in other cases DOE averaged two or three units to develop a CSL. In cases where DOE averaged multiple units to develop a CSL, the cost of the different units often varies dramatically. The tables below show the BOM costs for the units used to develop one of the CSLs each for Product Classes 2, 3, and 4. In each case, either two or three units were averaged to develop the CSL. For Product Class 2, CSL 2 was based on the average of two cordless phones/answering devices, one of which has a BOM that is three times higher than that of the other unit. For Product Class 3, CSL 1 was based on the average of two power tools, one of which has a BOM that is four times higher than that of the other unit. Finally, for Product Class 4, CSL 2 was based on the average of three units—a handheld vacuum, a notebook computer, and a power tool. The handheld vacuum has a BOM that is 2-3 times that of each of the other two units.

Product Class 2			
	Unit ID	**Product**	**BOM**
CSL 2	616.2.1	Cordless Phone/Answering Device	$5.22
	664.2.1	Cordless Phone/Answering Device	$1.56

Product Class 3			
	Unit ID	**Product**	**BOM**
CSL 1	1044	Power Tool	$0.65
	1051	Power Tool	$2.70

Product Class 4			
	Unit ID	**Product**	**BOM**
CSL 2	1045	Handheld Vacuum	$15.93
	630.2.1	Notebook Computer	$5.99
	713.2.1	Power Tool	$4.19

In sum, DOE's analysis found that battery chargers with similar energy consumption can have wildly varying costs. But simply averaging these divergent BOM costs provides no assurance that the Department has isolated the cost of any innovations needed to meet a particular efficiency level. When the results are as wildly varying as those shown above, there is no basis to conclude that the higher BOM cost products help indicate the true cost of meeting a particular CSL. The engineering analysis must therefore be revised to identify the actual cost to improve efficiency.

Below we describe our specific concerns and recommendations regarding the analyses for Product Classes 2, 3, and 4. We note that we believe that there are additional cost-effective energy savings that could be achieved for Product Class 5 relative to DOE's proposal in the

[2] CSL 0 for PC 2 and the max tech levels for all the product classes are exceptions where DOE used extrapolations or manufacturer data rather than teardowns.

NOPR. We described our concerns and recommendations regarding the analysis for Product Class 5 in our previous comments submitted on May 29, 2012.

Product Class 2

The table below shows the specific units that were used to develop CSLs 1, 2, and 3 for Product Class 2. (CSLs 0 and 4 were based on manufacturer data and DOE extrapolation, respectively).

<table>
<tr><th colspan="6">Product Class 2</th></tr>
<tr><th>CSL</th><th>Unit ID</th><th>Product</th><th>Battery Chemistry</th><th>BOM</th><th>MSP</th></tr>
<tr><td>0</td><td colspan="4">Manufacturer Data</td><td>$0.62</td></tr>
<tr><td>1</td><td>617A.2.3</td><td>Cordless Phone</td><td>Nickel</td><td>$0.53</td><td>$0.71</td></tr>
<tr><td rowspan="2">2</td><td>616.2.1</td><td>Cordless Phone/Answering Device</td><td>Nickel</td><td>$5.22</td><td rowspan="2">$2.13</td></tr>
<tr><td>664.2.1</td><td>Cordless Phone/Answering Device</td><td>Nickel</td><td>$1.56</td></tr>
<tr><td rowspan="2">3</td><td>687.2.1</td><td>Digital Camera</td><td>Lithium</td><td>$2.46</td><td rowspan="2">$3.84</td></tr>
<tr><td>703.2.1</td><td>Digital Camera</td><td>Lithium</td><td>$1.99</td></tr>
<tr><td>4</td><td colspan="4">DOE Extrapolation</td><td>$5.72</td></tr>
</table>

The Technical Support Document (TSD) states that DOE did not tear down any unit at the baseline for Product Class 2 due to a lack of product with this efficiency at the representative unit battery voltage and energy.[3] The representative unit for Product Class 2 has a battery voltage of 3.6 V and a battery energy of 3 Wh.[4] CSL 2 is based on two units that have a rated voltage of 2.4 V and an average battery energy of 1.5 Wh. There is a cordless phone in DOE's data set (Unit 747.2.1) at CSL 0, which DOE did not tear down, that has a rated voltage of 3.6 V and a battery energy of 1.7 Wh. While the battery energy of this cordless phone is lower than that of the representative unit, the battery energy is similar to that of the units used to develop CSL 2. DOE does not explain why the CSL 0 unit (747.2.1) could not be included in the analysis while the two CSL 2 units were included. **We urge DOE to conduct a teardown to characterize the baseline unit for Product Class 2 so that the cost assumption of the baseline unit is transparent to stakeholders.**

DOE used two cordless phones/answering devices to develop CSL 2. As described above, one of the units has a BOM that is three times higher than that of the other unit even though both units are chargers for cordless phones and both units have similar unit energy consumption (UEC) levels. One driver of the very high cost for Unit 616.2.1 appears to be two capacitors that cost $1.20 each, which is close to the entire cost of Unit 664.2.1. Both Unit 616.2.1 and Unit 664.2.1 have a similar total number of capacitors—38 and 46, respectively. However, none of the capacitors in Unit 664.2.1 cost more than $0.06 while the two high-cost capacitors of Unit 616.2.1 cost almost 20 times as much.

The problem with averaging the BOM costs for these two units is that the design of the high-cost unit, Unit 616.2.1, misrepresents the cost of achieving CSL 2. DOE does not describe the

[3] Technical Support Document. p. 5-98.
[4] *Ibid*. p. 5-78.

rationale for averaging the two cordless phones/answering devices in the TSD, but including Unit 616.2.1 in the calculation of the cost to meeting CSL 2 ignores that when upgrading their products to comply with a new energy conservation standard, manufacturers have a strong incentive to adopt the lowest-cost method of achieving the required efficiency level. The Department's teardown analysis for Unit 664.2.1 shows that a more cost-effective method of meeting CSL 2 is available. By assuming that manufacturers will fail to optimize their designs, DOE's engineering analysis overstates the costs associated with moving to that higher efficiency level.

In our previous comments submitted on May 29, 2012, we urged DOE to evaluate an intermediate level for Product Class 2 between CSL 2 and CSL 3 that would more closely reflect the California Energy Commission (CEC) standard. In DOE's data set for battery chargers, it appears that there are seven units that fall between CSL 2 and CSL 3. Of these, there is one unit that could be characterized as CSL 2.5 (Unit 1050) and three units that could be characterized as CSL 2.75 (Units 1055, 629.2.1, and 698.2.1). The table below shows the UECs for these units along with the UECs for each CSL. We note that Unit 1055—an electric shaver—is a nickel charger. DOE did not tear down this unit so we do not have any information about the components of the charger or the BOM cost. However, we would expect a nickel charger to be lower cost than a lithium charger with similar energy performance. As DOE notes in the TSD, lithium batteries are more common in higher-cost applications.[5] **We encourage DOE to conduct a teardown to characterize an intermediate level between CSL 2 and CSL 3.**

Unit ID	UEC (kWh/yr)					
	Unit	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
1050	2.00	8.76	6.61	3.10	1.11	0.86
1055	1.43	8.46	6.30	2.93	0.94	0.69
629.2.1	1.61	8.90	6.75	3.18	1.19	0.94
698.2.1	1.54	8.73	6.58	3.09	1.10	0.85

There is also a nickel charger in DOE's data set (Unit 664.2.2) that almost meets CSL 3. This unit is a charger for a cordless phone/answering device. DOE developed CSL 3 for Product Class 2 based on two lithium chargers for digital cameras. Again, while we do not have any information about the components of the nickel charger that almost meets CSL 3 or the BOM cost, we would expect this unit to have a lower cost than the lithium chargers used to develop CSL 3. Therefore, the nickel cordless phone/answering device (Unit 664.2.2) could represent a lower-cost way of achieving an efficiency level similar to CSL 3. The table below shows the UEC for this unit along with the UECs for each CSL. **We encourage DOE to conduct a teardown of Unit 664.2.2.**

UEC (kWh/yr)					
Unit 664.2.2	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
1.06	8.33	6.16	2.85	0.86	0.61

[5] *Ibid*. p. 5-96.

DOE states in the TSD that units meeting CSL 4 (max tech) are not commercially available.[6] However, it appears that a unit in DOE's data set—Unit 688.2.1—meets CSL 4. The table below shows the UEC for this unit—a digital camera—along with the UECs at each CSL level. We did not find any explanation in the TSD as to why this unit could not be used to characterize CSL 4. **If Unit 688.2.1 can be used to represent CSL 4, we encourage DOE to conduct a teardown of this unit.**

UEC (kWh/yr)					
Unit 688.2.1	CSL 0	CSL 1	CSL 2	CSL 3	CSL 4
0.74	8.77	6.62	3.11	1.12	0.87

In our previous comments submitted on May 29, 2012, we explained how improvements in power supply efficiency can have an especially significant impact on the efficiency of battery chargers in Product Class 2. **For teardowns of battery chargers that DOE has already conducted and any additional teardowns of battery chargers that DOE conducts, we urge the Department to evaluate the impact of improving power supply efficiency on the efficiency of the battery charger system since improved power supply efficiency can be a low-cost way of improving battery charger efficiency.**

Finally, for Product Class 2, we are unable to reproduce the manufacturer selling prices (MSPs) shown in the TSD. In Table 5-50 of the TSD, DOE provides average manufacturer markups for each product class for battery chargers. The TSD states that DOE multiplied these product-class specific markups by the BOM to arrive at an MSP for each unit.[7] The average manufacturer markup for Product Class 2 shown in Table 5-50 is 1.2. When we multiply this markup by the BOM cost for CSL 1 and by the average BOM cost for CSL 2 and CSL 3, we get very different results for MSP than what DOE shows in Table 5-54. For example, for CSL 3, if we average the two BOMs ($2.46 and $1.99) and multiply by the average manufacturer markup, we get an MSP of $2.67 while DOE shows an MSP of $3.84.[8] The TSD states that DOE normalized the teardown results for Product Class 2 to align with the aggregated manufacturer data point for CSL 0.[9] However, we could not find any explanation for how any normalization was conducted. **We request that DOE clarify how the MSPs were calculated for Product Class 2.**

<u>Product Class 3</u>

The table below shows the specific units that were used to develop CSLs 0, 1, and 2 for Product Class 3. (CSL 3 was based on DOE extrapolation).

[6] *Ibid*. p. 5-104.
[7] *Ibid*. p. 5-92.
[8] *Ibid*. p. 5-106.
[9] *Ibid*. p. 5-105.

Product Class 3					
CSL	**Unit ID**	**Product**	**Battery Chemistry**	**BOM**	**MSP**
0	1029	Power Tool	Nickel	--	$0.77
1	1044	Power Tool	Nickel	0.65	$1.98
	1051	Power Tool	Lithium	2.70	
2	1046	Power Tool	Lithium	4.64	$5.47
3	DOE Extrapolation				$5.51

DOE tested a power tool that was used to represent CSL 0 (Unit 1029), but did not conduct a teardown of this unit.[10] We did not find any explanation as to why this unit was not torn down to develop a BOM cost. **We urge DOE to conduct a teardown to characterize the baseline unit for Product Class 3 so that the cost assumption of the baseline unit is transparent to stakeholders.**

DOE used two power tools to develop CSL 1. As described above, one of the units (1051) has a BOM cost that is four times higher than that of the other unit (1044). Unit 1044 is a nickel charger with a single component listed in the BOM while Unit 1051 is a lithium charger with 99 components listed in the BOM. However, as DOE concluded in the TSD, the two units offer comparable performance and utility. Therefore, to accurately assess the costs associated with meeting CSL 1 in Product Class 3, the focus belongs on Unit 1044. Even if some manufacturers may currently produce chargers meeting this efficiency level through higher-cost designs, any manufacturers redesigning products to comply with CSL 1 would have an opportunity to adopt the lowest-cost compliant design.

In addition, a review of the BOM data for Product Class 3 suggests that DOE's BOM costs may not include all components of the battery charger systems analyzed. For example, the single component listed in the BOM for Unit 1044 is a transformer. All of the BOMs for external power supplies have more components and a higher cost than some of the BOMs for battery chargers, including the BOM for Unit 1044. If the battery charger system for Unit 1044 contains a wall adapter, the components and costs associated with the wall adapter appear to be excluded from the BOM. If this is the case, it is unclear why wall adapters would be excluded from the BOM data, since they are part of battery charger systems and since changes in power supply efficiency directly impact the efficiency of battery charger systems. **We request that DOE clarify whether the BOM data includes all the components of each battery charger system.**

In our previous comments submitted on May 29, 2012, we urged DOE to evaluate an intermediate level for Product Class 3 between CSL 1 and CSL 2 that would more closely reflect the CEC standard. There is a large gap in efficiency between CSL 1 and CSL 2 as CSL 2 has a UEC that is five times lower than that of CSL 1. We believe that DOE would find that an intermediate level between CSL 1 and CSL 2 would be cost-effective. DOE's data set includes a power tool (Unit 1033) that has a UEC of 1.97, which falls between CSL 1 and CSL 2 and is similar to the CEC standard.

[10] *Ibid*. p. 5-110.

UEC (kWh/yr)				
Unit 1033	CSL 0	CSL 1	CSL 2	CSL 3
1.97	11.80	4.68	0.82	0.78

DOE did not tear down this unit, so we do not have any information about the components of the charger or the BOM cost. **We urge DOE to conduct a teardown of Unit 1033 or other units with similar UECs to characterize an intermediate level between CSL 1 and CSL 2.**

<u>Product Class 4</u>

The table below shows the specific units that were used to develop CSLs 0, 1, and 2 for Product Class 4. (CSL 3 was based on DOE extrapolation).

Product Class 4					
CSL	**Unit ID**	**Product**	**Battery Chemistry**	**BOM**	**MSP**
0	715.2.1	Power Tool	Nickel	$2.60	$3.79
1	716.2.1	Power Tool	Lithium	$4.63	$6.76
2	1045	Handheld Vacuum	Lithium	$15.93	$12.71
	630.2.1	Notebook Computer	Lithium	$5.99	
	713.2.1	Power Tool	Lithium	$4.19	
3	DOE Extrapolation				$18.34

DOE used a power tool to develop CSL 0 and a power tool to develop CSL 1. For CSL 2, however, DOE averaged a handheld vacuum, a notebook computer, and a power tool. The handheld vacuum has a BOM cost that is more than double that of the notebook computer and that is almost four times that of the power tool. The notebook computer has a BOM that is 40% higher than that of the power tool. This data shows that the notebook computer and the handheld vacuum have a large incremental cost relative to power tools at CSL 0 and CSL 1. On the other hand, the power tool at CSL 2 is actually less expensive than the power tool at CSL 1. The large gap in the BOM costs for the three chargers meeting CSL 2 and the declining costs for power tools to meet this level show that additional analysis is needed. Moreover, if DOE is correct in its conclusion that battery chargers used in power tools offer utility and performance that is comparable to those used in handheld vacuums and notebook computers, the teardowns that DOE has performed to date show that power tool designs more accurately reflect the costs associated with increasing efficiency in this product class. **Therefore, we request that DOE (1) analyze an additional power tool meeting CSL 1 to determine whether the unusual cost-efficiency results obtained for these products result from a sub-optimal design in Unit 716.2.1 and (2) rely on the lowest-cost design (Unit 713.2.1) to represent the cost of CSL 2.**

In our comments above, we have requested that DOE conduct additional teardowns for Product Classes 2-4. As described in the supplemental California IOU comments, the current market does not encourage high-efficiency nickel chemistry battery chargers. However, since the CEC standards will go into effect early next year, we expect low-cost high-efficiency nickel chargers to soon be introduced to the market. These new products may be good candidates for teardowns to represent the lowest-cost ways of achieving higher efficiency levels.

We urge DOE to adopt the marking requirements for battery chargers proposed in the NOPR. DOE is proposing to adopt a marking protocol that would have "BC III" denote the battery charger standards adopted in the final rule.[11] In contrast, the marking protocol adopted by the CEC will identify compliant products with a "BC" marking without a roman numeral. The NOPR states that DOE may consider adopting the CEC marking requirements in order to minimize the burden associated with the transition from the CEC marking requirement to the DOE requirement.[12]

Both the federal and California marking requirements apply to the date of manufacture of the product, not the date of sale. The transition therefore imposes no inventory constraints; manufacturers just need to switch manufacturing processes from one mark to the other on the date that the federal regulation goes into effect. We believe that this does not represent a significant burden for industry. Should DOE want to minimize this burden further, the Department could establish a short grace period during which it would not enforce the marking requirements in order to give manufacturers more time to switch over to the new marking system.

California's single-level marking requirement meets California's enforcement needs, but lacks the flexibility for other programs or countries to adopt higher or lower efficiency levels. DOE's proposal in the NOPR for a multi-level marking scheme would support additional levels such as ENERGY STAR, providing a clear and simple way to identify products that meet various standard levels. A multi-level marking scheme would also facilitate global market transformation, which would benefit U.S. consumers in the form of lower prices due to faster market transition and increased scale. Therefore, we urge DOE to adopt the marking requirements for battery chargers proposed in the NOPR. The marking transition can be managed with minimal impact on industry, and should not stand in the way of a more effective marking policy.

Thank you very much for considering these comments.

Sincerely,

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Executive Director
Appliance Standards Awareness Project

[11] 77 Fed. Reg. 18565.
[12] 77 Fed. Reg. 18567.

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