NATURAL RESOURCES DEFENSE COUNCIL

NRDC Comments on

Updated Draft 1 Version 2.0 Specification for Battery Charging Systems
dated December 14, 2010

Submitted by:

Pierre Delforge – Sr. Scientist
Natural Resources Defense Council (NRDC)

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On behalf of the Natural Resources Defense Council (NRDC) and our more than 1.3 million members and online activists, we respectfully submit these comments on EPA's updated Draft 1 Version 2.0 Specification for Battery Charging Systems dated December 14, 2010.

Battery chargers are becoming increasingly common in consumer and commercial products. Based on Department of Energy (DOE) data, NRDC estimates that there are approximately 1.5 billion products that contain battery chargers in use in US homes, offices, retail stores, medical facilities, and warehouses. These battery charging systems use an estimated 15,700 GWh annually, representing the equivalent of the entire production of nearly 5 medium-sized 500MW power plants.

Battery charging system (BCS) efficiency depends on the combined efficiency of its components: the power supply, charge control circuitry and the battery. Per PG&E and Ecos analysis average battery charging system efficiency is currently around 40% meaning over half of the energy drawn by products using BCSs is wasted as heat, providing no value, but costing money to the user and causing unnecessary pollution. Worse, the efficiency of some consumer end-use systems can be as low as 2%, meaning 98% of their energy use is wasted.

NRDC commends EPA for proposing a robust revision of the 2006 BCS specification, and offers the comments summarized as follows and detailed further below in this memo:

- NRDC agrees with EPA's revised timeline to synchronize with DOE's test procedure and standard development for consumer BCSs.

- NRDC agrees with EPA's proposal to cover notebooks and netbooks in the ENERGY STAR Computer specification rather than in the BCS specification. However in that case it is important that BCS efficiency requirements and testing procedure for notebook and netbook computers are included in that specification. Otherwise the specification could be ignoring half or more of the energy use of these products, as the battery charging system can account for half of a notebook energy use and is not currently accounted for by the ENERGY STAR test method.
- NRDC recommends the use of modal power limits instead of Unit Energy Consumption (UEC) limits for all BCSs, including BCSs with Battery Energy of less than 3 kWh. Modal power limits are independent of product duty cycle which can vary dramatically within the same product class. For example, product class 2 includes both mobile phones which are used mostly unplugged, and power tools which tend to be plugged in most of the time. Using a common duty cycle for these different products does not allow to define a representative UEC, and to set requirements that will achieve the most cost effective energy savings.
- NRDC recommends making Unit Energy Consumption limits dependent on battery energy: If EPA decides to use UEC instead of modal limits, we recommend the UEC limits are a linear function of battery energy rather than constant within each class. This will allow to account for products that have significantly different battery energy ratings within each class, and enable progressive and more cost-effective limits, without setting overly strict requirements for some products while giving others a free pass.
- NRDC agrees with EPA that BCSs for on-road vehicle should be excluded from this revision. However we believe these BCSs should be included in an interim revision as soon as possible, before the next planned BCS revision in 2 years or later.
- NRDC strongly recommends that BCSs with inductive coupling be included in the specification. Inductive chargers represent a significant energy savings opportunity, and could expand dramatically in the coming years as electronic products adopt this technology. NRDC believes it is important to encourage efficient designs early, before industry makes major investments in this technology.
- NRDC also recommends including BCSs that do not draw power from AC mains such as MP3 players and in-vehicle GPS, and BCSs for stationary, backup or emergency uses in the specification.

More detailed information on these comments are presented below:

- **NRDC agrees with EPA's revised timeline to synchronize with DOE's test procedure and standard development for consumer BCSs.** Mandatory and voluntary standards are both important tools to transform a market, and are most effective when working in conjunction, for example when voluntary levels represent a step up from

mandatory levels in order to encourage leadership amongst industry. NRDC commends EPA for setting its new timeline to closely follow that of DOE's rulemaking.

- **NRDC agrees with EPA's proposal to cover notebooks and netbooks in the ENERGY STAR Computer specification rather than in the BCS specification**. Notebooks and netbooks deliver higher computing performance and use significantly higher levels of energy than handheld computers. While battery life is still an important factor for notebooks and netbooks, manufacturers have to balance it with performance. There is not as strong a natural incentive for manufacturers to design for energy efficiency as for handheld computers.

  Notebooks and netbooks typical energy consumption (TEC) is strongly influenced by design features other than that of the battery charging system, such performance in running traditional operating systems and applications, and graphics processing, which makes a computer-specific set of requirements and test procedure important for these products.

  However if notebooks and netbooks continue to be covered by the Computer specification, BCS efficiency requirements and testing procedure for notebook and netbook computers should be included in that specification.

  Battery charging system efficiency is not covered by the current ENERGY STAR v5 Computer specification: the test method and requirements only cover the computer when plugged in. This does not guarantee a good level of efficiency of the battery charging system. For instance given a notebook with a BCS efficiency of 50%, which is in the range of typical BCS efficiency per the PG&E CASE Report on BCS Efficiency, if that notebook were used unplugged a significant portion of the time, the overall energy use of the notebook could be up to twice as high as that measured by the current ENERGY STAR test method.

  Moreover, as battery life is not impacted by BCS efficiency, there is little natural incentive for manufacturers to design notebook and netbook with high BCS efficiency, which increases the importance of a voluntary standard to minimize the overall energy used by notebooks and netbooks.

- **NRDC recommends the use of modal power limits instead of Unit Energy Consumption limits for all BCSs, including BCSs with Battery Energy of less than 3 kWh**: EPA proposes to use Unit Energy Consumption (UEC) to set energy efficiency requirements in BCS product classes 2-6. While NRDC understands the needs and benefits to communicate annual energy consumption to consumers, we believe an approach based on power limit per mode would be more cost-effective for BCSs with battery energy of less than 3kWh. Power limits per mode would consist of limits for 24-hour charge and maintenance energy, maintenance and No Battery modes. Modal limits are independent of duty cycle assumptions. Duty cycle, i.e. average time spent in each mode, can vary dramatically between products in the same product class. For example, product class 2 includes both mobile phones which are used mostly unplugged, and

power tools which stay plugged in most of the time. Using a common duty cycle for these different products does not allow to define a representative UEC, and to set requirements that will achieve the most cost effective energy savings. Modal power limits ensures good operating efficiency independently from device duty cycle. We suggest a hybrid approach where UEC would be measured and communicated to consumers, but qualification criteria as based on modal limits.

- **NRDC recommends making Unit Energy Consumption limits dependent on battery energy**: If EPA decides to use UEC instead of modal limits, we recommend the UEC limits are a linear function of battery energy rather than constant within each class. Products within a single class can have significantly different battery energy ratings. For example, products in class 2 can have a battery energy ranging from less than 10 to 99 Wh. Yet, the UEC limit does not take into account this ten-fold difference in battery energy. We recommend making the UEC limit a linear function of battery energy within each product class.

- **NRDC agrees with EPA that BCSs for on-road vehicle should be excluded from this revision. However we believe these BCSs should be included in an interim revision as soon as possible, before the next planned revision in 2 years or later.** BCSs for on-road vehicles are still emerging as electric vehicles (EVs) are becoming commercially available in significant numbers. Efficiency standards for on-road vehicle BCSs are still being developed, it is therefore too early to include efficiency requirements for these chargers in the ENERGY STAR specification. However, sales of electric vehicles are anticipated to ramp-up rapidly over the coming years, and each vehicle requires large amounts of energy. NRDC estimates that with 1 million electric vehicles on US roads by 2015, and assuming an overall efficiency of 85%, EV BCSs would be using approximately 500 GWh of electricity, equivalent to the entire product class 6 medium energy, high voltage BCSs. This could be as high as 1 TWh at an average efficiency level of 70%. It is therefore critical that we don't miss the opportunity to proactively avoid this potential major new source of energy waste, by setting standards as early as possible to encourage efficient designs before EV BCSs are deployed in high numbers.

- **NRDC strongly recommends that BCSs with inductive coupling be included in the specification.** DOE data indicates that over 5 million rechargeable toothbrushes and water jets ship every year. At 10 kWh per unit and with a 5 yr lifetime, this represents approximately 250 million kWh per year energy use annually in the US and a significant opportunity for energy savings. Beyond personal care products, inductive chargers are spreading fast to consumer electronics. They are already available for some mobile phones such as the Palm Pre. The Wireless Power Consortium is currently developing a standard for wireless charging. Once the standard is available, the technology has the potential to spread very quickly among consumer electronics given its convenience, it could have a significant impact on BCS energy consumption. NRDC believes it is important to encourage efficient designs early, before industry makes major investments in this technology.

- **NRDC also recommends to include BCSs that do not draw power from AC mains such as MP3 players and in-vehicle GPS, and BCSs for stationary, backup or emergency uses.** While each category individually may not represent a huge savings opportunity, taken together NRDC estimates that they use approximately 1,100 GWh annually in the US based on DOE data, or 7% of overall BCS energy use. Given that similar energy efficiency technology will be required for these products as for other product classes, the more products use energy efficient technology, the cheaper the technology will become, creating momentum and reducing cost for other products to adopt the new Energy Star efficiency levels.
- **Definitions, Standby or No-battery mode, line 64:** to make the definitions of Off mode and Standby/No-battery mode, we suggest line 64 reads ~~all such switches are turned on~~ at least one such switch is turned on.

Conclusion

NRDC commends EPA for revising this specification for a technology that constitutes a significant energy savings opportunity for America's consumers and businesses. This will save consumers money, make the US economy more competitive, and preserve people's health and environment through reduced pollution. We look forward to working with EPA on completing this specification.