California Energy Commission
Dockets Office, MS-4
1516 Ninth Street, MS-25
Sacramento, CA 95814-5512

March 15, 2011

RE: Battery Charger System Energy Efficiency Standards (Docket Number Docket 09-AAER-2)

Dear Commissioners:

California's investor owned utilities (IOUs) strongly support the California Energy Commission's proposed battery charger system efficiency standards (Docket Number Docket 09-AAER-2). These comments supplement and, in some instances, revise the standards proposal in the IOU CASE report. They are meant to supplement the IOU information presented at the October 2010 and March 2011 staff workshops. These comments are provided in two parts:

1) Response to specific comments received in writing by a manufacturer coalition (March 1, 2011).
2) Discussion of IOU recommended changes to the standards analysis and standards proposal based on stakeholder comments received to date and new research developed since the October 2010 publication of CASE report.

As discussed in these comments, the Energy Commission's action to broadly regulate battery chargers systems is important and necessary for California notwithstanding the pendency of a federal rulemaking. State regulation furthers California's policy objectives, will provide real, cost-effective energy savings for California and could encourage the adoption of more stringent standards at the federal level. The Energy Commission rulemakings related to battery chargers began over three years ago, during which the Energy Commission has solicited information from all stakeholders. The Commission now relies on the best available data on the energy efficiency of battery charger systems to support the proposed efficiency standards. For these reasons as well as those discussed in more detail in these comments, the state rulemaking is beneficial to California and should continue.

Part 1: Responses to manufacturers' March 1, 2011 Comment Letter

INDUSTRY LETTER STATES THE FOLLOWING: "*The Energy Commission's broad pursuit of battery charger regulations is unnecessary and wasteful given U.S. Department of Energy's rulemaking on battery charger systems already underway*"

IOU RESPONSE: The Energy Commission's action to broadly regulate battery chargers systems is important and necessary for California.

California standards proposal has a broader scope. The Energy Commission proposal covers commercial and industrial battery charger systems that are outside of DOE's standards coverage. There are important energy savings opportunities in these product categories that would not be captured without this state standard.

CEC's proposed compliance date one year before DOE's compliance date earns California significant energy savings above and beyond the DOE regulations. For those products within DOE's scope of coverage, the net present value of lifecycle savings from the first year sales in the year prior to preemption is $300 million(see Table 1)This benefit to California ratepayers far exceeds the cost of the Energy Commission to conduct the rulemaking on battery chargers and enforce the regulation.

Table 1. First Year Sales Savings

Category	One-year energy savings from first year sales ($M)	NPV lifecycle savings from first year sales ($M)
Consumer chargers (DOE scope of coverage)	$60	$300
Non-consumer chargers (Outside DOE scope of coverage)	$10	$60
Total (Consumer and non-consumer)	$70	$360

Although DOE is statutorily required to complete regulation of battery chargers by July 2011, with a proposed compliance date of July 2013, the timing of the completion of the battery charger standards process is uncertain. DOE has not yet released the battery charger standards NOPR nor has it released the final rule for the consumer battery charger systems test procedure. Given this delay relative to previously published DOE schedules for battery chargers, the final rule date is uncertain. This delay would have the net effect of increasing the time in which the California standard is enforced before the DOE standard, thereby increasing energy savings and net benefit for California ratepayers.

California's standard could influence the DOE standards outcome, enabling DOE to set more stringent standards. The long-lasting effect of DOE standards will impact consumers in California after consumer battery chargers standards are preempted. Because of California's large market size, one year of California regulation ahead of DOE regulation can spur energy efficient technology innovation for more efficient battery charger components and solutions. This has a long-lasting impact on future standards for battery chargers and products that contain them.

Achieving the energy savings associated with this battery charger standard supports California's AB 32 goals of reducing greenhouse gas emissions to 1990 levels by 2020. California's AB 32 goals provide additional mandate for why California should act prior to a DOE rule. California has made a substantial investment in developing the research to support this policy measure, including conducting early testing of battery chargers and developing a draft test procedure as part of the California Energy Commission Public Interest Energy Research (PIER) Program. The IOUs and the CEC helped to craft the battery charger test procedure, which was finalized in late 2008. These past efforts have laid the groundwork for a successful standard that achieves significant rate-payer energy savings, and net benefit.

INDUSTRY LETTER STATES THE FOLLOWING: "*The Energy Commission's development of regulations which are already being developed at the federal level would create unnecessary cost and compliance burdens for the marketplace and could negatively impact product usage and technology choices*."

IOU RESPONSE: The regulations do not add substantial compliance burden to the marketplace. Product availability and technology choices are expected to remain consistent before and after the compliance date.

Separate regulations for external power supplies and battery charger systems are warranted. Both the DOE and the CEC are proposing to simultaneously regulate external power supplies and battery chargers. Although there is some product overlap in the regulations (slide 9 of IOU efficiency committee workshop presentation March 2011), the regulations focus on the efficiency of two systems. The focus of the external power supply regulation is to improve externally-housed ac-dc power conversion. The battery charger regulation ensures that products chemically store energy efficiently in a battery. A system is used to refuel these rechargeable batteries. This system includes ac-dc power conversion, battery charge control circuitry, and a battery. Some battery charger systems include an external power supply to operate, but many use internal power supplies that are currently unregulated (slide 10 of IOU efficiency committee workshop presentation March 2011). Improving the efficiency of an external power supply also improves the efficiency of the battery charger system, so the regulations support one another.

Product redesign needed to comply with the CEC proposed standard uses market available technology and requires minimal product design changes, making a one-year compliance date feasible for manufacturers. Consumer products are regularly redesigned to encourage consumer upgrade to new models and to distinguish products in the market. The engineering steps needed to redesign many

products (circuit design and board design) can be absorbed into regular OEM redesign schedules. Changes to product molding are not required and the components required are small and fit on existing circuit board space (see slides 21 –slide 32 of IOU efficiency committee workshop presentation March 2011).

The proposed California standards levels enable all battery chemistries to comply with the standard, enabling consumers to have a variety of choices for battery technology and product price. Models of power required to counteract self-discharge in battery maintenance mode for all available chemistries (Slide 16 and 17 of IOU efficiency committee workshop presentation March 2011) demonstrate that this standard is not limiting technology.

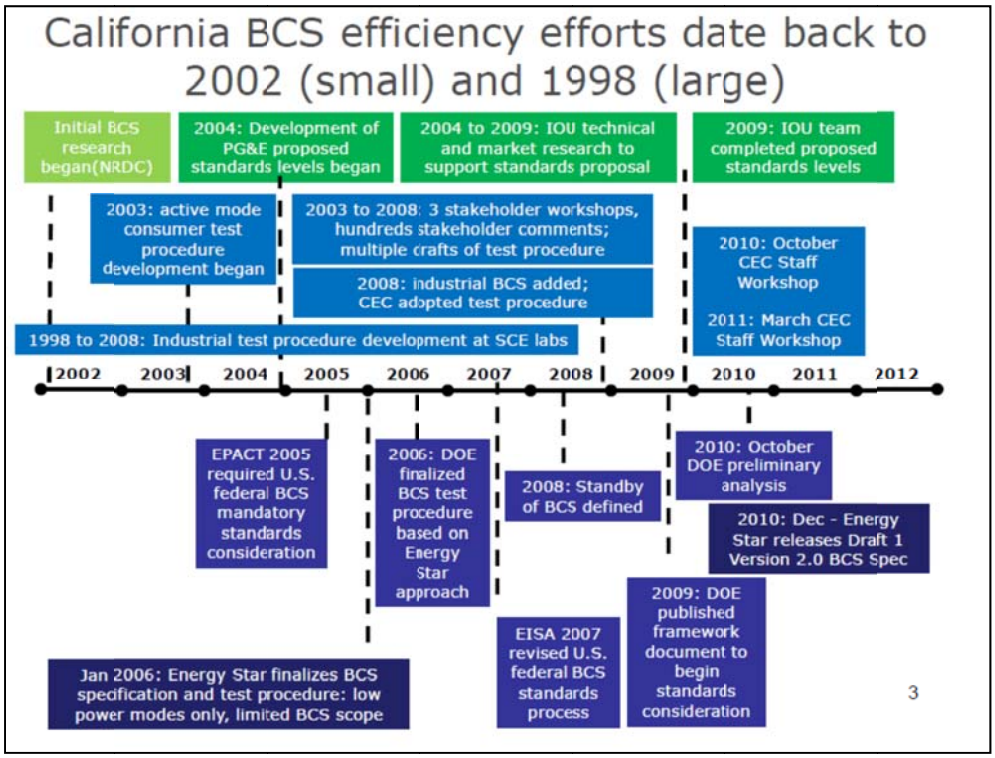
INDUSTRY LETTER STATES THE FOLLOWING: "*The Energy Commission is relying on a Pacific Gas and Electric Company (PG&E)/Ecos Consulting CASE (Codes and Standards Enhancement Initiative) report that lacks technological and economic rigor and suffers from many of the shortcomings present in similar reports used to advance other regulations before the Commission, including stale and out-of-date data.***"**

IOU RESPONSE: The IOU CASE report relies on the best available data on the energy efficiency of battery charger systems.

The laboratory and market data presented in the CASE report (October 2010) were heavily relied upon by DOE in its fall 2010 preliminary technical support document (TSD). This is largely because they are the best available data to inform the federal rulemaking. The second part of this comment letter suggests updates to the CASE report primarily based on careful review of DOE's TSD to incorporate new information that was previously unavailable (specifically information on BOM markups). The IOUs make every effort to evaluate and incorporate new data as it is available to improve the standards analysis.

As mentioned at the workshop, the CASE report builds upon IOU involvement in battery charger research since 1998 for larger chargers and 2002 for consumer chargers (see Figure 1 below). Furthermore, the CEC has been transparent in their model assumptions and has asked for input from industry on multiple occasions.

Figure 1. Battery Charger Research and Development Timeline



INDUSTRY LETTER STATES THE FOLLOWING: "*The Energy Commission's reliance on information from biased interests continues to be a concern, in addition to the lack of openness and transparency regarding documents that were the subject of the Commission's public workshop on October 11, 2010.***"**

IOU RESPONSE: The CASE report and associated presentations at the staff and efficiency committee workshops represent the position of the California IOUs and their ratepayers.

As stated in the IOU presentation at the October 2010 efficiency committee workshop ("California IOU Codes and Standards Program: Overview"), the codes and standards program encompasses a wide array of activities including building codes, appliance standards, and compliance activities among others. Codes and standards have contributed to stabilizing the per capita electricity consumption in California, saving money for ratepayers, and reducing greenhouse gas emissions. The IOUs have a mandate from the California Public Utilities Commission's *Energy Efficiency Strategic Plan* to pursue the following issues related to battery chargers: 1) zero net energy for residential new construction by 2020 and by 2030 for commercial; 2) expand Title 20 to address significant end-use; and 3) develop and adopt broader codes and standards for plug loads. Furthermore, AB32 goals require energy efficiency improvements through appliance standards, with a particular focus on plug load devices (such as battery chargers) that have largely remained unregulated. The IOU statewide team engages a team of professional consultants that specialize in plug load energy efficiency research and policy to support these goals.

Part 2: Suggested changes to CASE Report based on stakeholder comment and recent research

The statewide IOU team supports the modified battery maintenance proposal presented by the California Energy Commission staff at the March 3, 2011 efficiency committee workshop.
The battery maintenance power of 0.5 W is feasible for the largest observed lithium and nickel batteries (see Slide 16 and 17 of IOU efficiency committee workshop presentation March 2011). However, for battery capacity greater than approximately 300 Wh, models suggest that higher maintenance power is required to counteract self discharge for lead acid batteries, which are the primary chemistry in this battery capacity range. The CEC staff proposal for a continuously increasing function for battery maintenance addresses this concern while maintaining a single requirement for all battery capacities. IOUs support the CEC staff approach of using lead acid self discharge parameters to develop the shape of this battery maintenance power allowance, but suggest slight modifications to the proposed constants in the function to better represent Lead Acid. We suggest that CEC increase the 60% value in the function to 62.5% to reflect the required battery charger active mode efficiency at >300Wh battery capacity and modify the 3% constant (loss per day) to be 2.5% more typical of Lead Acid batteries. This change sufficiently addresses manufacturer concerns associated with counteracting self-discharge with the proposed battery maintenance power allowances.

The statewide IOU team proposes to modify power factor requirements to make them more easily understandable to stakeholders.
To simplify the implementation of the power factor requirements for battery charger systems, the requirements can be based on input power rather than input current. We specifically propose the following language for power factor requirement:

"For all *small battery charger systems*, if the ac input power exceeds 10 watts in active mode charge during the execution of the battery charger test procedure, then the power factor in that mode shall either

(a) be at least 0.55 at 115V, 60 Hz, or
(b) be at least 0.50 at both 115 V, 60 Hz and 230 V, 50Hz

during the period in which the *small battery charger system* is greater than 10 watts input power.

In addition, for all *small battery charger systems*, if input power exceeds 75 watts in active mode, then the power factor shall be at least 0.90 in that mode during the period in which the small battery charger system is greater than 75 watts input power."

This approach has a further advantage of aligning with European standard requiring 0.9 power factor for products greater than 75 watts input power (EN 61000-3-2). As demonstrated in our presentation to stakeholders March 3 (slide 35-37), this power factor requirement is cost effective and relatively easy to implement given the many market-ready silicon solutions available.

The statewide IOU team proposes that the CASE report be updated to include DOE markups on incremental Bill of Materials (BOM) costs.

Since the development of the CASE report in 2011, DOE released information in its preliminary technical support document that suggests specific markups that translate BOM cost to costs at retail. This includes manufacturer markup, retail markup, and tax. We propose that the CEC incorporate these markups, which are based on better information than originally used in the CASE report. The table below summarizes the suggested markups and includes rationale based on the DOE TSD.

Table 2. Updated Recommended Markups on BOM

Categories	**Total Markup on BOM***	**Rationale**
Cell phones, cordless phones, personal audio electronics, personal care, portable lighting, universal battery charger	1.45	DOE class 2
Emergency systems	2.00	DOE class 10
Laptops, power tools, portable electronics	1.85	DOE class 4; DOE value for this class (class 3) not given in preliminary TSD, employ conservative DOE class 4 value because it is higher than class 2
Handheld barcode scanners, two way radios, emergency backup lighting	2.45	Using the highest value from DOE to be conservative because these products are low volume
Auto/marine/rv, personal electric vehicles	2.45	DOE class 5
Golf cart/ electric carts, single phase lift-trucks, three phase lift-trucks	2.45	DOE class 7 (similar to the lift trucks)

*includes manufacturer, retail, and tax markup from DOE analysis

We suggest that the Energy Commission use the following updated BOM costs based on recent updated teardown and BOM analysis conducted in January and February of 2011.

IOU consultants conducted research in early 2011 to tear down and redesign battery charger products. Specific results of the tear down are documented in slide 21 –slide 32 of IOU efficiency committee workshop presentation March 2011. As a result of this teardown analysis and other research, we propose that the CEC use the following incremental BOM costs for each category in the CASE report (table below). Some BOM values have increased, and one has decreased. Considering the following BOM and the DOE markups suggested in the table above, energy savings and net benefit model continues to demonstrate that the standard is overwhelmingly cost effective, providing significant net benefit to the ratepayers of California.

Table 3. Updated Savings and Payback

Market Segment	Product	Incremental BOM Cost	Total Incremental Unit Cost*	Net Unit Savings	Payback (yr)
Small Consumer	Auto/marine/RV	$10.00	$24.40	$369.95	0.5
	Cell phones	$0.00	$0.00	$0.14	0.0
	Cordless phones	$0.40	$0.58	$8.69	0.3
	Personal audio electronics	$0.00	$0.00	$0.21	0.0
	Emergency systems	$3.00	$6.01	$12.75	2.1
	Laptops	$0.50	$0.91	$8.58	0.4
	Personal care	$0.10	$0.14	$1.28	0.5
	Personal electric vehicles	$2.00	$4.88	$626.42	0.1
	Portable electronics	$0.40	$0.72	$0.49	2.8
	Portable lighting	$0.40	$0.58	$11.19	0.4
	Power tools	$0.55	$1.02	$11.15	0.5
	Universal battery charger	$0.40	$0.58	$4.03	0.9
	Golf cart/ electric carts	$200.00	$487.92	$417.47	4.7
Small Non-Consumer	Emergency backup lighting	$3.00	$7.51	$4.26	5.6
	Handheld barcode scanners	$0.50	$1.21	$19.16	0.4
	Two-way radios	$0.50	$1.21	$8.04	0.9
Large	Single phase lift-trucks	$200.00	$487.92	$1,404.37	3.2
	Three phase lift trucks	$400.00	$975.84	$6,209.89	1.7

*The product of BOM and markup as specified in Table 2.

These values are our best estimate of current costs. As the standard is implemented and the demand for more efficient components increases, the incremental cost is likely to fall (as was seen with the external power supply regulations).

The statewide IOU team encourages the Energy Commission to adopt an alternate duty cycle for personal care products in response to manufacturer input regarding battery-powered trimmers and shavers.

The DOE duty cycle indicates that the unplugged time for shavers is 33%, for hair clippers 96%, for beard and mustache trimmers 96%, for rechargeable toothbrushes 0%, and for rechargeable water jets 0%. The market-weighted average duty cycle for this group of personal care products is 54% of the time unplugged. We recommend that the duty cycle for personal care products be harmonized with the DOE, so that the charge time is 5%, the maintenance time is 36%, the no battery time is 6%, and the unplugged time is 54%.

IOU consultant research conducted in January and February of 2011 suggests that the original CASE report overestimated the cost associated with bringing these types of single cell chargers into

compliance (October 2010 CASE report suggested incremental BOM cost of $0.40 was required.) Newest IOU research supports that only a more efficient power supply is required to meet this standard, with an associated incremental BOM cost of $0.10. IOU models of the energy savings with these new duty cycles and cost results in the proposed standard being even more cost-effective than calculated in the original CASE report (Table 2).

We appreciate your consideration for these comments.

Sincerely,

Pacific Gas and Electric Company
San Diego Gas & Electric
Southern California Edison
Southern California Gas Company