smart electronics initiative

May 9, 2013

California Energy Commission
Dockets Office, MS-4
Re: Docket No. 12-AAER-2A
1516 Ninth Street
Sacramento, CA 95814-5512

RE: Green Technology Leadership Group comments to the California Energy Commission's 2013 Appliance Efficiency Pre-Rulemaking Docket No. 12-AAER-2A "Invitation to Participate" for Consumer Electronic products

To Whom It May Concern:

The Green Technology Leadership Group (GTLG) is pleased to submit comments in response to the California Energy Commission's (CEC) 2013 "Invitation to Participate" for Consumer Electronic products on behalf of our organization and our members.

GTLG commends the Commission for adding the "Invitation to Participate" in the Title 20 proceedings this year to consider the best way to proceed in the listed Appliance Efficiency categories. More energy use savings from consumer electronics and plug loads are necessary for California to reach its goal "to reduce energy consumption by 40% by 2020 in residential home energy use" (pg. 9, California's Long-term Energy Efficiency Strategic Plan, 2011). In addition, more efficient consumer electronic devices are specifically listed in Governor Brown's 2012 Executive Order B-18-12 and the Green Building Action Plan to reduce statewide greenhouse gas emissions by at least 10% by 2015 and 20% by 2020.

GTLG and its partner companies in the Smart Electronics Initiative (SEI) are designing, manufacturing, and selling the infrastructure to tomorrow's most energy-efficient consumer electronic devices. In 2010 alone, our partner companies' products totaled over 40 billion shipped devices represented in over 95% of all global smartphones, 35% of all digital televisions and set-top boxes, and at least 10% of all mobile computers.

GTLG is a nonprofit organization established to align industry and policy innovators to provide solutions to the most pressing existing energy, technology, and climate policies today. Participants in the organization are leading companies, clean technology business organizations, and policy experts in the areas of renewable energy, consumer electronics, alternatives fuels, carbon management, energy efficiency, and others. The SEI is a unique GTLG collaborative of innovative electronics companies partnering with policymakers, academia, and technical analysts to incent the production and use of energy-efficient consumer electronics devices. SEI partner companies include ARM Holdings, Belkin, Marvell, ON Semiconductor, Pace, Texas Instruments, and Power Integrations.

SEI companies can provide immediate solutions to increase efficiency in most CEC appliance efficiency categories through a number of overarching technologies that can and are being considered across the entire consumer electronic supply chain. The potential for higher efficiency already in the market demonstrates that there is room for setting new, meaningful standards. These include innovations such as the following:

1. Improved chip design - Using a Reduced Instruction Set Computing (RISC) based approach to computer design, processors require significantly fewer transistors than processors that would typically be found in a traditional computer. This leads to lower costs, less heat, and less power usage, traits that are desirable for use in set-top boxes, phones, computers displays, lighting, and motors. The reduced complexity and simpler design allows companies to build a low-energy system on a chip for an embedded system incorporating memory, interfaces, radios, etc.

   ARM, for example, is using its ARM big.LITTLE™ processor as an energy-saving technology where the highest performing ARM central processing units (CPUs) are combined with the most efficient ARM CPUs in a combined processor subsystem to deliver greater performance at lower power than today's best-in-class systems. With big.LITTLE processing, software workloads are dynamically and instantly transitioned to the appropriate CPU based on performance needs. This software load balancing is so fast that it is completely seamless to the user. By selecting the optimum processor for each task, big.LITTLE can reduce energy consumption in the processor by 70% or more on light workloads and background tasks, and by 50% for moderately intense work, while still delivering the peak performance of the high performance cores.

   Under its Smart Energy Platform, Marvell's most recent microcontroller, the 8MC200, enables high-performance wireless computing for smart devices with a low-power components. It features an ARM® Cortex™ M3 microprocessor and provides faster memory speeds and input/output capability on a chip dc-dc converter, which significantly lowers the bill of materials (BOM) cost.

2. Power factor correction - Power factor describes the amount of useful power delivered by a mains network. When PF is less than one, the product of input current and input voltage are greater than the power used by the load. The higher power being transmitted through the power cables means the utility loses more power moving the energy to the consumer.

   Power Integrations introduced a single stage PFC IC family which incorporates the constant current (CC) output circuitry required to drive LEDs. This has been updated recently with their new LYTSwitch product family. The single stage approach allows good power factor (>0.9) while maintaining very high efficiency to reduce bulb temperature, increasing lifetime and reducing the need for expensive heat-sinking. The single stage approach also eliminates the cost

adder typically associated with traditional two-stage PFC circuits meaning that the addition of high PF is now effectively cost neutral.

3. Low-power mode – Low-power mode, sleep mode, and standby mode save energy when consumer electronics are left on but not being actively used. Although some consumer electronics have this component, many go into low-power mode at different times, so a device can go to sleep within five minutes, half hour, or three hours based on the design or consumer choice. If products take less time to go into low-power mode, this can save overall energy among all the electronics used in the vicinity.

   Power supplies can also be improved to reduce no-load standby power needs. ON Semiconductor's NCP1246 controller has applications in game consoles, displays, LCD televisions, notebook/desktop computers, and other ac-dc adapters to help reduce the power supply no-load usage to under 10 milliwatts, compared to the 300 milliwatts typical in regulatory requirements.

   The set-top box, according to PSMA, is one device that could be better designed to reduce power consumption. To meet energy-efficiency standards in Europe and Asia, Pace already has a single-chip set-top box like the TDS865 designed to minimize power consumption for satellite high-definition TV.

4. Sensors - More objects are becoming embedded with sensors and gaining the ability to communicate. The resulting information networks promise to create new opportunities for consumer electronic devices to sense when to power on and off to help save energy or for other purposes.

   Networked sensors and automated feedback mechanisms can change usage patterns for energy often by enabling more dynamic pricing. Smart meters promoting smart energy use allows residential consumers to shut down air conditioners or delay running dishwashers during peak times. Commercial customers can shift energy-intensive processes and production away from high-priced periods of peak energy demand to low-priced off-peak hours.

   Texas Instruments believes sensors are the heart of industrial automation, so it offers low-power sensor products like the TMP302C to connect to faster, high-performing programmable logic controllers (PLC) and human-machine interface (HMI) systems. TI uses the sensors with the ARM® Cortex™ chip series to achieve even lower power consumption and lower costs.

   To cut down on overall energy usage, Belkin has a motion sensor called the WeMo Motion that turns off electronics in a room once the consumer leaves. The electronics turn back on when the consumer's motion is detected in the room again. WeMo Motion works with its partner WeMo Switch to send wireless signals to control the on and off modes of electronics. It also comes with a mobile

application where consumers can make sure the electronics are off when they leave the home.

5. More appropriate prices for calculating consumer benefits. The "Invitation to Participate" included detailed questions related to the appliance costs, kilowatt-hours saved, and appliance markets; but did not request information regarding the rate (cents per kilowatt-hour) that the Commission will apply to the kilowatt-hours saved to determine whether a new standard adds to the costs for consumers over the life of the appliance. The Commission has traditionally used the average cost of electricity in estimating the energy savings that consumers could see from purchasing a more efficient appliance, when in fact the savings that consumers would realize depends on their marginal electric rates which varies given the state's tiered pricing. The Smart Electronics Initiative intends to address this issue in our response to the Commission's "Request for Proposals" part of the preliminary rulemaking process. We would be interested in receiving insight on CEC assumptions for calculating these savings.

GTLG supports CEC's efforts to develop a data-driven, well thought-out plan for appliance standards for consumer electronics. We think standards should be carefully considered in alignment with incentives and state procurement policies as outlined in EO B-18-12.

Attached are answers to a subset of the Commission's questions regarding computers and set top boxes. In addition, we recommend reviewing our recently released "Get Smart Guide: Energy Innovation for the Consumer Electronics Industry" that can be found on our website at http://smart-electronics.org/get-smart-guide-energy-innovations-for-the-consumer-electronics-industry/. We believe there are additional insights in this report relevant for the Title 20 rulemaking process.

We thank you for the invitation to participate in the Title 20 rulemaking process and look forward to working more with you in the future.

Sincerely,

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smart electronics initiative

ANSWERS TO CEC QUESTIONS ON CONSUMER ELECTRONIC APPLIANCES

COMPUTERS

Market Competition for Efficiency Products

- What are the incremental costs between the different levels of 80 plus compliant power supplies and power supplies that do not meet the 80 plus specifications? What are the main drivers of these costs?

Answer to Computer question

Regarding internal computer power supply efficiency, it appears that most desktop computers shipped into the U.S. today currently incorporate an 80 Plus power supply, based on component demand from the power supply companies who provide product to the major computer manufacturers. Using the basic 80 Plus efficiency level as a baseline, we believe the incremental Bill of Materials (BOM) cost to achieve a Bronze level is very small (approximately $0.25), typically requiring minor component upgrades such as improved output diodes. The current draft of ENERGY STAR's version 6 Computer program requires an 80 Plus Bronze power supply for compliance.

Moving to an 80 Plus Gold level requires a change in circuit switching topology and a change in the output diode stage to a synchronous rectification stage (i.e. switching IC and two MOSFETs). An estimate of the incremental BOM cost for this change is in the $1.00 to $1.50 range. Jumping to an 80 Plus Platinum would require more expensive components; depending on quantities, these could add another $1.00 to $2.00.

The technology to achieve all of these levels is currently available as shown on the Plug Load Solutions website, which lists all of the models that EPRI has certified in the 80 Plus categories.[1] As of May 1, 2013, there are over 4,000 power supply designs that are 80 Plus certified for desktop, workstation, and non-redundant server applications; with 734 80 Plus Gold and 194 80 Plus Platinum power supplies listed. These are also the fastest growing categories, with 80 Plus Gold increasing by 37% over the past year, and 80 Plus Platinum increasing by 90% as shown in the table below. The data also suggests that there is more emphasis on designing Gold and Platinum power supplies than Silver.

[1] http://www.plugloadsolutions.com/80PlusPowerSupplies.aspx

Number of 80 Plus certified power supply models[2]

	80 PLUS	80 PLUS BRONZE	80 PLUS SILVER	80 PLUS GOLD	80 PLUS PLATINUM	***Total***
2011	*1179*	*1059*	*239*	*333*	*20*	*2830*
2012	*1245*	*1305*	*266*	*535*	*102*	*3453*
2013	*1262*	*1581*	*318*	*734*	*194*	*4089*
2013 increase over 2012	*17*	*276*	*52*	*199*	*92*	*636*
2013 percent increase	*1%*	*21%*	*20%*	*37%*	*90%*	*18%*

The CEC should consider the relatively low cost, product availability, and product momentum of the 80 Plus Gold level as it reviews the appropriate energy efficiency requirements for desktops. At a rate of 200 additional certifications a year, as has been the case in the past two years, there would be over 1,000 80 Plus Gold models certified 18 months from now.

Additionally, the CEC should investigate adding an efficiency requirement at 10% loading, based on current discussions about the amount of time that computers spend in an idle mode.

SET-TOP BOXES

Energy Saving Technologies, Components, and Features

- To what extent are energy efficient mobile networking technologies incorporated into STBs and network equipment?
- What are the design practices and technologies incorporated into the most efficient products?
- What are the costs associated with more efficient hardware such as energy efficient Ethernet technology?

Market Competition for Efficiency Products

- How many small businesses are involved in the manufacture, sale, or installation of these products?
- What are the current market drivers towards improving efficiency?
- STB Specific Market Characteristics
- How do set-top box manufacturers collaborate with service providers during research and development (R&D)?

Other

- What product development trends in the market may have an impact on power consumption or proper categorization of devices?

[2] 2012 and 2011 data from web.archive.org; 3/31/11 and 4/26/12.

Answers to all Set-top Boxes (STBs) questions

Due to network requirements, STBs typically do not implement mobile technologies. The technologies needed to support the current generation of STBs are extremely complex, having to deliver high-bandwidth pay TV content both over a wide area network and a local area network within a home, whilst maintaining a high level of service and protecting the security of the content.

Manufacturers design STBs to minimize their power consumption both in the 'on' modes and the standby modes. Common good practice is to implement active power management, where circuit blocks are powered or unpowered according to the dynamic requirements of the system.

The traditional hardware manufacturers of STBs are generally large companies, however, under the definition proposed by the Department of Energy (DOE), many small service providers will become manufacturers, as they will be responsible for the integration of software into the STB, the cost impact on these could be significant.

The major STB manufacturers all collaborate with the main service providers to develop specifications and products that minimize energy whilst maximizing performance, usually working in conjunction with the core silicon providers. It is now very common to see Energy Star compliance as a firm requirement in specifications.

We expect the DOE Notice of Proposed Rulemaking and Energy Star V4.1 to have a significant impact on the STB market and recommend CEC monitor their progress closely.