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November 21, 2011

California Energy Commission
Docket No. 11-AAER-2
Docket Unit
1516 Ninth Street
Sacramento, CA 95814

RE: TECHAMERICA COMMENTS TO THE CALIFORNIA ENERGY COMMISSION REGARDING PROPOSED APPLIANCE EFFICIENCY REGULATIONS (BATTERY CHARGER SYSTEMS) [Docket Number 11-AAER-2]

The Technology Association of America (TechAmerica) welcomes the opportunity to comment on the California Energy Commission's (CEC) proposed amendments to its Appliance Efficiency regulations (Title 20, California Code of Regulations, Section 1601 through Section 1608) to create efficiency standards for battery charger systems. We appreciate the CEC's willingness and desire to engage stakeholders throughout this proceeding thus far and maintain that such deliberation and transparency are critical components to sound policy making.

TechAmerica is the U.S. technology industry's largest advocacy organization, representing over 1,000 member companies of all sizes from the public and commercial sectors of the economy. California's technology sector is a major driving force behind productivity growth and jobs creation in the state and is a fundamental part of the global innovation economy.

Despite our agreement with the CEC's goal of reducing energy consumption, TechAmerica remains concerned that the regulations as currently drafted will harm innovation in the tech industry. However, we have identified several changes which we believe would significantly improve the regulation and make its requirements more feasible for regulated entities. These modifications include, among other things, very modest changes to the existing efficiency formula which would allow California to both realize savings from increased energy efficiency while ensuring that new products are not hampered with undue constraints.

Efficiency Formula

As currently constructed, the formula is too strict for mobile computing devices. While many devices within the industry currently comply with the standards, the formula does not seem consistent with industry trends. As mobile devices incorporate larger batteries and increased functionality, the efficiency standards are going to be increasingly difficult (or even impossible) to meet in a cost-efficient manner.

TechAmerica believes that the approach put forward by the Information Technology Industry Council (ITI) at the October 24th workshop has substantial merit. The suggestion that the formula be adjusted by increasing the standard allowance for batteries smaller than 50Wh from 12 to 20 represents a reasonable effort to balance the needs of the tech industry with the goal of driving energy efficiency.

ITI Proposed Maintenance and 24 Hour limit adjustment:

- Maintenance and no-battery mode power to 1.2W for devices with $E_b \leq 100$Whrs
- 24hour maintenance limit to $20 + 1.6\ E_b$ for devices with $E_b \leq 50$Whrs

Alternatively, the formula could be adjusted to increase the battery capacity multiplier. Increasing the multiplier from 1.6 to 1.85 would address many of the concerns our members have regarding current and future devices. This has the added benefit of directly addressing the problem of the formula not being able to keep up with increases in battery capacity.

USB-Based Chargers

As mentioned in our public testimony at the October 24th workshop, we have particular concern over the impact that the proposed regulations could have on USB-based charging systems. USB is a well-established industry standard that allows existing and future devices to share common power sources and cables. USB-based chargers bring many benefits to consumers and the environment:

Reduced eWaste: USB's universal design decreases the number of custom adapters in circulation and cuts down on waste. They also eliminate the need for separate power and data cables.

Availability of Power Sources: Consumers can charge devices from a wide variety of sources using USB cables. The universal nature of USB makes it easy to find available power sources. USB is commonly available via personal computers, installed base of mobile phone/tablet power adapters, dock accessories, public charging stations, and automobile charging ports.

Increased Customer Convenience: USB adapters are generally smaller and lighter than the alternatives allowing for convenient transport. Interoperability with other devices also allows consumers to travel with a single cable and adapter to charge phones, tablets, GPS, etc.

Increased Functionality: USB allows devices to transfer data to other devices and allows for expansion and upgrade via accessories (e.g. synching a device with a computer, transferring photos from a camera SD card, attaching sensors, remove control via automobile dash board controls, credit card readers, etc.

However, Energy Star has recognized that an average small voltage external power supply (EPS) – like those used in USB-based charging systems – is 3% less efficient than its standard voltage counterpart [see Attachment A for more details]. As a result, USB-based charging systems begin to run into problems complying with the formula as battery size increases because of the longer charge times. Adding a small additional battery capacity multiplier for USB-charged devices would maintain all of the consumer benefits associated with USB-compatible chargers while having very little negative impact on energy consumption. We therefore propose adding the below formulas for devices that utilize USB charging AND include the power adapter in-box.

Proposal: Efficiency limits for small battery charger systems

Battery capacity E_b	Devices Charged with USB Power Source; Maximum 24 h charge & maintenance energy (Wh)	All other battery chargers Maximum 24 h charge & maintenance energy (Wh)
≤2.5 Wh	< 16 x N	< 16 x N
>2.5 Wh and ≤5 Wh	< 12 x N + 1.6E_b	< 12 x N + 1.6E_b
>5 Wh and ≤10 Wh	< 12 x N + 1.7E_b	
>10 Wh and ≤20 Wh	< 12 x N + 1.75E_b	
>20 Wh and ≤30 Wh	< 12 x N + 1.8E_b	
>30 Wh and ≤100Wh	< 12 x N + 1.85E_b	
>100 Wh and ≤1000 Wh	N/A	< 22 x N + 1.5E_b
E_b = capacity of all batteries in ports (Wh) N = number of charger ports/charger controllers		

Adding the above battery multiplier for USB-based chargers would result in only 1.3kW per year of additional energy consumption for a 25W tablet-sized device – and this is even using aggressive assumptions that consumers will charge their device every weekday. This is the equivalent of only $0.20 in energy savings per year versus the proposed CEC standard [see Attachment A for calculations]. Those potential savings are simply not enough to justify the corresponding increase in waste or the reduction in customer convenience and functionality.

Implementation Timeline

The timeline for implementation laid out in the draft regulations is not realistic. Supply chains in our industries are increasingly complex and significant changes cannot be made on short notice. Products in today's world often have design and production phases that are 2-3 years or longer. Changes that touch batteries, such as the present regulations may demand, tend to take even longer. Forcing those changes during a one-year window is overly burdensome, and runs the risk of vastly increasing transition costs associated with adoption of new charging technologies. The implementation date for the regulations should be pushed back at least one year, to January 2014.

Labeling

The current labeling requirements provide no benefit to consumers. We would like to see language added specifically allowing for alternative ways of providing labels in a manner accessible to regulators. In particular, TechAmerica suggests that you add options allowing any product to be labeled via markings on the product, on the box, OR via electronic means in the operating system of mobile devices.

Inductive Charging

We also believe the CEC should exempt from the proposed regulations loosely-coupled wireless charging systems that are under active development by a number of TechAmerica member companies. TechAmerica respectfully requests that this exemption be implemented by limiting the regulation of inductive charging systems to the only type of wireless charging systems that the CEC considered during its rulemaking process, namely, tightly-coupled inductive charging systems.

New loosely-coupled wireless charging systems offer many public interest benefits for they will allow a consumer to simultaneously and independently charge multiple devices, such as a cell phone, a handheld gaming device, and a pair of hearing aids, by placing them in any position on a charging pad or some other properly equipped surface. In this way, these new systems will eliminate the need to have separate power adapters for each device.

Without the requested relief, the CEC would effectively delay the introduction of these new, highly useful systems in California or, even worse, prevent them from ever being sold in California. The requested exemption is essential because the proposed regulations broadly cover all types of inductive charging systems, including loosely-coupled wireless charging systems that are not yet on the market. Accordingly, we request that the CEC limit its rules for wireless charging systems to tightly-coupled inductive charging systems in order to allow continued development of loosely-coupled wireless charging technology.

Network Backup Batteries

We also seek clarification that network backup batteries are exempt from these rules. While we believe the CEC's intent was to exempt backup batteries based on the existing 6 exemptions listed – we request clarification on this point. Such backup batteries are critical and have to be able to operate at full capacity at a moment's notice, thus they cannot be put into deep sleep mode.

Below are two proposed alternatives that would alleviate this concern. First, the CEC could revise exclusion (4) as follows (new language in red):

> (4) battery charger systems with input that is <u>three phase</u> of line-to-line 300 volts root mean square or more and is designed for a stationary power application or any <u>one phase</u> battery charger system supporting communications, telecommunications, broadband and/or other information services, and/or video equipment employed by service providers, whether within their networks or on customer premises.

Alternatively, the CEC could add exclusion (7):

> (7) Battery charging and back-up battery power equipment supporting communications, telecommunications, broadband and/or other information services, and/or video equipment employed by service providers, whether within their networks or on customer premises.

While three phase battery charger systems are often used, there are situations where their use is impracticable (e.g. because of the smaller size of the facility, such as a cell tower). In these scenarios, the providers still have the same need for constant power in order to be prepared for emergencies. Therefore, the distinction between three phase and single phase chargers is unnecessary and the exclusion should be broadened accordingly. Either one of the above options would be satisfy this concern.

We believe the exemption fits the intent of the CEC's 6 listed exemptions because communications infrastructure, including broadband and video, are deemed critical facilities by the federal government and the state and are part of emergency communications: the existing 911 system, the Next Generation 911 system and the emergency alert systems. As such, they need to operate at 100% capacity at a moment's notice during an emergency situation.

We thank the CEC for the opportunity to provide written comments and look forward to working with you to achieve our shared goal of reduced energy consumption. For any questions or comments, please do not hesitate to contact me at (916) 443-9088 or robert.callahan@techamerica.org.

Sincerely,

Robert Callahan
Director, State Government Affairs
TechAmerica

cc: Harinder Singh, California Energy Commission
Ken Rider, California Energy Commisssion

ATTACHMENT

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Attachment A - Devices Utilizing USB External Power Supplies

Summary

California's proposed battery charger efficiency limits for 24 hour charge and maintenance energy are too stringent for an emerging class of mobile IT products that utilize USB external power supplies.

Why is preserving USB battery charging important?

USB offers the following advantages:

- Reduced eWaste - USB is a well established industry standard that allows a wide range existing and future devices to share a common USB power source and/or simply charge via a USB port on a personal computer. Some common mobile devices currently ship without external power supplies due to the common availability of USB power sources. Since USB provides both power and data, ewaste that would result from redundant data cables is also eliminated.

- Availability of power sources - USB power is commonly available via USB ports on personal computers as well as a very large installed base of mobile phone/tablet external power supplies, dock accessories, public charging stations, and automobile charging systems.

- Additional functionality - USB allows devices to transfer data to other devices and allows for expansion and upgrade via accessories (e.g. syncing a device with a computer, transferring photos from a camera SD card, attaching sensors, control via automobile stereo system, credit card readers, etc.).

- Customer convenience - USB external power supplies are small and light allowing for convenient transport and interoperability with other devices (e.g. sharing a single external power supply with mobile phones, tablets, GPS, etc.).

Why are USB external power supplies less efficient?

USB external power supplies have the following inherent design characteristics that impact the efficiency of the ac to dc power conversion:

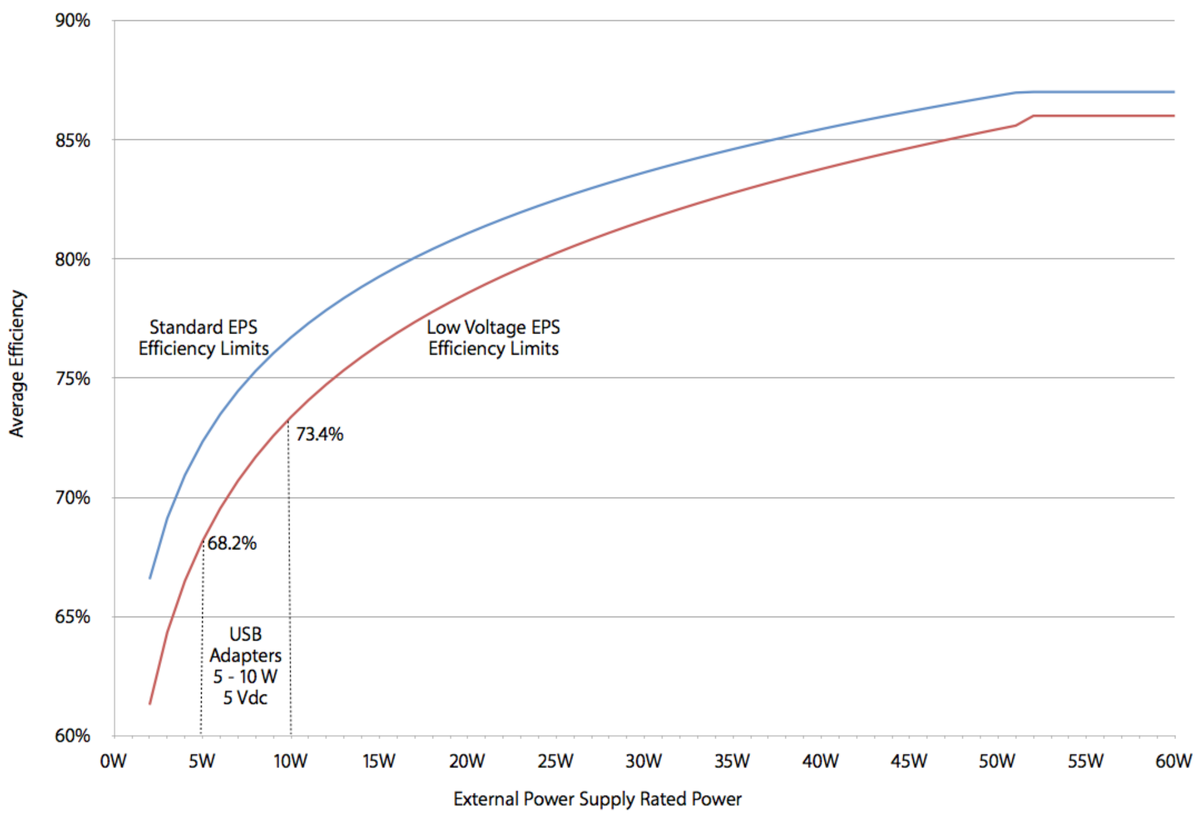
- Low voltage output - As illustrated by Energy Star and ErP Lot 7 specifications for external power supplies, low voltage designs (<6W) are recognized as having an average efficiency that is 3 percentage points lower than an equivalent standard voltage design (e.g. 12-24 V).

- Low power output - USB external power supplies are typically rated between 5 W and 10 W. As illustrated by Energy Star and ErP Lot 7 specifications for external power supplies, these low power models are recognized as being less efficient than higher rated models (e.g. 45-85 W). See Table 1 and Figure 1.

Table 1: External power supply average efficiency limits (Energy Star & ErP Lot 7)

Rated Output Power of External Power Supply	USB/Low Voltage Models Ave Eff = 0.075*ln(rated power) + 0.561	Standard Models Ave Eff = 0.063*ln(rated power) + 0.622
5 W	68.2%	72.3%
10 W	73.4%	76.7%
45 W	N/A for USB external power supplies	86.2%
60 W	N/A for USB external power supplies	87%

Figure 1: Comparison of "low voltage" and "standard" external power supply efficiency limits



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How does USB charging of mobile devices affect the 24 hour charge and maintenance energy consumption?

For USB powered devices employing relatively large batteries (25+ Wh) there is a significant technical challenge to meet the California's efficiency limits for battery chargers. There is an emerging trend in mobile IT devices of increased battery capacity with each new product generation. The need for increased battery capacity is driven by improvements in product performance and functionality including:

- Long battery life (e.g. up to 10 hours use between charges)
- Large, high resolution touch screen displays
- Simultaneous support of multiple wireless networks (WiFi, Bluetooth, GSM, CDMA, GPS)
- High performance processors and graphics processors
- Energy consumptive applications (e.g. camcorder, video conferencing, gaming)

As battery capacity increases, the maximum output power of the typical USB external power supply remains fixed at approximately 10 W. This increases the charge time of the mobile device since the speed of charging is limited by the output rating or the USB external power supply. Consequently, the active charge portion of the 24 hour energy test is occurring for a longer duration and at a relatively lower efficiency when compared to notebook computers with a higher voltage/higher output custom external power supply. Consequently, the ability for USB charged device to pass California's proposed efficiency levels becomes increasingly difficult as the battery capacity increases.

Proposed Solution

There are obvious environmental and customer benefits that result from utilizing USB power sources. To balance the inherent efficiency challenges associated USB charging, an alternate performance level is needed. The alternate formulas proposed in Table 2 are restricted to devices that utilize USB charging AND include the external power supply in-box.

Table 2: Efficiency limits for small battery charger systems

Battery capacity E_b	Devices charged with USB external power supplies Maximum 24 h charge & maintenance energy (Wh)	All other battery chargers Maximum 24 h charge & maintenance energy (Wh)
≤2.5 Wh	< 16 x N	< 16 x N
>2.5 Wh and ≤5 Wh	< 12 x N + $1.6E_b$	< 12 x N + $1.6E_b$
>5 Wh and ≤10 Wh	< 12 x N + $1.7E_b$	
>10 Wh and ≤20 Wh	< 12 x N + $1.75E_b$	
>20 Wh and ≤30 Wh	< 12 x N + $1.8E_b$	

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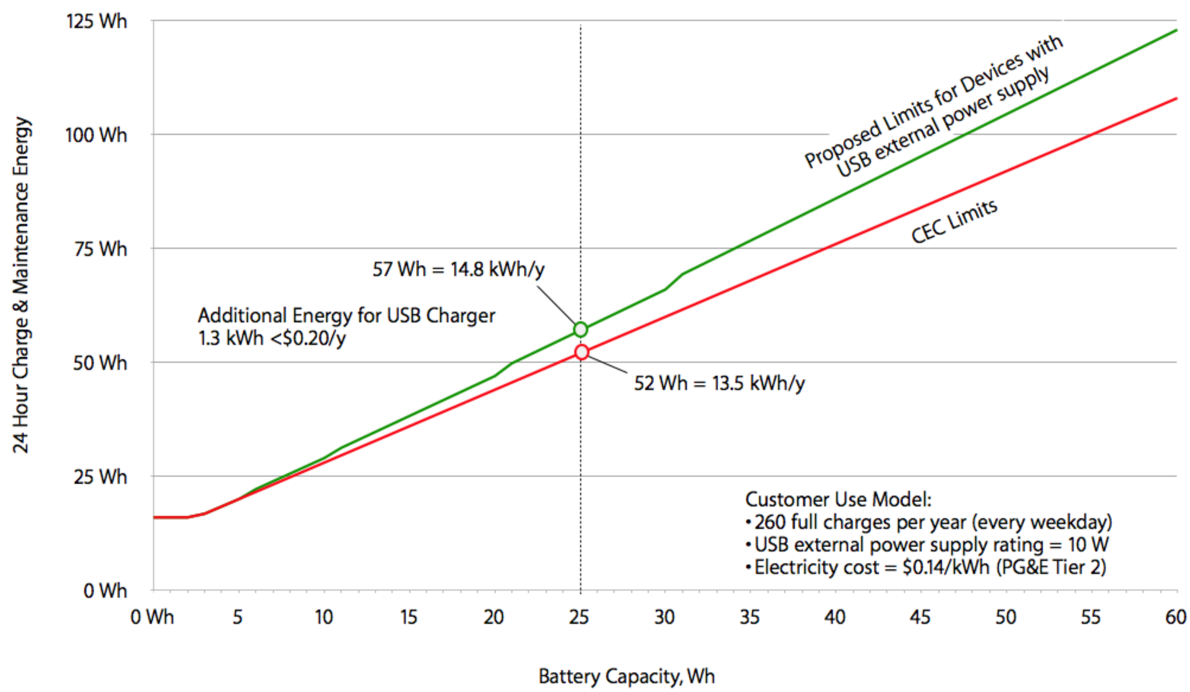
>30 Wh and ≤100 Wh	< 12 x N + 1.85E_b	
>100 Wh and ≤1000 Wh	N/A	< 22 x N + 1.5E_b
E_b = capacity of all batteries in ports (Wh) N = number of charger ports/charger controllers		

What is the potential impact on annual energy consumption and cost?

The potential impact of the USB battery charger efficiency limits on annual energy consumption and customer cost would be very minimal. As illustrated in Figure 2, a USB charged device (e.g. tablet computer) with a 25 Wh battery would only result in an additional 1.3 kWh of electricity use per year compared to the proposed California limit. The additional electricity cost to the customer would be less than $0.20 per year. This assumption is based on a very aggressive customer use scenario of 260 full charge cycles per year (5 full charges per week).

Figure 2: Comparison of USB battery charger systems efficiency limits to CEC proposed limits



Example calculations from Figure 2:
5 weekdays/week x 52 weeks/year x CEC 24h energy limit Wh x 1 kWh/1000 Wh
CEC level for 25 Wh battery charger = 260 weekdays/year x 52 Wh x 0.001 = 13.52 kWh/year
USB level for 25 Wh battery charger = 260 weekdays/year x 57 Wh x 0.001 = 14.82 kWh/year

Additional energy required for USB charger = 1.3 kWh/year
Cost of additional energy required for USB charger [(1)] = 1.3 kWh x $0.14/kWh = $0.18 per year

[(1)] *Based on PG&E Tier 2 residential electric charges effective 11/1/2011*

Conclusion

USB charging of mobile devices is very convenient for users and provides an industry standard power source that can be shared among a wide range of devices. The common availability of USB power sources has helped reduce the need for custom external power supplies. This has resulted in less embodied energy and carbon emissions associated with the production of external power supplies and less e-waste at product end of life.

A new generation of cutting-edge mobile IT devices are coming on the market with relatively large batteries charged with USB external power supplies. These products face significant technical challenges with respect to the proposed California limits for 24 hour charge and maintenance energy. An increase to the E_b multiplier is needed that scales appropriately with the established efficiency levels for USB external power supplies. Increasing the E_b multiplier would have very minimal impact on annual energy consumption while allowing for the benefits of USB charging to continue in future generations of products.

If less stringent efficiency limits are not established for products with USB charging, manufacturers will not have sufficient time to implement changes in the product and/or external power supply to meet the January 1, 2013 effective date. In addition, some product designs may be required to change to a non-USB custom external power supply which would impact product design, performance, and functionality, as well as seriously impact cost and customer satisfaction.

SUPPLEMENTARY ATTACHMENT
To TechAmerica written comments – November 21, 2011 regarding the California Energy Commission's Battery Charger Systems Proposed Regulation – [Docket Number 11-AAER-2]

In addition to our original TechAmerica comments, please find the supplementary tables below showing an alternative proposal to Table 2 that was referenced in our original written comments (the alternative proposal is labeled immediately below as Table A), and Tables 1-3 showing that both Energy Star and the European Energy Related Products Directive assign different efficiency limits dependent on the voltage and rated output power of the power supply.

The proposal below takes the methods utilized by both Energy Star and the European Energy Related Products Directive to create a more appropriate limit for low voltage chargers. For data on how, see the for further information for how ES and Euro handle low voltage external power supplies.

Table A: Efficiency limits for small battery charger systems [advantage is direct reference to the external power supply "low voltage" efficiency formula]

Battery capacity E_b	Devices charged with USB power adapters Maximum 24 h charge & maintenance energy (Wh)	All other battery chargers Maximum 24 h charge & maintenance energy (Wh)
≤2.5 Wh	< 16 x N	< 16 x N
>2.5 Wh and ≤100 Wh	$< 12 \times N + 1.6E_b \times 0.87/(0.075 \times \ln(P_o) + 0.561)$	$< 12 \times N + 1.6E_b$
>100 Wh and ≤1000 Wh	N/A	$< 22 \times N + 1.5E_b$
E_b = capacity of all batteries in ports (Wh) N = number of charger ports/charger controllers ln = natural log P_o = rated output power of power adapter (W)		

External Power Supply Specifications

Energy Star for External Power Supplies, Version 2.0, average efficiency of standard and "low voltage" power supplies

Table 1: Energy-Efficiency Criteria for Ac-Ac and Ac-Dc External Power Supplies in Active Mode: Standard Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal) [2]
0 to ≤ 1 watt	$\geq 0.480 * P_{no} + 0.140$
> 1 to ≤ 49 watts	$\geq [0.0626 * \ln(P_{no})] + 0.622$
> 49 watts	≥ 0.870

Table 2: Energy-Efficiency Criteria for Ac-Ac and Ac-Dc External Power Supplies in Active Mode: Low Voltage Models

Nameplate Output Power (P_{no})	Minimum Average Efficiency in Active Mode (expressed as a decimal) [2]
0 to ≤ 1 watt	$\geq 0.497 * P_{no} + 0.067$
> 1 to ≤ 49 watts	$\geq [0.0750 * \ln(P_{no})] + 0.561$
> 49 watts	≥ 0.860

Table 3: European Energy Related Products Directive 2005/32/EC (ErP Lot 7)

The average active efficiency shall be not less than the following limits:

	AC-AC and AC-DC external power supplies, except low voltage external power supplies	Low voltage external power supplies
$P_O \leq 1{,}0$ W	$0{,}480 \cdot P_O + 0{,}140$	$0{,}497 \cdot P_O + 0{,}067$
$1{,}0$ W $< P_O \leq 51{,}0$ W	$0{,}063 \cdot \ln(P_O) + 0{,}622$	$0{,}075 \cdot \ln(P_O) + 0{,}561$
$P_O > 51{,}0$ W	0,870	0,860