Wireless Power Consortium
www.wirelesspowerconsortium.com

November 10, 2011

DOCKET
11-AAER-2
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California Energy Commission
Docket Office, MS-4
Re: Docket No. 11-AAER-2
1516 Ninth Street, Mail Station 4
Sacramento, California 95814-5504
Email; Docket@energy.state.ca.us

RE: Docket No. 11-AAER-2

Dear Madam/Sir:

The Wireless Power Consortium, hereafter referred to as WPC, is comprised of 100 member companies[1], many of which have a large presence in California, and are engaged in the emerging technology of wireless, or inductive transfer of energy to both power and charge consumer products of a diverse and varied product mix.

The WPC commends the Commission for its efforts to establish efficiency standards. We have reviewed the proposed rules as set forth in Docket No. 11-AAER-2, and while we enthusiastically endorse the intent of the rules, are concerned that the rules as currently drafted do not sufficiently address the unique nature of measuring the efficiency of the large and diverse number of products by different manufacturers of power sources and products that inductively draw energy from them, that are or will soon be available in the market. It is therefore, that the WPC respectfully proposes an alternate method for the measurement of efficiency that would not require manufacturers of power sources to be responsible for the efficiency of products from other manufacturers that would draw power from the inductive power source. The proposed WPC method, already approved by all 100 member companies, would also provide a method for the measurement of efficiency that would not require manufacturers of products that inductively draw energy from inductive power sources to be responsible for the efficiency of products from manufacturers that provide power from an inductive power source.

Thank you for consideration of our comments and proposal. Representatives of the WPC would welcome the opportunity to meet with you or your consultants to answer any questions or provide additional information.

Sincerely,
Daniel Teninty,P.E.
Daniel Teninty, P.E.
WA Lic # 31508
WPC Regulatory Working Group Chair

cc:
Harinder Singh via e-mail hsingh@energy.state.ca.us
Kenneth Rider via e-mail krider@energy.state.ca.us

[1] See Figure A – WPC Member Companies – November 2011

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Wireless Power

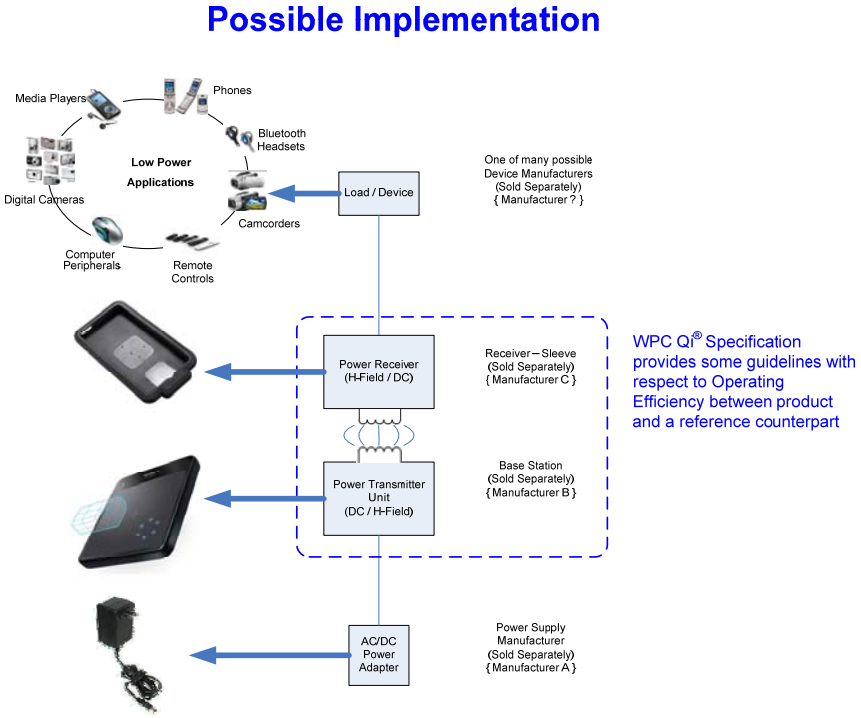
Wireless power, or inductive charging, is an emerging technology for which technology standards are currently evolving to provide for a common platform of interoperable products from many of the WPC's 100 member companies. Several member companies have or will soon have on the market, inductive power sources, either as stand alone products or as part of a power "hot spot" that is incorporated into surfaces of furniture or in automotive applications. Other WPC member companies, including several cell phone manufacturers, cellular service providers and cell phone technology providers, are or will soon be offering products that are enabled to receive power from inductive power sources. The proposed CEC rules certainly address inductive charging systems that are marketed as a complete system in one package by one manufacturer, but as written, do not address a method for the independent measurement of the electrical efficiency of the constituent parts of an inductive charging system where the constituent parts of the system are offered in separate packaging from different manufacturers.

We understand that because this is an emerging technology, the Commission has perhaps not yet had time to study it in detail. We are concerned, that the Commission might inadvertently take regulatory action that could have the unintended effect of stifling this new technology.

What we understand:

- Product categories are defined for Battery Chargers (BC)
- Minimum Efficiency Levels, charging power levels and maximum no load power consumptions are considered for each category and combined to determine the average power consumed in a 24 hour period.
- The only inductive products that are taken into account in the process are complete products such as toothbrushes. They are considered inductive battery chargers (class 1).

It is important to understand that the Qi standard allows for transmitters and receivers to be manufactured by different companies and to be sold separately, where the receiver is in control of the Power Transfer process. It is because of the WPC's **Qi** standard, that **Qi** compliant products are guaranteed to be interoperable. The WPC have previously provided a copy of Part 1 of this standard to aid in the further understanding of this technology and why it does not fit the existing classifications of inductive chargers as defined in the Docket No. 11-AAER-2.



- We can see the following possible approaches.
    - According to the CEC definition, a **Qi** compliant *Power Source* is not a battery charger because it does not contain charge control.
    - A **Qi** Power Source is not an external power supply either because it does not contain a DC output.
    - Therefore one could reason that a **Qi** Transmitter is exempt from the efficiency rules for battery chargers.

- OR as **the WPC proposes**, a new method for measuring efficiency is adopted for inductive power sources:
    - The question of how to address the independence of an inductive power source and any inductive power receiver in regards to overall system efficiency can be answered as described in Part 2 of the WPC's **Qi** System Description as the following excerpt shows:

System Description
Wireless Power Transfer Version 1.0.1 System Efficiency (informative)
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3 System Efficiency (informative)

The efficiency of a wireless power transfer System depends on the combination of the specific Power Transmitter and the specific Power Receiver that are used, as well as their alignment. Since the Power Transmitter and Power Receiver are subsystems of two separate pieces of end equipment that may originate from different manufacturers, the efficiency of the each can only be measured with a reference test fixture of the other subsystem. Below defines the procedure to measure the system efficiency with the help of the Test Power Transmitters and Test Power Receivers, which are defined in [Part 3].

3.1 Definition

Figure 3-1 shows a schematic diagram of a wireless power transfer System, consisting of a Power Transmitter coupled to a Power Receiver. As illustrated, represents the DC input power to the (inverter stage of the) Power Transmitter, and represents the amount of DC power that is consumed in the load, which is connected to the output terminals of the Power Receiver. The system efficiency is defined as:

$$\eta_{\text{system}} = \frac{P_{\text{OL}}}{P_{\text{in}}}.$$

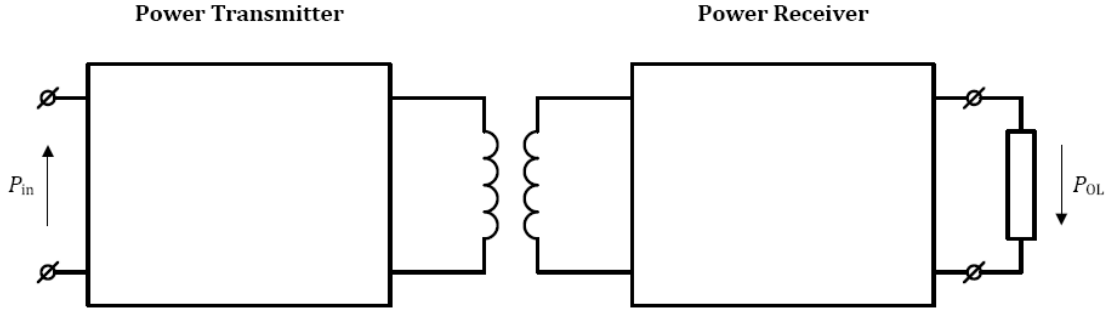

Figure 3-1: System efficiency

3.2 Power Transmitter efficiency

Table 3-1 indicates the recommended minimum system efficiency of a Power Transmitter, as measured with the set of Test Power Receivers defined in [Part 3]. It is also recommended that if the Power Transmitter is to be delivered with an AC adapter, the AC adapter should be Energy Star compliant.

Table 3-1: Recommended minimum system efficiency

Test Power Receiver	Load [Ω]	Minimum System Efficiency [%]
TPR#1A	3.5	55
TPR#1B	8.7	65
TPR#1C	10	50
TPR#1D	75	25
TPR#1E	5	55

The system efficiency of the Power Transmitter is measured using Test Power Receiver #1, as defined in [Part 3]. Measurement of the Power Transmitter efficiency shall proceed as follows:

- Place Test Power Receiver #1 on the Interface Surface of the Base Station—as guided by the Test Power Receiver's alignment aid, if necessary .
- Calculate the Power Transmitter efficiency η_{system} as:

$$\eta_{\text{system}} = \frac{P_{\text{OL}}}{P_{\text{in}}}.$$

- Repeat the above 2 steps 3 times, and calculate the average Power Transmitter efficiency η_{average} as:

$$\eta_{\text{average}} = \frac{1}{3}\sum_{i=1}^{3} \eta_{\text{system}}(i).$$

3.3 Power Receiver efficiency

Measurement of the Power Receiver efficiency shall proceed as follows:

- Place the Power Receiver (Mobile Device) under test on the Interface Surface of Test Power Transmitter #1 defined in [Part 3]—as guided by the Power Receiver's alignment aid, if necessary.
- The power delivered to the load of the Power Receiver must be predetermined or set to a known condition P_{OL}.
- Measure the amount of power P_{in} input of the Test Power Transmitter, at a power dissipation P_{OL} in the load of the Power Receiver under test.
- Calculate the system efficiency for the Power Receiver η_{system} as:

$$\eta_{\text{system}} = \frac{P_{\text{OL}}}{P_{\text{in}}}.$$

- Repeat the above 3 steps 3 times, and calculate the average Power Receiver efficiency η_{average} as:

$$\eta_{\text{average}} = \frac{1}{3}\sum_{i=1}^{3} \eta_{\text{system}}(i).$$

The one area where the Qi standard of the WPC has not yet developed a process for measuring efficiency is when there is no receiver device present. In this mode of operation the Power Source or Power Transmitter sends out a periodic enquiry of a few milliseconds to check if there is a valid load present. If not, then the Power Source is not activated. This cycle repeats until a valid receiver device is detected. This area is currently being explored with the goal of reaching a consensus among WPC members for a validated method to make this measurement.

Wireless Power Consortium

- 100 members and growing

A NEW GLOBAL STANDARD

WIRELESS POWER CONSORTIUM

Figure A – WPC Member Companies – November 2011