May 17, 2013

Environmental Protection Agency
ENERGY STAR® Program
Ms. Taylor Jantz-Sell
Lighting Program Manager
1200 Penn Avenue NW 6202J
Washington, D.C/ 20160

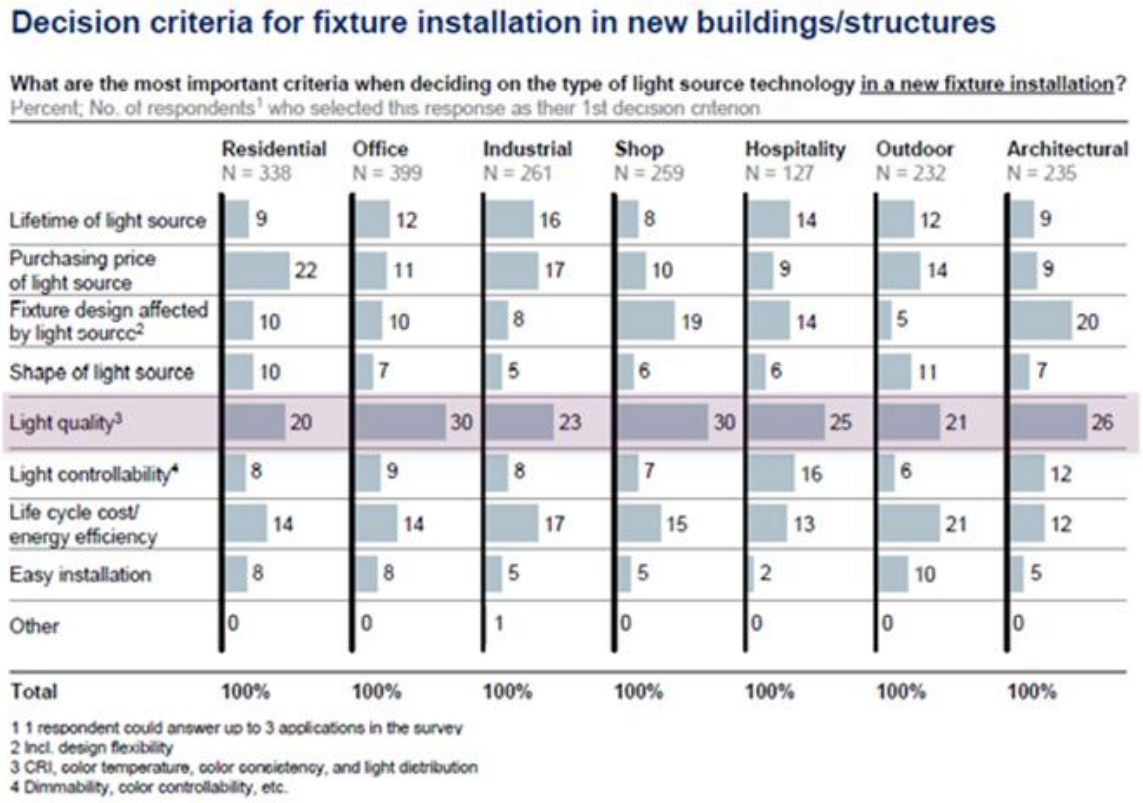
Subject: ENERGY STAR® Program Requirements Product Specification for Lamps (Light Bulbs)
Eligibility Criteria Version 1.0 Draft 4

Dear Ms. Jantz-Sell,

It is with great appreciation for EPA's efforts to advance energy savings through the adoption of energy efficient lamps, that we offer our comments on Draft 4 of the ENERGY STAR® specification for Lamps.

1. Section 3.1.4 Color Quality and 9.1 Luminous Efficacy: All Lamps

Soraa reaffirms and restates its previous comments related to the importance of color rendering for adoption of incandescent and halogen lamp alternatives. It has already been well documented that good quality of light is of prime interest for both consumers and commercial users alike (McKinsey, Lighting the Way, 2011).



It is well documented that LED performance (lumens per Watt, LPW) is inversely proportional to color rendering index (CRI) (see Figure 1). Ensuring equal opportunity and consumer choice in the marketplace for both modest (80<CRI<90) and high (CRI>=90) color quality lamps requires consideration for this, the most straightforward of which is to include a two-tiered table for LPW performance targets.

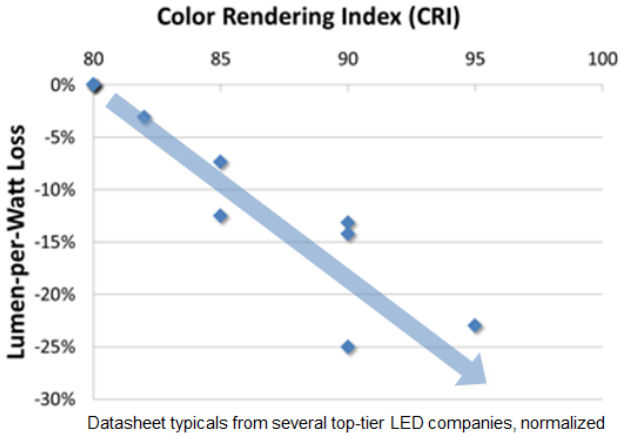


Figure 1: Luminous Efficacy comparison for phosphor-based warm white LED components between 80 and 95 CRI. Average LPW penalty is 1.5-2% per point of CRI

While ENERGY STAR® is not a mandatory standard; the EPA must recognize that for many practical reasons it has become a *de facto* standard for the lighting industry. In absence of a second high CRI tier, it is likely that, similar to the historical situation with CFL, the vast majority of lamp products will perform close to the lower boundaries of quality requirements as set in the ENERGY STAR® Lamp specification. This can be seen today from the color quality attributes of currently qualified ENERGY STAR® lamps (see Figure 2). Left unaddressed, this lack of high color quality lighting products will lead to a stalling in consumer adoption of energy efficient lighting technology, similar to what has been observed to date with CFLs (NEMA press release 4/1/13 – *What a Difference a Year Makes for Incandescent Lamps*).

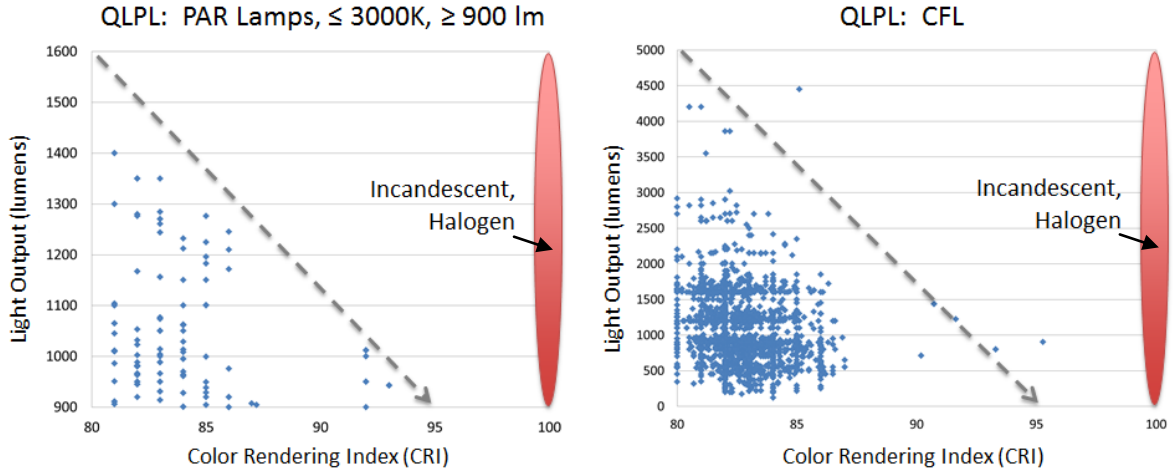


Figure 2: Light output vs. color rendering index (CRI) for both PAR Lamps (left) and CFL (right) from the ENERGY STAR® Qualified Lighting Product List (QLPL), compared to conventional light sources which consumers have become accustomed to over many decades (red ovals). The current standards drive the industry to predominantly produce modest color quality lamps which do not address the color quality barrier to adoption.

A second high CRI tier with differential efficacy requirement enables a level playing field for lamps of different color quality. Taking into account the inherent LPW trade-off as a function of CRI for phosphor converted white LEDs, a two tier system enables manufacturers to offer both options within a similar design envelope.

***Recommendation**:* Soraa proposes to keep the existing efficacy requirements currently proposed in draft 4, but raise the color quality to a minimum CRI 90. For lamps with CRI between 80 and 90, Soraa proposes to increase the luminous efficacy requirement by +5 lm/W across the board (see Table 1).

Adoption of this proposal will increase overall energy savings through enhanced adoption of high quality of light lamps as well as through more energy efficiency in lamps of modest light quality.

CURRENT

	Lamp Rated Wattage (Watts)	Minimum Lamp Efficacy (initial lm/W)
Omnidirectional	<15	55
	≥15	65
Directional	<20	40
	≥20	50
Decorative	<15	45
	15≤ W <25	50
	≥25	60

PROPOSED

		Minimum Lamp Efficacy (initial lm/W)	
	Lamp Rated Wattage (Watts)	80 ≤ CRI < 90	CRI > 90
Omnidirectional	<15	60	55
	≥15	70	65
Directional	<20	45	40
	≥20	55	50
Decorative	<15	50	45
	15≤ W <25	55	50
	≥25	65	60

Table 1: Proposed luminous efficacy for two color-rendering tiers

2. Section 12. Dimming Performance: All Lamps Marketed as Dimmable

The proposed test methods do not provide any guidance on dimmer performance testing for non-self-ballasted lamps (i.e., products that require a transformer). For low voltage lamps, the proposed three dimmer types (Single (Forward) Phase Shift; Double Phase Shift, or Electronic Low Voltage/ Reverse Phase), can only be evaluated in meaningful ways when the right transformer type is paired with the dimmer. Low voltage lamps are also outside the scope of alternative standards for dimmability of LED lamps like SSL 7A -2013.

***Recommendation**:* Lamps that operate with an external transformer (such as 12V MR16) are excluded from section 12.

We thank you for the opportunity to present our ideas and comments and look forward to provide further clarification depending on your needs.

Sincerely,

Mike Krames
CTO
Soraa Inc.