



California Energy Commission

DOCKETED

12-BSTD-3

TN # 67978

OCT. 23 2012

To: The California Energy Commission, Dockets Unit

From: Jim Gaines, Philips Lighting

Subject: Comments on the California Quality LED Lamp Specification (12-BSTD-03)

Date: 23 October, 2012

Philips understands and shares in your desire to avoid a repeat of the slow adoption of CFLs. We understand the argument that an over-emphasis on cost caused CFL performance characteristics to be too low, leading to customer dissatisfaction with CFL's. We suspect that manufacturers may also have been misled by the large rebates offered for poor quality lamps. (If a manufacturer sells a large volume of a certain product, that manufacturer will assume that the customer likes it, without necessarily considering whether the customer was actually a utility that was not involved in customer satisfaction at the end application.) We also understand that many of the CFLs sold and rebated in CA were not even Energy Star, and had CRIs around 65. So basing the CA performance specification on dissatisfaction with Energy Star is not correct.

In Philips' opinion, an over-emphasis on performance will be as detrimental as an overemphasis on cost. An overemphasis on cost leads to poor light quality and dissatisfied customers. Similarly, an overemphasis on performance will lead to high cost, and dissatisfied customers. We believe that the best approach is one that is sensitive to both cost and performance. This will also make most effective use of limited rebate budgets. We believe that the Energy Star specification is a reasonable approach that meets both requirements: reasonable cost and good performance.

If the CA specification is narrow, then the effect will be to remove some of the benefits of SSL technology, such as the ability to select lamps with different CCTs (different CRI/different efficacy/different cost/etc), based on the customer's application. Although the standard is, in principle, "voluntary", if the rebate is large, it is effectively not voluntary, because other lamps cannot compete. If the rebate is substantial, then lamps that do not meet the standard, but might provide other benefits, will effectively be excluded, because customers will choose the cheaper (with rebate) lamp for all applications. Another consequence is that the consumer will remain ignorant of the possibilities of SSL. If there is only one realistic choice, the consumer will have no motivation to learn what the possible variations are and what they mean for his/her applications.

General message from Philips Lighting: CA should implement the Energy Star specs in the CA performance criteria. Then, CA should do the comprehensive studies, as suggested by Michael Siminovitch, to see what the minimum performance parameters for widespread customer adoption *really* are. Only after the minimum performance parameters are determined should any changes be made to the performance standard. If too-high

standards are enacted, CA ironically risks stunting the adoption of SSL, by requiring unnecessarily high performance specifications and artificially forcing the price to be too high.

Beyond the CEC and its consultants, who is concluding that Energy Star is not good enough for California consumers? At what point did the CEC give up on simply using the Energy Star specification as is, (and trying to work directly with EPA on improving the Energy Star specification, as needed)?

Below I address specifications that appear in the draft issued for the meeting on October 11. Difficult specifications, that will cause increased cost and are unlikely to provide benefits in consumer approval include:

- *CRI 90^[1], R9>0 at 25 and 55°C.* High CRI phosphor-converted LEDs are unavoidably lower efficacy (10-15% efficacy decrease to go from 80 to 90 CRI). High-CRI lamps will require more complicated phosphors, more LEDs, higher-power electronics, more heatsinking and higher cost for a given flux. Another approach for high CRI is to use two color channels (as Cree TrueWhite or Philips L Prize technology do), but this requires associated driving electronics for two channels, resulting in added cost (both for the LEDs and the electronics) and worsening color consistency. We advocate CRI 80.
- *4 step McAdam ellipse at time 0, centered on 2700 or 3000K at both 25 and 55°C.* The Energy Star specification is for 7 McAdam steps. We can support decreasing this value to 5 McAdam steps, but no further at this time.
- *2 McAdam steps from average, both at 25 and 55°C.* This will require very tight binning of the LEDs, which will increase cost for the LED manufacturer, and possibly reduce yield as well. We advocate eliminating this specification.
- *Dimming.* At least 3 dimmers listed ON the package. Packaging space is very tight and there is very little room to add the necessary text. Consumers will not know which dimmer they have at home, to compare to the list anyway. We prefer to maintain compatibility information with Internet lists. “Without flicker or noise” is not defined.
- *Power factor ≥ 0.9 .* This has no influence on consumer adoption. There is no evidence that high power factor is needed for these low power lamps. Discussions on this topic are going on in IEEE (and other) workgroups now. We suggest talking to Energy Solutions about their LED Accelerator program, where excessively strict PF and THD specifications in some tiers have resulted in very few qualified lamps in these tiers. This spec was not in the previous draft. Michael Siminovitch also has made statements before (and quoted studies) that CFLs (with their much higher THD and lower PF (0.5))

^[1] The draft of the appendices for Title 20 specifies that CRI should be 90 or above. We do not think this specification is justified, either.

have not caused disturbances in the grid. We see no reason to set the PF specification so tight.

- *Extra floodlamp specs.* What benefit do these specs provide?
- *None of Michael Siminovitch's points are addressed in the future work sections. In addition, Appendix C is empty!* Are there no plans now to do the consumer studies to determine whether the above specifications are really needed?

The specifications are, in general, possible to reach (as the Philips L Prize lamp demonstrates - except for the power factor), but there is no good evidence that the customer requires them. The detriment of increased cost is likely to far outweigh the benefit from performance improvements that are so slight that they will provide no benefit to the great majority of end users.

We do approve of some changes since the earlier draft:

- *Color change over life has been removed*
- *Lifetime requirement have been shortened to 25000 hours.* Improved, but why is there a Commercial grade now, for this residential specification, with longer lifetime requirements?
- *Lifetime test shortened from 10,000 to 3000 hours.*
- *Color shift when dimming has been removed*
- *Omnidirectional light distribution changed to be the same as Energy Star.*

With the exception of the color error at time 0, where we believe that 7 McAdam steps may indeed be too large, we believe that the CA specification should use the Energy Star specifications for integrated lamps. This will maintain cost at a reasonable level, performance at a very good level and foster customer adoption.

Philips' experience with the L Prize lamp and its lower-cost EnduraLED alternative, shows that customers are adopting the lower cost alternative at much greater rates than the high-performance L Prize lamp, despite various rebates on both lamps. Philips has sold about 10 times as many EnduraLED lamps as L Prize lamps during the time both products were on the shelves. Our practical experience with these two lamps shows that the customer is happy with the performance of the EnduraLED lamp (which meets Energy Star specifications) and is not satisfied with the price of the L Prize lamp. It is our strong belief that the CA bulb specification, which is closer to the L Prize than to the EnduraLED lamp, is much too strict and will result in lower adoption rates than the Energy Star specification. We are open to further discussion on the comparison between L Prize and EnduraLED product performance in the marketplace and would be happy to provide more details in a private setting to elaborate on our position.

Publicly available evidence includes:

A recent Consumer Reports article

(<http://www.consumerreports.org/cro/resources/streaming/PDFs/Consumer+Reports+Lightbulb+Review+Facebook.pdf>) provides additional evidence that performance of Energy Star LED retrofit bulbs is attractive to consumers, but the price is too high. (“Staffers try, and like, LEDs.... But staffers said they wouldn’t buy them until prices drop.”)

There is also a Popular Mechanics review of SSL products (Sept, 2011), where some CRI 80 products scored higher than CRI 90 products. The highest scoring lamp had CRI 80.

LRC’s ASSIST activity recommends CRI 80 for retail merchandising applications (a demanding application for color accuracy). They also recommend that consideration be given to a new parameter (Gamut Area Index (GAI)), for color accuracy considerations in merchandising applications. (See “Guide to Light and Color in Retail Merchandising” ASSIST recommends, Volume 8, Issue 1, March 2010, and “Recommendations for Specifying Color Properties of Light Sources for Retail Merchandising”, ASSIST recommends, Volume 8, Issue 2, March 2010.) Points from the article include:

- Specification of CRI alone may be insufficient in some applications.
- CRI 80 is sufficient if GAI is also sufficiently high



Left: 10W L Prize lamp. Right: 12.5W EnduraLED omnidirectional lamp