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Comments to 2016 Title 24 Codes & Standards Enhancement (CASE) Proposal

I am an independent marketing consultant working in the lighting, energy, and AEC sectors. From 2011-2013 I was the Marketing manager for Soraa, an LED startup that pioneered LED lamps based on a new substrate technology, GaN on GaN. Before that I was the Director of Business Development for Integral Group in Oakland, a leading deep-green engineering and building sciences firm. I am currently consulting to lighting designers and manufacturers, am active in the San Francisco Section of IES, and am on the Lighting Quality Committee for the International Association of Lighting Designers (IALD).

This commentary follows the basic outline of the May 15, 2014 presentation on the CASE proposal for Residential lighting prepared by David Douglass-Jaimes of TRC and Michael McGaraghan of Energy Solutions. IN this commentary I speak for lighting designers and manufacturers, from whom I have independently solicited feedback on the proposal. I also rely on many years of experience in marketing and coordinating energy efficiency programs and design projects and working with a broad range of professionals in the lighting and architecture, engineering, and construction industries.

Barriers to Adoption of Efficient Lighting

Negative Image

LEDs do appear to be suffering temporarily from bad "PR"- specifically a negative association with low quality products, similar to the public's association with CFLs and their subsequent failure to be widely adopted, at least in residential markets. However there are fundamental differences in the two technologies and the way they are being adopted. LEDS, especially in the last year, have made significant advances in quality and low price. As an industry insider, I am more aware of the improvements in quality than an average consumer, but it's safe to say that these trends are moving more rapidly than is generally realized. Also, negative public sentiment as evidenced by the Wall Street Journal article represents in our view an extreme end of the spectrum, and is based on earlier lower quality product. Many consumers who have purchased and successfully installed LEDS (granted this can still be quite challenging) report high levels of satisfaction with light quality, controllability and overall value.

Inflexible and Unfamiliar Sources

Unfortunately, lighting as a product category has suffered from a notable lack of technical innovation, and many lamp and fixture types and especially base and connection types show designs that are far from optimal. It would be nice if lighting had evolved more like computing technology in general, where connection types change relatively frequently and often improve considerably in the process- take the USB format for instance. In lighting, most lamp and connector types were suitable for incandescent and fluorescent technology that is now becoming eclipsed by LEDs. Since LEDs are primarily a directional source, lamp forms that take unidirectional incandescent burners and direct them by parabolic reflectors are not the most efficient design for LEDS.

Aside from the difficulty in changing and standardizing lamp and connector types, a critically important design parameter that is being ignored or obfuscated by industry and government groups is that of ease of use for consumers. In the mid-term, Edison based lamps will represent perhaps the best standard for lamp types. Proliferation of new connection and lamp types should serve mainly to improve design, energy efficiency, and flexibility, not mainly to lock up proprietary market domination by a small group of market players.

Higher Costs for High Efficacy

Complaints about high costs in LED are increasingly becoming irrelevant as the technology continues to develop rapidly. In reality, there will be no significant issues with producing low cost high, quality, high efficacy sources and fixtures within perhaps even a five year window. It's also important to include high CRI sources within the scenario of reduced costs. Most people don't realize that in the last 6 months even, manufacturers have risen to the challenge of producing high CRI LEDs at low cost, as they are aware that the market wants them. Manufacturers used to complain that increasing efficiency, CRI, and lifetime, was more

costly, and there is considerable basis in fact for these claims, but more and more they are adding higher quality and efficiency to their products at affordable process, driven by market demand.

Quality a Key Driver for Adoption

It's increasingly well understood that no one wants to repeat the history of CFLs- that their low quality was mainly responsible for low adoption rates. Yet without a tangible and specific goal of high CRI (>90) requirements for residential lighting, adoption of LEDs will be compromised. Industry is willing and able to provide high quality, high efficacy products and indeed is already beginning to do so. Standards that prescribe only "good enough" minimum CRI (>80), as proposed by EPA, will have a negative effect on the market, as they will continue to incentivize offering low quality light to consumers and specifiers, who will reject it as they did with CFLs.

Lifetime

Lifetime has been oversold considerably with LEDs, as frequently it's the only point of differentiation some manufacturers can claim. The biggest problem with really long lifetime claims or requirements is that it's impossible to predict what the lighting, energy and electrical infrastructure will be like in 15 or 20 years, or even 5 years. Many manufacturers claim lifetimes of 250,000 today- 28 years at a full 24/7 operation. Electrical components like drivers are nowhere near this level of lifetime performance, for instance. Lifetimes of 50,000 hours or more, while certainly being a benefit for installations in industrial and commercial applications, are probably completely irrelevant for most applications, as we might assume that every component in the infrastructure- wires, drivers, switches, storage, controls, fixtures, and lamps- is likely to undergo significant improvement in efficiency or flexibility or both, and will be replaced long before the long lifetime of one component, lamps, is reached. Changing lifetime expectations to more realistic levels will be difficult for consumers to accept, as they only see that longer is better, but manufacturers can gain some short term cost reductions by reducing product lifetimes.

Base Type Requirements

Current socket requirements are a big hurdle for moving forward and are also making things a lot more expensive for a manufacturer of energy efficient bulbs. Existing lamp base types (GU5.3, E26, GU10, etc .) obviously facilitate a more rapid replacement of incandescent and fluorescent sources. But today these cannot be accounted for as energy efficient sockets. Lamps that meet the voluntary CEC LED lamp quality specification, cannot be used in title 24. Manufacturers are forced to develop different sources for Title 24 than for CEC lamp quality spec.

If we could use existing base types, it present benefits on both sides: new construction and building upgrades can be done with fixtures with standard sockets, which can be very cost effective because of their widespread use. At the same time, if retrofit (LED) lamps can be used in new construction, it increases their volume, which helps reduce their cost.

With respect to the restriction of which light sources can be used, title 24 is currently leaning heavily towards making it as difficult and unattractive as possible to replace sources after inspection. Future revisions should focus on disincentivizing alterations after inspection. Why would people want to replace new LED sources which are significantly better than previous sources in all relevant attributes: dimming, light quality, energy efficiency and lifetime? If good quality is part of the initial installation, concerns about post inspection changes become irrelevant. In fact, today it is difficult to achieve good quality with title 24 (steering towards pin based CFL, big GU24 sockets). For domestic use, it could be more effective to require for example a power restriction in the initial switch or require demand response control for a certain power level.

New Opportunities

LED technology offers unprecedented improvements in flexibility, efficiency, and light quality over incumbent technologies. Apart from the temporary but certainly complex difficulties in transitioning to an entirely new infrastructure and technology for lighting, in reality LEDs offer not simply parity with incandescent and fluorescent sources but lighting that is significantly better than either in all ways. The market is already beginning to realize this- regulatory efforts should not stand in the way of this but should incentivize improvements in lighting quality in order to further adoption.

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