

DOCKETED

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Objections to the Proposed Rule Docket Number 15-AAER-6

Additional submitted attachment is included below.

November 30, 2015

NOTICE OF PROPOSED ACTION
PROPOSED AMENDMENTS TO APPLIANCE
EFFICIENCY REGULATIONS
California Code of Regulations, Title 20,
Sections 1601 through 1609
CALIFORNIA ENERGY COMMISSION
Docket Number 15-AAER-6

Comments by Francis Rubinstein

I write these comments to object to the proposed Amendments to Appliance Efficiency Regulations referenced above. My comments are submitted as a California taxpayer; I do not purport to speak for the Lawrence Berkeley Lab. However, my comments are informed by over 34 years' experience as a Staff Scientist in the Lighting Group at Lawrence Berkeley National Laboratory as well as an individual who has worked, on a pro bono basis, with CEC Staff on California Title 24 rule making in the past.

The purpose of the regulations in Title 20 is to encourage the use of appropriate energy-efficient products in the residential and commercial markets. I submit the proposed revisions will have the opposite effect. By limiting customer choice, raising operating costs, and raising the price of LED lamps to the consumer, the proposed actions may cause many consumers to avoid LEDs altogether and fall back on poorer, less efficient products for most of their home lighting needs.

I object specifically to two major portions of the Proposed Amendments:

1. Excessively high requirements for the allowable Color Rendering Index (CRI), which will severely limit the availability of more efficient and less costly LED lamps that would be adequate to the purpose.
2. The requirement for an omni-directional distribution for general service LED lamps

1. Objections to the CRI and efficacy requirements:

A. Staff has framed the main efficacy requirement by an “equation” that is mathematically incorrect. Staff’s formulation:

Lamp efficacy (lumens/watt) + 2.3 * CRI (unitless) >= 277 (units undefined!)

doesn’t survive engineering unit analysis. One cannot take a physical quantity such as lamp efficacy (which has units of lumens/watt) and “add” it to a term such as CRI (which is a pseudo-efficiency without units) and obtain a result that is technically meaningful.

Because the “equation” is technically incorrect, it will not (and should not) survive legal challenge.

B. Although the above could be re-formulated to be technically correct (similar to the NRDC’s proposed Table 2, which I do support both in formulation and value), I object to the high bar on CRI and efficacy that Staff’s “formulation” selectively imposes on lamps of modest CRI (80-85). To illustrate this, I take two LED lamps: one with a higher CRI (92) that just passes the CEC proposed efficacy limit and a second LED lamp of modest CRI that passes the efficacy limit but just fails the CRI minimum.

Lamp	Efficacy (l/w)	Light Output (lumens)	Power (watts)	CRI	kWh consumed over life	Lamp operating cost (\$/lamp)	Initial Lamp Cost (\$/lamp)	Lifecycle Cost (\$/lamp)
High CRI lamp (pass)	65	800	12.3	92	123	\$16	\$12	\$28
Medium CRI lamp (fail)	88	800	9.1	81	91	\$12	\$10	\$22

As shown in the above hypothetical example, the consumer might be obliged to purchase a high CRI that would use 35% MORE energy and cost 35% more to operate than a medium CRI lamp that would be adequate to the consumer’s purposes. The Staff has not presented any persuasive evidence that a modest increase in CRI is worth the added cost of the lamp, the increased operating costs to the consumer or the increased energy footprint for the State. Given the imperatives of California’s carbon and energy reduction targets, it is not in the interest of the State to steer consumers to premium CRI

lamps, when a cheaper and more efficient lamp that is adequate to the consumer's needs is available.

C. In attempting to justify the requirement for high CRI, Staff asserts that:

"The vast majority of lamps covered under the proposed color score regulation are used in residential buildings. Several residential room types demand color accuracy, including the kitchen and bathroom, where grooming and food preparation/consumption occur".

Even if one accepts Staff's debatable assertion that grooming in bathrooms and food preparation in kitchens REQUIRES high CRI lighting, kitchens and bathrooms account for less than 30% of the bulbs in a typical home. According to Navigant's Lighting Market Characterization Report 2010, more than 70% of the light bulbs in a typical house are not in the kitchen or bathrooms. **Staff has not presented any evidence that high CRI lighting is necessary for the majority of light bulbs in a typical residence.**

Simply put, high color rendering is not required in most applications and should not be imposed as a restriction by the State. Since modest CRI lamps are more energy-efficient and less expensive to operate, the consumer's choice of this type of lamp should not be arbitrarily restricted.

D. The Staff's additional requirements on CRI, which not only requires CRI ≥ 82 , but also requires all the individual CRI components to each be greater than 72%, will greatly reduce the number of lamps available to the consumer all in the name of

increased color fidelity. Staff's actions will reduce consumer's choice of less expensive LED lamps and as a result will force consumers to consider premium lamps that they cannot afford. Furthermore, the additional CRI component requirements represent an additional cost burden to the manufacturers with regards to compliance. Manufacturers already have test requirements to comply with existing Energy Star requirements. Staff has not presented convincing evidence that the additional cost burden to the manufacturers is justified. If the testing requirements are unnecessarily burdensome, manufacturers will simply not market their products in California. Consumers will be forced to choose cheaper options such as CFLs, which do not perform nearly as well as LEDs but will not be regulated by T20, or energy-wasteful appliance lamps, which are allowed as exceptions to Federal rules. Alternatively, consumers will simply skirt the California retail market altogether and buy their light bulbs on Amazon.

2. Objections to the omni-directional performance requirement:

The Staff recommendation imposes an omni-directional luminous distribution for all general service lamps. There are a huge variety of lamp shapes and types available in the residential market and Staff has not demonstrated that omni-directionality is necessary in all cases. In many instances, it is simply important that there be light, not light of a particular distribution (or spectral distribution). For example, it is far more important for safety purposes that there be a functioning light over a stairwell than that the light have a

particular distribution. If consumers have their choices restricted, they may delay replacing failed lamps, which in some cases would result in a safety hazard. Lamp luminous distribution is an aesthetic consideration and it is not the business of the State to impose a purely aesthetic requirement on any product.

In summary, I strongly recommend that Staff abandon their proposal to legislate high color fidelity at the expense of energy efficiency, consumer choice and cost and use instead the alternative proposed by the NRDC. The NRDC recommendations would encourage the use of the most energy-efficient LEDs while allowing consumers to purchase more expensive, higher CRI lamps if they so desire.

Respectfully submitted,



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