

CALIFORNIA ENERGY COMMISSION

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September 4, 2015

Mr. Peter Banwell
ENERGY STAR Program
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, MC 6202J
Washington, DC 20460
Via e-mail: Lighting@energystar.gov

RE: CALIFORNIA ENERGY COMMISSION'S COMMENTS ON ENERGY STAR
LAMPS SPECIFICATION 2.0, DRAFT 3

Dear Mr. Banwell:

Thank you for the opportunity to comment on the U.S. Environmental Protection Agency's (U.S. EPA) ENERGY STAR Program Lamps Specification 2.0, Draft 3. The California Energy Commission (Energy Commission) has taken an active interest in the U.S. EPA's efforts to improve the ENERGY STAR Lamps Specification 2.0, particularly as the Energy Commission has adopted new high efficacy Light-Emitting Diode (LED) specifications for its 2016 Building Energy Efficiency Standards and is in the middle of a rulemaking to establish Tier 1 and Tier 2 minimum efficiency standards for general service LEDs that are sold or offered for sale in California.

The Energy Commission supports updating the Lamps Specification, but we are deeply concerned that Draft 3 again fails to promote the higher efficacy and lower life-cycle-cost lighting products. This is contrary to the stated goals of the ENERGY STAR program, harms the ENERGY STAR brand, and sets what should be market leading efficiency targets below minimum efficiency standards under consideration in California and at the federal level.

Therefore, the Energy Commission recommends that U.S. EPA increase the efficacy requirements by, at minimum, harmonizing with California's draft LED Tier 1 standards.¹ The Energy Commission also continues to recommend that U.S. EPA harmonize with

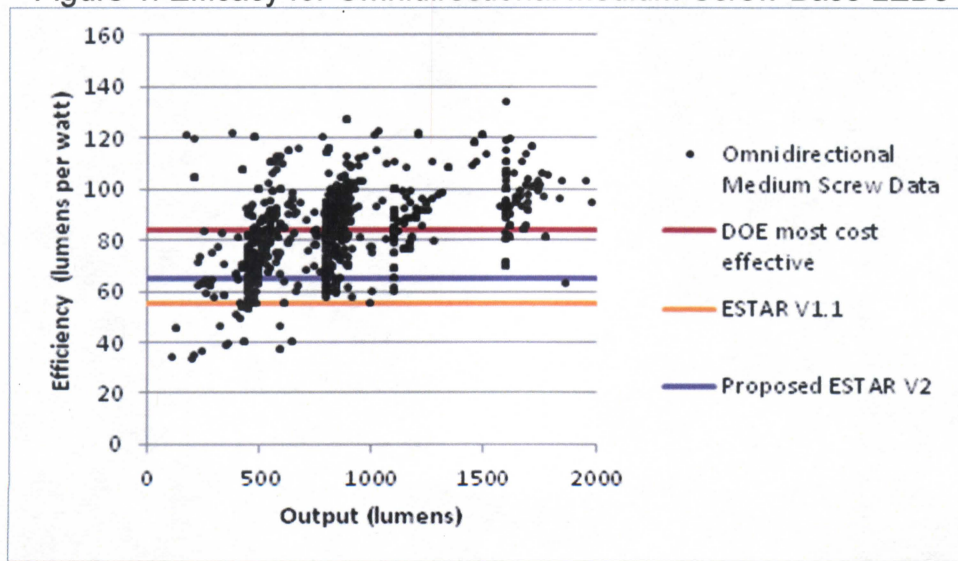
¹ The Energy Commission recently published its proposed standards as part of its Standardized Regulatory Impact Assessment, available at:
http://dof.ca.gov/research/economic_research_unit/SB617_regulation/Major_Regulations/documents/SRIA-CEC-LED-regs.pdf.

the state's Voluntary California Quality LED Lamp Specification with respect to color rendering, power factor, dimmability, correlated color temperature, and flicker.²

I. Draft 3 fails to identify the highest efficiency products.

The primary purpose of the ENERGY STAR program under the Energy Policy and Conservation Act and its amendments is to reduce energy consumption by identifying (with the ENERGY STAR label) energy-efficient products that meet the highest energy conservation standards.³ Indeed, U.S. EPA's stated goal in revising the ENERGY STAR Lamp Specification is to increase the efficacy requirements. Yet for omnidirectional lamps, Draft 3 proposes to set the efficacy at 65 lumens per watt, a level that in practice reflects little if any improvements for LEDs today, let alone LEDs one year from now when this Specification is expected to go into effect. As demonstrated in Figure 1 below, 65 lumens per watt is actually *below* the average efficacy for omnidirectional LEDs. Choosing "below average" as the minimum efficacy level fails to achieve the U.S. EPA's number one goal – to identify energy-efficient products in the lighting market.

Figure 1: Efficacy for Omnidirectional Medium-Screw-Base LEDs



Source: California Energy Commission, using ENERGY STAR and Lighting Facts datasets.

² Because these issues are explained in detail in the Energy Commission's May 14, 2015 Comments to U.S. EPA on Draft 2, they are not reiterated here.

³ 42 U.S.C. § 6294a.

A. Retaining the ENERGY STAR label for Compact Fluorescent Lamps (CFLs) leaves ENERGY STAR behind efficiency trends.

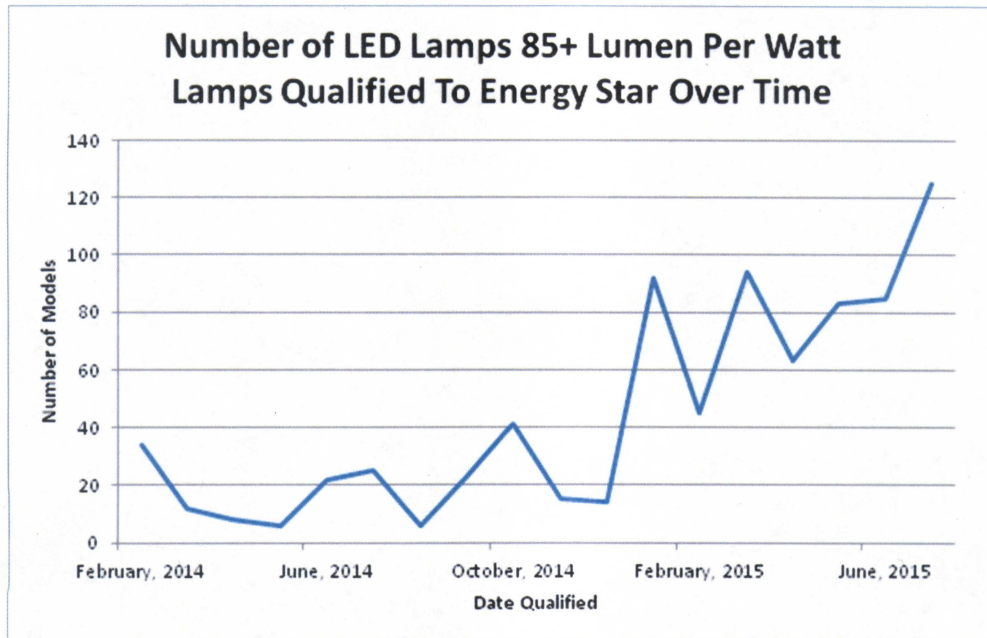
The U.S. EPA has stated that it is not increasing efficacy because some stakeholders wish to retain the ENERGY STAR label for less efficient and less environmentally preferred CFLs. This is a very laggard approach to a market that is quickly evolving. The ENERGY STAR program cannot meet its goals and intended purposes by setting its specification to the least common denominator.

ENERGY STAR is intended to be a forward looking program that responds to efficiency trends in the market. Recent market trends show that CFLs are decreasing in market share, yielding to more efficient (and often better quality) LED lamps. The National Electrical Manufacturers Association's (NEMA) shipment indexes show that year-over-year CFL shipments declined by 9.4 percent, while LED year-over-year shipments increased by 153.6 percent.⁴ With this marked decrease in CFL shipments, it is unclear that manufacturers would even make additional investments or attempts to improve CFLs, with or without support from ENERGY STAR.

Moreover, CFLs are a mature technology with fewer untapped opportunities for improvements in efficacy. In contrast, LEDs are a relatively new technology that is making significant improvement in both efficacy and quality over short periods of time. Indeed, the number of LED models certified to the ENERGY STAR program that have an efficacy above 85 lumens per watt has sharply increased in the last year, indicating that the market is trending toward highly efficacious LEDs and away from low efficacies.

⁴ NEMA, First Quarter Proves to be a Mixed Bag for Consumer Lamp Indexes (May 28, 2015), <http://www.nema.org/news/Pages/First-Quarter-Proves-to-be-a-Mixed-Bag-for-Consumer-Lamp-Indexes.aspx>.

Figure 2. Number of LED lamps above 85 lumens per watt qualified to ENERGY STAR



Source: California Energy Commission, based on the ENERGY STAR dataset

The U.S. EPA needs to stay ahead of these market trends by promoting highly efficient LEDs. An ENERGY STAR lagging specification slows the transition away from lower efficiency products, like CFLs, by having its label increase the competitiveness of these products. This is contrary to the fundamental purpose of the ENERGY STAR Program.

B. Setting a lower efficacy bar is not technology neutral.

The U.S. EPA has suggested that the low efficacy levels are necessary to ensure that the specification remains technology neutral by providing the ENERGY STAR label to both CFLs and LEDs. This is not what technology neutrality means. A technology-neutral approach would set appropriate efficacy standards without regard to whether CFLs can meet them, because it would not be sensitive to them as a separate class of products. "Technology-neutral" means evaluating the data without bias towards a particular technology. The U.S. EPA has done the reverse and evaluated the data to protect and preserve both CFL and LED technologies.

In some cases, as where a technology provides additional service, technology-specific standards or exemptions may be appropriate. Here, instead, U.S. EPA is reducing its efficacy levels to allow CFLs to continue to compete with LEDs, even as the specification provides CFLs unwarranted advantages over LEDs by allowing CFLs to

have attributes unfavorable to consumers: negative R9 values, poor color maintenance, and shorter lifetimes. CFL performance is almost universally worse than LED performance, and there are no special positive considerations for keeping CFLs in the program. Therefore, to be consistent with its goals, the ENERGY STAR Program should increase its efficacy targets to push the most efficient products, without regard to which technologies they employ.

II. Draft 3's proposed levels harm the ENERGY STAR brand and fall below levels under consideration for mandatory standards in California and at the U.S. Department of Energy.

With its rulemaking on general service LED lamps, California intends to set standards for general service LEDs at higher efficacy levels than proposed in Draft 3. California's appliance efficiency standards have also had a history of driving the national market, in part because other states frequently adopt California's standards, and in part because California is such a significant part of the market with roughly one eighth of the country's population. This was most recently the case with the Energy Commission's standards for battery charger systems.⁵ Manufacturers have been clear that in the case of LED lamp manufacturing, much like battery chargers, they are likely to make a single set of product lines for North America. This means the Energy Commission's efficacy standards will effectively set the national standard until the U.S. Department of Energy (U.S. DOE) adopts standards.

ENERGY STAR's proposal to set a low efficacy level will do two harmful things: (1) it harms the ENERGY STAR brand in California by making it useless for distinguishing between higher efficacy LEDs and lower efficacy CFLs, and (2) it keeps the ENERGY STAR program from being a functional driver of efficiency ahead of mandatory standards.

A. The ENERGY STAR brand will not help consumers to identify efficient lamps in California.

The Energy Commission is currently developing two tiers of minimum efficiency standards for general service LEDs. Once adopted, Tier 1 would go into effect January 1, 2017, and Tier 2 would go into effect January 1, 2019. Based on the Energy Commission's analysis, these standards are both cost-effective and technically feasible, and will achieve significant energy savings in the state. In addition, California will implement the 45 lumens-per-watt backstop in the Energy Independence and Security

⁵ 80 Fed. Reg. 52932 (Sept. 1, 2015) (Energy Conservation Standards for Battery Chargers; *Supplemental notice of proposed rulemaking*).

Act of 2007 to remove most filament options as of January 1, 2018, a little over one year into the implementation of Lamps Specification 2.0.

In the past, the ENERGY STAR programs have supported energy efficiency efforts in California by helping consumers choose the most efficient products. Yet the conservative efficacy levels chosen in Draft 3 will not support California consumers at a time when the ENERGY STAR label for energy efficient lighting products is more important than ever. With the 45-lumens-per-watt mandatory standard in place in 2018, California consumers will only be choosing between CFLs and LEDs. California's proposed Tier 1 LED standards will eliminate lower efficiency ENERGY STAR LEDs from the California market. This means that the lowest efficacy medium screw base omnidirectional lamps available in the California market will be CFLs bearing the ENERGY STAR label. When the ENERGY STAR label appears on the lowest efficacy products in the market, the label has lost its value as an indicator of efficiency and energy savings, distorting the market and causing confusion among consumers. In essence, this constitutes faulty program design: EPA is, perhaps unwittingly, about to invert normal, effective market development program sequencing by subordinating ENERGY STAR's voluntary approach to a mandatory standard.

B. The proposed ENERGY STAR levels will not serve a valuable role in driving the market toward more efficient products ahead of mandatory standards.

The ENERGY STAR program has historically helped prepare the market for mandatory standards by incentivizing voluntary improvements in efficiency. The dynamic between mandatory minimum efficiency standards and voluntary market leading programs has greatly advanced efficiency when used together. Both California and the U.S. DOE have had some successes in the past where voluntary programs with incentives preceded mandatory standards. Yet Draft 3 fails to push the market toward any improvements in efficiency at the critical point when both California and the U.S. DOE are considering minimum energy efficiency standards for general service lamps. While the U.S. DOE's standards are not anticipated to take effect until January 1, 2020, it is important that the U.S. EPA set a specification now that moves the market toward the most cost-effective U.S. DOE levels (Candidate Standard Level 5⁶).

Specification 2.0 coincides with the U.S. DOE rulemaking that is expected and statutorily required to be completed by January 1, 2017. The time sensitive and key

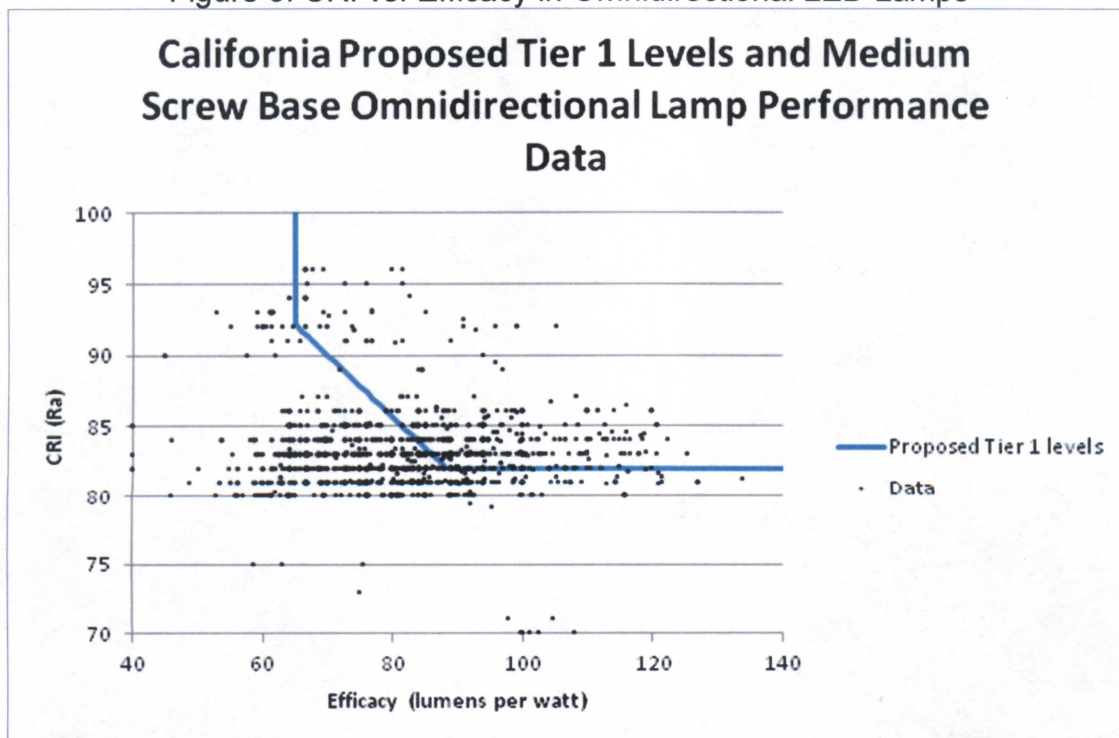
⁶ See U.S. Department of Energy, Preliminary Technical Support Document: Energy Efficiency Program for Consumer Products and Commercial and Industrial Equipment: General Service Lamps (Dec. 1, 2014), available at <http://www.regulations.gov/#!documentDetail;D=EERE-2013-BT-STD-0051-0022>.

decision for the U.S. EPA in Specification 2.0 is whether to provide three years of support for more efficient products by setting a level that allows consumers to identify the most efficient products now, or instead to continue down the path of setting a conservative specification that will need significant revision simply to catch up with the bare minimums needed to even enter the market. The Energy Commission recommends that the U.S. EPA continue to lead the national market in efficiency rather than wait for mandatory standards to take the lead and then try to catch up with them.

III. The U.S. EPA should adopt efficacy levels that are at least as stringent as the Energy Commission's draft Tier 1 standards.

The Energy Commission believes that some tradeoff between efficacy and color rendering index (CRI) may be appropriate for a near-term revision to the specification, with later revisions continuing to increase efficacy and CRI as LED lamps improve in both areas. For its own rulemaking analysis, the Energy Commission mapped ENERGY STAR and Lighting Facts data on efficacy and CRI to determine the best approach for a standard that permits a tradeoff between the two. The results are shown in Figure 3.

Figure 3: CRI vs. Efficacy in Omnidirectional LED Lamps



Source: California Energy Commission, using ENERGY STAR and Lighting Facts Datasets

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The Energy Commission is proposing its Tier 1 levels as shown in the blue line to allow for appropriate tradeoffs that permit high quality without sacrificing energy efficiency. The line drawn above can be represented by the following equation to capture these levels for general service LEDs:

$$2.3 \times CRI + Efficiency \geq 277 \text{ and } CRI \geq 82, \quad Efficiency \geq 65 \text{ lpw}$$

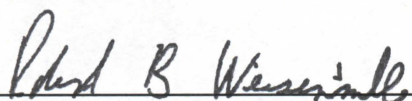
This equation would allow for lower efficacy lamps at 65 lumens per watt if they have a CRI of just over 92; conversely, lamps with a CRI of 82 (the lowest level permitted under the Commission's draft standards) must meet an efficacy level of at least 88.4 lumens per watt. As such, it does not represent a significant departure from the U.S. EPA's proposed level of 65 lumens per watt, for higher CRI lamps. Moreover, higher efficacy standards for lower CRI lamps is reasonable: 32 percent of general purpose replacement lamps certified to ENERGY STAR over the last year already meet or exceed the 88.4 lumens per watt level.

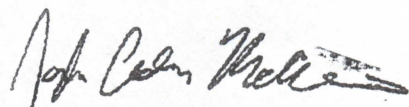
IV. Conclusion

The Energy Commission strongly encourages the U.S. EPA to harmonize with or exceed the Energy Commission's Tier 1 efficacy levels for general service LEDs, while retaining the technology neutral approach that the U.S. EPA began with Lamps Specification 1.0. Going beyond the proposed California Tier 1 levels will ensure that the ENERGY STAR program remains the recognized leader for highly efficient, high quality lamps.

The Energy Commission appreciates the opportunity to comment on the U.S. EPA's ENERGY STAR Lamps Specification 2.0, Draft 3. If you have any questions about our comments, please contact Ken Rider, Associate Electrical Engineer, at (916) 654-5006, or Ken.Rider@energy.ca.gov. We look forward to continuing to support and to offer feedback to the U.S. EPA's ENERGY STAR program.

Sincerely,


ROBERT B. WEISENMILLER
Chair


J. ANDREW McALLISTER
Commissioner
Policy Lead for Energy Efficiency