PHILIPS

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Environmental Protection Agency
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Washington, DC 20460

Philips Lighting Comments on Energy Star Lamps V2.0

Date: 2015-3-13

Dear Ms. Jantz-Sell,

Philips Lighting appreciates the opportunity to provide the attached comments on the Energy Star Lamps V2.0.

As you may know, Philips North America is headquartered in Andover, Massachusetts. The U.S. Philips companies are affiliates of the Netherlands-based Royal Philips N.V., a diversified health and well-being company, focused on improving people's lives through meaningful innovations. Our long history in North America began in 1933, and today, it is the company's largest single market in the world, with approximately 22,000 employees and operations at 55 major facilities in 25 states and across 3 Canadian provinces. Sales for the region in 2013 was more than $9.5 billion*, which accounts for more than 30% of Philips global revenue.

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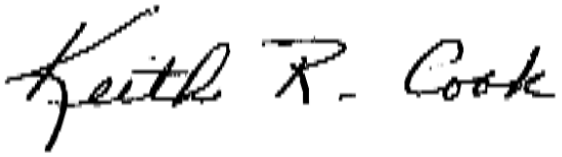
energy efficient lighting solutions and new lighting applications, as well as male shaving/grooming and oral healthcare. Philips lights 65% of the world's top airports, 30% of offices and hospitals and landmarks such as the Empire State Building, the Sydney Opera House, the New Year's Eve Times Square Ball and the Great Pyramids. Philips owns more than 64,000 patent rights, is one of the world's top-50 most valuable brands, one of the world's top-50 most innovative companies, and ranked as one of the Best Global Green Brands by Interbrand.

Please find our detailed comments below. We look forward to working with you further on this important effort. If you have any questions on these comments, please contact me.

Sincerely,



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Below are Philips' comments and recommendations regarding the development of the Energy Star Lamps V2.0.

Comments on Energy Star Lamps V2.0, draft 1, from the SSL perspective:

1. We thank Energy Star for making provisions for standby power, connected lamps and color tunable lamps. We appreciate that Energy Star has reacted favorably to the NEMA connected lamps market study and suggestions that Energy Star expand their scope to include these lamps. We think that 0.5W of standby power is reasonable.

2. The presence of definitions for both Connected Lamps and Dimmable Lamps can cause confusion, since all or nearly all connected lamps will also be dimmable. It is not Energy Star's intention, judging from section 12 that a connected lamp also work with a phase-cut control. Some rewording of the definitions may be desirable. (Minor point)

3. Section 12.1 states that "the controls must be listed on the lamp packaging". Is this intended to be an exhaustive list of controls or a single example of a compatible control? There are likely to be many lamps from different manufacturers that work with a given control, and many controls from different manufacturers that work with a given lamp (particularly with an open communications protocol). A requirement to list all controls that are compatible *on the packaging* will not be workable. A requirement to list compatibility information on a website will be more workable.

4. Test condition 2 in section 5.1 is confusing, particularly the words "most consumptive". It should be "more consumptive than the default". Otherwise, one could have a least efficient ANSI white setting (2) that is *more* consumptive than the default (1), but, if the *most* consumptive point occurs at a third setting (3), then the manufacturer doesn't have to report anything but the default (1), which does not seem to be Energy Star's intention. If power consumption is lower than the default, then energy is being saved, and we see no reason to be concerned about the efficacy of the lamp at such settings. Consider an example: A lamp has default setting of 3000K, and maximum power consumption occurs at 5000K, but efficacy is higher at 5000K than at 3000K. There are no ANSI white CCTs at which efficacy is lower than at 3000K AND power consumption is higher than at 3000K. In this case, the full photometric testing would have to be done at 3000K (the default), and the 5000K power consumption would have to be reported. (But no full photometric testing at 5000K, since 5000K is more efficient than the default.) We also suggest that Energy Star explicitly state that the testing is all done at full output power for each setting. This would exclude extra testing for lamps that have the feature that they

imitate incandescent lamps during dimming by gradually dropping CCT as intensity drops. Such lamps should not be treated as Color Tunable Lamps.
What does “selected by the manufacturer” mean? Does this mean “marked on the package”, “selected by the manufacturer for testing”, “capable of being selected by a user and emitted by the lamp” or something else? What does Energy Star hope to gain by requiring testing at two points that would not be gained by testing at a single default point?

To address the comments above, we suggest changing the later part of the text in Section 5 to:

When testing a color tunable lamp, photometric performance testing (per section 9) shall be performed at:

1. The default setting from the factory[1].
2. The least efficient setting among the ANSI white light nominal CCTs (if that setting is different from the default AND if power consumption at that setting is more than 15% higher than at the default setting) [Motivation for change: If the default setting is close, in terms of energy use, to the setting with highest power consumption, then avoid doubling the photometric testing.]

Lamp performance at the test settings described above shall meet all photometric performance requirements of the specification. All other testing, including lumen and color maintenance testing, shall be performed at the default setting (or at the highest power setting among the ANSI white light nominal CCTs if that setting uses more than 115% of the default power setting). [Motivation: The lowest efficacy condition is likely to be one of the extremes of the allowed ANSI CCTs (e.g. 2200K, if the allowed ANSI CCTs are extended to include 2200 and 2500K). Under this condition, power is likely to be relatively low and at least one of the LEDs is likely to be driven at low power. The lumen maintenance testing at the lowest efficacy setting will therefore not exercise all of the LEDs. Testing at the default or highest power setting is more likely to have the LEDs maximally utilized (all LEDs driven at relatively high power). It will also provide greatest stress to the electronics, as well as greatest thermal stress.]

The power consumption of the setting with the maximum input power, regardless of chromaticity, shall be reported.

Testing for each required setting is to be done with light output set to maximum for that setting.

[1] The default setting is assumed to be maximum light output at one of the ANSI white CCT’s.

Dimmable Lamps that are designed to change color only during dimming, and where the color is entirely dependent on the dimmer setting, such as lamps that imitate the behavior of incandescent lamps by shifting to lower CCT when dimmed, are not considered "Color Tunable" for the purposes of this specification. [Motivation: Clarification to limit testing for lamps that imitate incandescent color change with dimming]

5. 2200 and 2500K lamps. We support Alex Baker's written suggestion, as long as #4 above is the correct interpretation of Energy Star's intention for testing of color tunable lamps. Efficacy will tend to be lower at these low CCTs. If Energy Star's intention is to require testing and compliance at the lowest-efficacy white condition *including* these new CCTs, and regardless of power consumption, then we do not support the addition of these two white points.
6. We oppose the *requirement* for a CCT Descriptor, in Table 15.2. Whether to include a descriptor, and which words to use, should be up to the manufacturer. While it may be arguable to standardize the *words* used to describe different CCTs, these words should not be *required* on the packaging, but optional.
7. The DOE SNOPR (http://energy.gov/sites/prod/files/2014/06/f16/led_tp_snopr.pdf) proposes defining lifetime as L70B50 instead of L70. This is fine. However, we strongly prefer that Energy Star make some allowance for infant-mortality failures in products, and maintain the possibility for one lamp to fail the lifetime testing. We would also like to see the 3% tolerance on light output, efficacy and lumen depreciation retained. Such strict specifications are not applied to CFLs, where one of 10 lamps is allowed to fail lumen maintenance testing.
8. We agree with removing the Rapid cycle stress test.
9. The new draft version of the Energy Star Lamps specification has been released only 5 months after the previous specification became fully effective. Will recertification testing be required for *all* lamps, or only those that must be redesigned to meet the new specification? We suggest that those lamps already on the QPL and meeting the new specifications be allowed to remain on the QPL without retesting. For those items that rely on the DOE test procedures, will Energy Star be effective only after the DOE procedures are finalized and present in the Federal Register?
10. Color tunable lamps may contain LEDs that are not generally covered by LM80 testing. For instance, red, blue or green LEDs may be used. To avoid increasing the testing burden for LED package manufacturers, we suggest that Energy Star early certification only require LM80 testing on the LED that provides the greatest amount of light when the lamp is set for full output at the default CCT. Lamps would still have to meet the 6000 hour requirement.

11. Efficacy – Although about 25% of Philips' qualified SSL lamps do not meet the proposed efficacy specification, we do not expect difficulty in meeting the efficacy specs in 1 to 1½ years, when the specification will go into full effect.
12. Section 12.7-12.11: We agree with open standards and open access requirements. We have some uncertainty about some terminology in these sections. In section 12.7, does "energy related commands" include commands to change color or light output? Or does this imply that the lamps must be able to respond to third party commands like demand response commands from a utility, to reduce power by a certain percentage? In section 12.9, is the lamp expected to maintain and provide a record of its energy usage? Below are suggested changes to sections 12.8-12.11. The changes are in red.

12.8. Open-standards & Open-access

1. Communication that enables connected functionality, (sections 12.9 – 12.12). must use, for all communication layers, protocols that are open and interoperable.
2. The product shall enable connectivity by one of following means:
   a. open-standards communications from the lamp, or
   b. open-standards communications from an external controller, included with the product or available separately.
3. To enable interconnection with the product; an interface specification, Application Programming Interface (API) or similar documentation shall be made available to interested parties that enables sections 12.9, 12.10 and 12.11 connected functionality, and includes accuracy, units and measurement interval for Energy Consumption Reporting

In some cases (e.g. IP interface), no suitable open standardized method may exist. Where no suitable standardized method exists, partners must use an open and documented communication method. In these cases, a manufacturer-specific mechanism shall be published for use with the product.

12.9. Energy Consumption Reporting

The product shall be capable of interconnecting with consumer authorized entities to communicate data representative of its interval energy consumption. It is recommended that data be reported in watt-hours for intervals of 15 minutes; however, representative data may also be reported in alternate units and intervals as specified in the product manufacturer's interface specification or API. Such representative data for energy consumption may include reporting of lamp type, light color and light output (either in absolute units, or relative to a reference level). If the lamp does not provide power consumption directly in watts, the manufacturer shall make available a method for estimating power consumption, in watts, from the representative data that is provided by the lamp.

It is not required that the lamp integrate power over time to get energy. The third party may poll the lamp for data at a desired rate, and estimate energy use, based on the representative data, the time interval between recordings, and the estimation method provided by the manufacturer.

12.10. Operational Status Reporting
At a minimum, the product shall be capable of providing the following information to energy management systems and other consumer authorized devices, services or applications via a communication link: operational status; e.g. on/off, color and luminous intensity.

This section is worded to leave flexibility to the manufacturer. It requires that a lamp provide a measure of operational status. Examples include on/off, color and luminous intensity, but these parameters are not mandated. In practice, manufacturers may provide light output as a percentage of full output, rather than providing luminous flux directly. Similarly, it may be inferred from the light output whether the lamp is on or off.

The information provided by the lamp in response to 12.9 and 12.10 may be identical.

12.11 Remote Management
The product shall be capable of receiving and responding to energy management system or other consumer authorized remote requests, via devices, services or applications, similar to hard-wired consumer controllable functions. Such requests may be simply a new setting of the light output and/or color. The lamp is not required to directly respond to commands, such as demand response commands, to reduce power usage by a specified percentage. Translation of a utility-issued Demand Response command to a command to the lamp is likely to be done through an intermediary building control system that receives the demand response command from the utility (an OpenADR command, for instance), and uses the manufacturer-supplied power-consumption estimator (see Section 12.9) and known communication protocol to determine which command to issue to the lamp (in the lamp's own language (Zigbee, for instance)) to reach the desired change in energy usage.

Comments on Energy Star Lamps V2.0, draft 1, from the CFL perspective:

1) We consider it unfair for the EPA to start a revision to the Energy Star Program Requirements for Lamps only five months after the previous version 1.1 took full effect (even though the intended date of implementation is 2016 as indicated in note box 12).

   We as manufacturers made a big effort and investment to provide a V1.1-compliant portfolio. We expected a period of at least 3 years to get the return on our investment. Now we see with disappointment that much of the investment and effort we put in to provide a V1.1-compliant portfolio will be wasted. We really question if it is worth putting effort and investment in developing a V2.0 compliant lamp portfolio, just to see that after a few months of the effective date a new revision with new outrageous requirements will appear.

2) The Luminous Efficacy requirements outlined in Section 9.1 will eliminate from the program CFL-I Directional (Reflectors) and Decorative lamps. CFL-I Reflectors and Decorative lamps cannot comply with the efficacy requirement of 65 lm/W.

   The EPA is making a huge jump of the efficacy requirements for Directional lamps from 40 lm/W for lamps with a power < 20W and 50 lm/W for lamps with P ≥ 20W to 65 lm/W for all lamps!

   We have the same concern for Decorative lamps. The jump in efficacy requirement went from 50 lm/W for lamps with power between 15 – 24W and 60 lm/W for lamps with P ≥ 25W to 65 lm/W for all lamps.

   For omnidirectional lamps, the jump is also very big; from 55 lm/W for lamps with P < 15W and 65 lm/W for lamps ≥ 15W to 70 lm/W for all lamps!
   Also for Dimmable lamps and other products with features or higher CCTs, which are less efficacious than the standard 2700K products.
   This requirement, together with the requirement outlined in Section 9.7 which prescribes an R9 > 0 will put most omnidirectional CFL-I lamps out of compliance. The products are mature in the market and consumers have not demanded R-value investigation. To strike the new R9 requirement will afford sufficient CFLs to requalify

   It is well known that the increase of the R9 value reduces the efficacy of the products. Additionally, it is expected that producing high-R9 discharge tubes for CFL-I lamps will increase the price of the products as a dedicated production of discharge tubes specific for the US will need to be produced and kept separated from the production for other regions.

   Our recommendation is:

Category	Recommended efficiency level
Omnidirectional	65 LPW
Directional ≥ 20 Directional < 20	55 LPW 50 LPW
Decorative ≥ 15 watts	55 LPW
Decorative < 15 watts	50 LPW

3) The starting time of ≤ 500 msec, as outlined in Section 11.4, will eliminate from the Program good pre-heat CFL-I products which provide a high number of switching cycles. This requirement will eliminate from the Program CFL-I products that provide a specific functionality which is appreciated by the customers and have special applications (e.g. for use with occupancy sensors).
Note box 25 indicates that "95% of the lamps meeting the new efficacy levels have a start time of 500 ms or less." While this statement is probably true, the lamps are either LED-based (not affected by switching stress) or instant start CFL-Is, which do not provide this high switching performance.

4) Section 11.5 establishes a run-up time requirement ≤ 60 seconds for all CFL-I lamps. This requirement itself will eliminate from the Program all Covered and Reflector CFL-I lamps. Is this the intention of the EPA?
Covered and Reflector CFL-I lamps control the mercury vapor pressure inside the discharge tube with an amalgam. The amalgam allows for a higher efficacy of lamps which run hot, but has the disadvantage of slower run-up.
Drop box 26 indicates that "89% of CFLs meeting the efficacy levels proposed in this draft have a run-up time of 60 seconds or less."
Can we see an analysis of the Covered and Reflector CFL-Is certified to the Program? Are there Covered and Reflector CFL-Is, first complying with the efficacy requirements proposed in the V2.0 draft and second, complying with the proposed run-up requirement?

   CFL-I products are made possible with a compromise of many factors. Adjusting one parameter, will disturb the performance of the products in other parameters. This is a mature technology which is not having breakthroughs anymore and it's essentially already optimized at the top performance. It does not have room for further ratcheting any more.

5) Putting more stringent requirements on CFL will just make manufacturers stop participating in the Energy Star program. They are likely to go to cheaper alternatives (purchasing from India, or other countries) to be competitive in price. The lamps on the market will most likely be less efficient, and contain more mercury. This seems counterintuitive to the goals of Energy Star.