

**Appliance Standards Awareness Project
American Council for an Energy Efficient Economy
National Consumer Law Center
Consumer Federation of America
Natural Resources Defense Council
Northwest Energy Efficiency Alliance
Northeast Energy Efficiency Partnerships
Alliance to Save Energy
Northwest Power & Conservation Council
Southeast Energy Efficiency Alliance**

October 16, 2016

Mr. Steven Chalk
Acting Deputy Assistant Secretary for Energy Efficiency and Renewable Energy
Appliance and Equipment Standards Program, U.S. Department of Energy
Building Technologies Office, EE-5B
1000 Independence Avenue SW
Washington, DC 20585-0121

Docket Number: EERE- 2017–BT–NOA–0052

Dear Mr. Chalk,

This document constitutes the comments of Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, National Consumer Law Center, Consumer Federation of America, Natural Resources Defense Council, Northwest Energy Efficiency Alliance, Northeast Energy Efficiency Partnerships, Alliance to Save Energy, Northwest Power & Conservation Council, and Southeast Energy Efficiency Alliance to the Department of Energy’s (DOE) “Energy Conservation Program: General Service Incandescent Lamps and Other Incandescent Lamps Request for Data” published in the Federal Register on August 15, 2017. (82 Fed. Reg. 38,613).

The “Request for Data” appears to have been issued in response to a settlement agreement between the Department and the National Electrical Manufacturers Association (NEMA) to resolve a lawsuit brought by NEMA.¹ We are concerned that the settlement and this Request for Data suggest an effort by the Department to work together with the major lighting companies to roll back lighting efficiency standards that apply beginning in 2020. Any attempt by DOE to circumvent the legally-required standards would be unlawful and would harm consumers. The 2020 standards have driven the development of a new generation of products that have already dramatically increased available light bulb choices and are already saving money for consumers. The 2020 standards will raise the floor for light bulb efficiency, spreading the benefits of new technology to all consumers and delivering enormous energy savings for the nation. As intended by Congress, the Department protected and increased those savings when it expanded the range of light bulbs subject to the 2020 standards in rules published on January 19, 2017.² Any attempt by DOE to reinstate a narrower scope for the 2020 standards would hurt consumers, increase energy waste and violate the law. Finally,

¹ See Settlement Agreement executed July 7, 2017 re: *National Electrical Manufacturers Association v. Department of Energy*, No. 17-1341 (4th Cir.) (Attachment 1) .

² 81 Fed. Reg. 7276 (Jan. 19, 2017); 81 Fed. Reg. 7322 (Jan. 19, 2017).

lighting manufacturers that appear to be seeking agency action to undermine the 2020 standards have had thirteen years to prepare for those standards, are already complying with similar standards in other parts of the world, and have previously called a 2020 phaseout of inefficient lighting “ideal.” We urge DOE to cease any efforts aimed at circumventing the 2020 standards.

These comments include sections that elaborate on each of the following points:

- **The 45 lumen per watt minimum energy efficiency backstop standard for general service lamps has been triggered and applies starting January 1, 2020.³**
- **The consumer benefits of this standard are very, very large, reaching about \$2,800 in savings for a typical household over ten years.**
- **Without the 2020 backstop standards, inefficient light bulbs would continue to waste consumers’ money and U.S. energy resources for decades to come.**
- **DOE’s definition for general service lamps, as amended on January 19, 2017, protects consumers from deceptively-marketed, money-wasting products and DOE lacks legal authority to roll that definition back.**
- **At this point, DOE’s only option is to strengthen the current general service lamp backstop standards required by statute.**
- **General service incandescent lamps are among the general service lamps that must meet the 45 lumen per watt backstop standards beginning on January 1, 2020.**
- **Cost-effective incandescent light bulbs more efficient than current general service incandescent lamp standards already exist, but manufacturers are no longer pursuing them in order to focus on far more promising light emitting diode products.**
- **Light bulb manufacturers have previously supported light bulb standards at the backstop level.**

I. The 45 lumen per watt minimum energy efficiency backstop standard for general service lamps has been triggered.

Beginning on January 1, 2020, the sale of any general service lamps (GSL) having a luminous efficacy less than 45 lumens per watt (LPW) is unlawful under the Energy Policy and Conservation Act (EPCA). This consequence is compelled by the language of EPCA and DOE’s actions in implementing that language. As amended by the Energy Independence and Security Act of 2007 (EISA), EPCA lays out an orderly path toward improved light bulb efficiency, requiring DOE to conduct two cycles of rulemaking to evaluate amended standards for GSLs. 42 U.S.C. § 6295(i)(6)(A), (B). Concerning the first such review, the statute includes a backstop provision that provides a safeguard against DOE action that is contrary to Congress’s design.

BACKSTOP REQUIREMENT.—If [DOE] fails to complete a rulemaking in accordance with clauses (i) through (iv) [of 42 U.S.C. § 6295(i)(6)(A)] or if the final rule does not produce savings that are greater than or equal to the savings from a minimum efficacy standard of 45

³ “Lamp” is the lighting industry term used to refer to the removable, light emitting component in a luminaire or light fixture, i.e. a light bulb.

lumens per watt, effective beginning January 1, 2020, the Secretary shall prohibit the sale of any general service lamp that does not meet a minimum efficacy standard of 45 lumens per watt.

42 U.S.C. § 6295(i)(6)(A)(v). Because DOE has failed to complete a rulemaking in accordance with 42 U.S.C. §§ 6295(i)(6)(A)(i)-(iv) this 45 LPW backstop requirement has been triggered.

In particular, DOE has failed to complete a rulemaking in accordance with clauses (i) and (iii). Clause (i) requires that—

Not later than January 1, 2014, the Secretary shall initiate a rulemaking procedure to determine whether—

(I) standards in effect for general service lamps should be amended to establish more stringent standards than the standards specified in paragraph (1)(A); and

(II) the exemptions for certain incandescent lamps should be maintained or discontinued based, in part, on exempted lamp sales collected by the Secretary from manufacturers.

42 U.S.C. § 6295(i)(6)(A)(i). DOE did not meet these obligations because the rulemaking procedure the Department initiated in December 2013 did nothing to inform a determination whether standards for general service incandescent lamps should be amended (as required in sub-clause (I)) or whether the exemptions for incandescent lamps should be maintained or discontinued (as required in sub-clause (II)). DOE did not meet the statutory deadline to initiate the required rulemaking procedure because the Department interpreted the “Light Bulb Rider,” § 315, Div. B, 2012 Consolidated Appropriations Act, Pub. L. 112-74, 125 Stat. 786, 879, as preventing any DOE analysis or consideration of the issues EPCA required the rulemaking to cover. *See Energy Conservation Standards Rulemaking Framework Document for General Service Lamps* (Dec. 2, 2013) at page 11 (explaining that because the Light Bulb Rider “appears to curtail any further activity to implement or enforce standards for GSILs, DOE will not be including lamps that meet the definition of GSIL in the GSL rulemaking at this time”) (Attachment 2).

DOE also failed to complete a rulemaking in accordance with clause (iii), which requires that—

If the Secretary determines that the standards in effect for general service incandescent lamps should be amended, the Secretary shall publish a final rule not later than January 1, 2017, with an effective date that is not earlier than 3 years after the date on which the final rule is published.

42 U.S.C. § 6295(i)(6)(A)(iii). January 1, 2017 has passed without DOE publishing either a final rule that amends the standards for general service incandescent lamps, or a notice of the Department’s determination that such standards do not need to be amended. DOE’s failure to meet this deadline means that DOE has failed to complete a rulemaking in accordance with clause (iii).

DOE has previously recognized the inescapable consequence of these failures—that they trigger the backstop. For example, when it proposed standards for GSLs in 2016, the Department confirmed that because of its interpretation of the Light Bulb Rider, “DOE is unable to perform the analysis required in clause (i) of 42 U.S.C. 6295(i)(6)(A). As a result, the backstop in 6296(i)(6)(A)(v) is automatically triggered.” 81 Fed. Reg. 14,528, 14,540 (Mar. 17, 2016). Similarly, with regard to the January 1, 2017 deadline, DOE acknowledged that if the Department fails to “publish a final rule that will meet or exceed the energy savings associated with the EISA 2007 45 lm/W backstop, then the backstop will be triggered beginning January 1, 2020.” *Id.* at 14,582.

However, portions of the Request for Data include statements that could be interpreted as indicating the Department has reversed course and now believes that the 45 LPW backstop requirement for GSLs has not yet been triggered. For example, the Department’s statement that “DOE initiated the [general service lamp] rulemaking process in a timely manner by publishing in the Federal Register a notice of availability of a framework document,” 82 Fed. Reg. at 38,614, could be read as suggesting the Department now believes it has satisfied clause (i) of 42 U.S.C. § 6295(i)(6)(A). Similarly, in observing that “DOE has not yet made a determination on whether standards applicable to GSILs should be amended, as required by statute,” 82 Fed. Reg. at 38,614, the Department could be implying that DOE’s ongoing obligation to make this determination somehow affects the applicability of the 45 LPW backstop.

To the extent these two statements do reflect a recent change in DOE’s interpretation of EPCA, neither survives scrutiny. Although DOE did initiate a rulemaking process for some types of GSLs “Not later than January 1, 2014,” the rulemaking process did not fulfill the requirements of 42 U.S.C. § 6295(i)(6)(A)(i). As explained above, that provision requires DOE, not later than January 1, 2014, to initiate a rulemaking to determine whether energy conservation standards in effect for GSLs should be strengthened and whether the exemptions for certain incandescent lamps should be discontinued. 42 U.S.C. § 6295(i)(6)(A)(i). DOE has irrevocably missed the statutory deadline to initiate that analysis because it did not begin working towards a determination on the standards or exemptions for incandescent lamps by the prescribed date. Accordingly, beginning January 1, 2020, EPCA forbids the sale of “any general service lamp that does not meet a minimum efficacy standard of 45 lumens per watt.” 42 U.S.C. § 6295(i)(6)(A)(v).

Similarly, DOE’s failure to meet the January 1, 2017 statutory deadline to complete this rulemaking provides a second, independent trigger for the 45 LPW backstop. The enactment of the backstop reflects Congress’s increasing frustration with DOE’s indifference to statutory deadlines for energy efficiency standard rules,⁴ and the only reasonable interpretation of the provision is that Congress intended it as a bulwark against any further delays. An interpretation that would frustrate that intent by enabling yet another missed deadline to circumvent a powerful tool crafted by Congress to spur timely DOE action would be arbitrary and unlawful.

II. The 2020 backstop standard will provide enormous benefits for individual consumers and the nation.

The light bulb standards that apply beginning in 2020 will deliver enormous energy savings and economic benefits and have already increased the light bulb product choices available to consumers. Moreover, prices for efficient light bulbs continue to decline, meaning that the economic benefits of the new standards will be even greater than predicted.

a. Consumer pocketbook savings from new standards are large.

Table 1 shows how the switch to LEDs from incandescent or halogen light bulb technology affects the cost of lighting for the typical consumer. Because LEDs use a fraction of the electricity of an incandescent or halogen bulb to provide the same light, they cost 60-90% less to operate. A single LED is usually more expensive than a single equivalent incandescent or halogen bulb, but because LEDs last much longer, over

⁴ In a 2006 settlement, DOE acknowledged its failure to meet legal deadlines for 22 standards. *See* Consent Decree, *New York v. Bodman*, No. 05-7807 (S.D.N.Y. Nov. 6, 2006), ECF No. 90 (Attachment 3). Against this backdrop, Congress also enacted section 141 of the Energy Policy Act of 2005, which requires the Department of Energy to issue semi-annual reports describing its standards rulemaking schedule and plan for implementing that schedule. *See* 42 U.S.C. § 15834. The initial report had been updated semi-annually since 2006 through 2016. No 2017 updates have been published as of this writing.

ten years consumers will often spend less to buy the number of LEDs they need than they would have spent on a larger number of incandescent or halogen bulbs.

Table 1 - Total consumer costs for LED and incandescent or halogen GSLs.

| Lamp Type | Watts | Initial Lumens | Rated Life (hrs) | Hours per day | Elec Cost 10 years ⁱ | Bulb Price per unit ⁱⁱ | Bulb Cost 10 years ⁱⁱⁱ | Total Cost 10 years ^{iv} |
|--|-------|----------------|------------------|---------------|---------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| MSB Reflector Lamps | | | | | | | | |
| Incand | 65 | 635 | 2,000 | 2.9 | \$ 90.27 | \$2.33 | \$ 12.33 | \$ 102.60 |
| LED | 8.5 | 650 | 10,000 | 2.9 | \$ 11.80 | \$3.33 | \$ 6.66 | \$ 18.46 |
| MR Lamps | | | | | | | | |
| Halogen | 50 | 430 | 3,000 | 2.9 | \$ 69.44 | \$3.49 | \$ 12.31 | \$ 81.75 |
| LED | 6.5 | 500 | 25,000 | 2.9 | \$ 9.03 | \$7.27 | \$ 7.27 | \$ 16.30 |
| Decorative 40 W equivalent Lamps (candelabra) | | | | | | | | |
| Incand | 40 | 360 | 3,000 | 2.6 | \$ 49.80 | \$1.24 | \$ 3.92 | \$ 53.73 |
| LED | 4 | 450 | 15,000 | 2.6 | \$ 4.98 | \$5.99 | \$ 5.99 | \$ 10.97 |
| Decorative 60 W equivalent Lamps (candelabra) | | | | | | | | |
| Incand | 60 | 475 | 3,000 | 2.6 | \$ 74.71 | \$1.24 | \$ 3.92 | \$ 78.63 |
| LED | 6 | 500 | 25,000 | 2.6 | \$ 7.47 | \$5.65 | \$ 5.65 | \$ 13.12 |
| MSB 3-way service A-Type Lamps | | | | | | | | |
| Incand | 72 | 1,000 | 1,200 | 2.3 | \$ 79.30 | \$1.99 | \$ 13.92 | \$ 93.22 |
| LED | 11 | 1,000 | 10,950 | 2.3 | \$ 12.12 | \$16.97 | \$ 16.97 | \$ 29.09 |
| Globe-shaped Lamps | | | | | | | | |
| Incand | 40 | 320 | 3,000 | 1.7 | \$ 32.56 | \$2.32 | \$ 4.80 | \$ 37.36 |
| LED | 4.5 | 350 | 25,000 | 1.7 | \$ 3.66 | \$6.32 | \$ 6.32 | \$ 9.98 |
| MSB A-Type 60 W equivalent Lamps | | | | | | | | |
| Halogen | 43 | 750 | 1,000 | 2.9 | \$ 59.72 | \$ 1.86 | \$ 19.69 | \$ 79.40 |
| LED | 9.5 | 840 | 10,000 | 2.9 | \$ 13.19 | \$ 2.56 | \$ 5.12 | \$ 18.31 |

Table 1 Notes:

ⁱ All bulb prices from LBNL Report *Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps* (see Table 3: Representative Lamp Options and Properties, Attachment 4) except prices for MSB A-Type 60 W equivalent lamps which were not included in this report's analysis. Prices for A-type lamps from shelf survey data collected by the Consumer Federation of America (see Attachment 5).

ⁱⁱ Aggregated purchase price of sufficient bulbs to exceed 10 years of service at daily hours of use shown.

ⁱⁱⁱ Cost of electricity assumed to be \$0.1312/kilowatt-hour, the national average residential rate published by the US Energy Information in September 2017.

(https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a)

^{iv} Cost of bulb purchases plus cost of electricity

Table 1 presents the nominal costs paid by consumers for lighting over 10 years using different light bulb technology options. For all types of GSLs, the LED versions cost consumers significantly less to own and operate than the incandescent or halogen versions. We estimate that if an average US household were to switch entirely to LEDs today, they would see over \$2,800 in electricity and light bulb savings over the next

ten years. If all US households switched to LEDs today, they would save over \$335 billion over the next 10 years (see savings estimation approach in Appendix 1).

DOE estimated 14 quadrillion British thermal units (quads) of electricity savings from the combined impact of the 2012-2014 general service incandescent lamp (GSIL) standards and from applying the EISA 2007 backstop to lamps that met the definition of GSL originally included in EISA 2007.⁵ DOE's January 2017 final rule amending the definition of GSLs means that lamp types representing twice as many lamps currently in use in the U.S. will be covered by GSL standards. The installed stock of these "new GSLs" has a disproportionately large potential for energy savings because the vast majority of these lamps are currently conventional or halogen incandescent lamps. The recently release LBNL report, *Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps, (EISA Impact Report)* estimates that the 45 LPW GSL standard will yield an additional 27 quads of savings for new GSLs shipped between 2020 and 2049.⁶ To put this in perspective, this cumulative potential savings is 35% larger than the 20 quads of energy consumed by the entire U.S. residential sector in 2016. The report's central estimate of consumer net present value savings ranges from \$120 billion to \$220 billion.

b. Consumers have a wide and growing array of LED light bulb choices that comply with the 2020 backstop standard.

Anticipation of national standards in the US and in other economies around the globe played a major role in spurring manufacturers' investments in LED technology. As a result, there has also been an explosion of LED choices. New manufacturers such as Cree and Soraal now compete in the market against the incumbents (GE, Philips and Ledvance [formerly Sylvania]). Smaller manufacturers such as TCP, Feit, Maxlite and Westinghouse offer a greater variety of products than ever before.

A casual visit to any hardware store or home improvement store provides ample evidence that consumers have not only more brands to choose among, but also more varieties of energy efficient LED light bulb choices today than ever before. Energy efficient LED GSLs are available in a wide and increasing variety of lamp types, sizes, light output and shapes. LED technology is still relatively young and continues to improve rapidly. Technical challenges posed by small form factor or high lumen output bulbs (e.g., MR16) have been overcome. LED light bulbs are now available in a greater range of color temperatures than incandescent lamps, and in designs that are so similar in appearance to traditional designs that it can be difficult to tell one from the other at even a short distance. One retailer, Target, now lists over 300 different LED light bulbs on its website.⁷ Walmart, Lowe's, Home Depot and local hardware stores all offer a large variety of GSL backstop standard-compliant light bulbs. LED light bulbs are also starting to offer features never before available, such as the ability to change color at the user's command or wireless connectivity.

In the "Request for Data," DOE seeks comment whether more efficacious substitutes exist for all GSILs and other incandescent light bulbs. As discussed below, DOE thoroughly addressed this issue in the final definition rule published in January. As of this writing, the following are just some examples of the many LED alternatives available for the incandescent light bulb types covered by the GSL backstop standard:

⁵ U.S. Department of Energy–Office of Energy Efficiency and Renewable Energy, 2009. Technical Support Document: Impacts on the Nation of the Energy Independence and Security Act of 2007 (Attachment 6).

⁶ Lawrence Berkeley National Laboratory. Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps. January 2017 (Attachment 4).

⁷ <https://www.target.com/s?searchTerm=led+light+bulbs#sortBy=relevance&Nao=0&cog=led light bulbs>

- MSB A-line lamps (by Ledvance, Philips Lighting, GE and many others^{8,9})
- Reflector lamps (by Cree, Philips Lighting, GE and others [see Figure 1]^{10,11,12})
- Candelabra base lamps (in many bulb shapes and styles by many manufacturers¹³)
- MSB B, BA, CA, F, G shape lamps (by many manufacturers^{14,15})
- MR lamps (by Sora and others¹⁶)
- MSB 3-way lamp (by several manufacturers¹⁷)
- MSB rough service (by many manufacturers¹⁸)
- MSB T shape lamps (by Satco and other manufacturers¹⁹)

Note: “MSB” refers to medium screw base



Figure 1 - 1150 lumen LED reflector lamp at the Home Depot

⁸ <https://www.ledvance.com/products/product-knowledge/led-lamps-online-special-201617/index.jsp>

⁹ https://www.usa.philips.com/c-m-li/choose-a-bulb/latest#filters=STANDARD_BULB_SU%2CCANDLE_BULB_SU%2CSPOT_BULB_SU%2CREFLECTOR_BULB_SU%2CMINIREFLECTOR_BULB_SU%2CLUSTER_BULB_SU%2CGLOBE_BULB_SU%2CSPIRAL_BULB_SU%2CCAPSULE_BULB_SU%2CLINEAR_BULB_SU%2CCIRCULAR_BULB_SU%2CTUBULAR_BULB_SU%2CUBENT_BULB_SU%2CSPECIALTY_BULB_SU%2CFK_BULBS_LED&sliders=&support=&price=&priceBoxes=&page=&layout=12.subcategory.p-grid-icon

¹⁰ <http://creebulb.com/products/reflector>

¹¹ https://www.usa.philips.com/c-m-li/choose-a-bulb/latest#filters=REFLECTOR_BULB_SU%2CMINIREFLECTOR_BULB_SU%2CFK_BULBS_LED&sliders=&support=&price=&priceBoxes=&page=&layout=12.subcategory.p-grid-icon

¹² <http://www.gelighting.com/LightingWeb/na/solutions/led-lamps-and-modules/directional/index.jsp>

¹³ [http://www.bulbs.com/LED_Bulbs/Candelabra_\(E12\)-Base/results.aspx](http://www.bulbs.com/LED_Bulbs/Candelabra_(E12)-Base/results.aspx)

¹⁴ <http://www.homedepot.com/b/Lighting-Ceiling-Fans-Light-Bulbs-LED-Light-Bulbs/Decorative-Candle/N-5yc1vZbm79Z1z0u2lw?experienceName=technical>

¹⁵ http://www.bulbs.com/LED_Globe/results.aspx

¹⁶ <https://www.soraa.com/products/lamps>

¹⁷ https://www.amazon.com/LED-Bulbs-3-Way-Light/s?ie=UTF8&page=1&rh=n%3A2314207011%2Cp_n_feature_three_browse-bin%3A3594188011

¹⁸ <https://blog.1000bulbs.com/home/why-you-dont-need-a-rough-service-light-bulb>

¹⁹ https://www.1000bulbs.com/product/192437/SATCO-S9580.html?gclid=EAIaIQobChMIInbugwMrk1gIV1rXACH0DfA9EAQYAABEgKtxfD_BwE

The California investor owned utilities maintain an ongoing effort to collect data at regular intervals on thousands of LED lamp product offerings from major online retailers. Their database documents the broad diversity of available LED lamps and suggests that they are now offered in nearly all shapes and lumen output ranges covered by the GSL definition.²⁰

So far, predictions that LED technology will encounter inevitable, absolute limitations that prevent it from replacing any specific incandescent lamp have proven to be unduly pessimistic. For example, one year ago, in commenting on DOE's proposed definition for GSLs, NEMA and other industry stakeholders claimed that "halogen bipin lamps cannot be made using LED technology and should not be included as general service lamps." 82 Fed. Reg. at 7309 (citing comments of Maxlite, NEMA, and GE). A year later, LED replacements for halogen bipin lamps are indeed available.²¹ While LED alternatives may not yet be available for some niche GSILs, DOE accounted for this eventuality in amending the definition of GSLs:

"DOE believes there are three main categories of lamps: (1) Lamps with more efficient, equivalent replacements (i.e., the same form factor and light output); (2) lamps currently without equivalent replacements but for which replacements can likely be made in the future; and (3) lamps for which industry is unlikely to ever be able to create equivalent replacements using more efficient technology. Regarding the third category of lamps, DOE has concluded that some form factor and light output combinations are unlikely to ever be available using more efficient technology due to technical limitations. As discussed in section III.A.4.a, DOE is declining to determine that lamps with those particular characteristics are used for traditional GSIL applications, and DOE is accordingly not including those lamps as GSLs."²²

In sum, DOE chose to leave any lamp type for which an LED replacement would not be readily available outside of the definition of general service lamp. We believe that DOE was very conservative in its identification of such lamps, given the rapid evolution of LED technology and growing market share. DOE did not accept several recommendations to discontinue certain exemptions submitted by co-signers to this letter to the GSL notice of proposed definition and data availability (NOPDDA). For example, several of us advised that DOE remove exemptions for mine service, traffic signal, marine, showcase, silver bowl, bug and plant light lamps, but DOE chose to retain these exemptions, further indicating that the agency took a cautious approach to expanding the definition.

c. Prices for lamps meeting the 2020 standards will keep dropping.

The *EISA Impact Report* referenced above includes a price index for LED lamp options based on a learning curve analysis. As show in Figure 5, prices for LED lamps are expected to continue to decline rapidly through 2020 in response to rising sales volumes and "cumulative production experience."²³

²⁰ Please see comments submitted to this rulemaking by the California investor owned utilities.

²¹ https://www.superbrightleds.com/cat/led-bi-pin/filter/Base_Type,G4,1,3377:Base_Type,G8,1,3943:Base_Type,G9,1,4563:

²² 82 Fed. Reg. at 7309.

²³ Page 23, Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps, Lawrence Berkeley National Laboratory, January 2017 (Attachment 4).

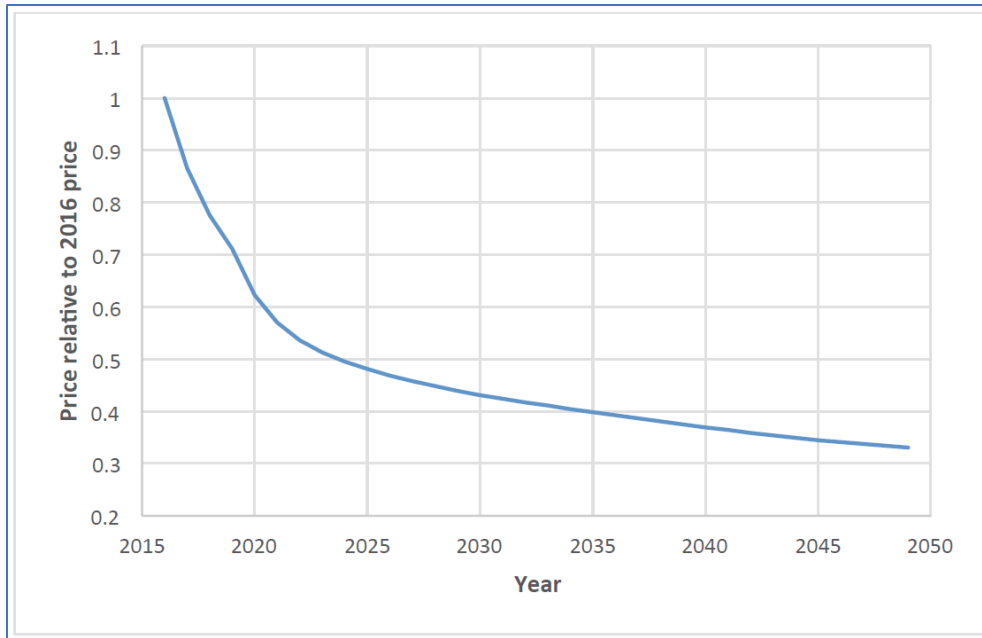


Figure 2- LBL Projected LED Price Index

Prices for LED light bulbs at major retailers have dropped dramatically over the last few years, following the steep slope of LBNL's projection of LED prices prior to 2020. Examples of current pricing for LEDs sold in multipacks at Home Depot are shown in Figures 3 and 4.



Figure 3- Home Depot house brand A-line 800 lumen LED (August 2017)



Figure 4- Home Depot house brand candelabra base 300 lumen LED (August 2017)

The price per bulb for a basic LED A-line lamp sold in multi-packs of eight bulbs in August 2017 was \$1.67. The decline in LED pricing has occurred not only for A-line, but also for decorative and reflector lamps. Figure 7 shows Home Depot house brand candelabra base decorative LED bulbs at a price of \$2.33 per bulb sold in multi-packs of three bulbs, also in August 2017. These prices are significantly lower than the prices for A-line and reflector LEDs included in Table 1. Candelabra LEDs were much more expensive a few years ago and not readily available in multi-packs. High lumen LED lamps are also now widely available and at much lower price points than just a few years ago.

LED technology is particularly well-suited to directional lighting applications that usually use reflector lamps because the LED “chip” light source emits light from one face, and not in all directions like an incandescent filament. LED reflector lamps that are direct drop-in replacements for existing screw- and pin-based incandescent reflector lamps are now widely available at cost-effective prices (see Figure 1). While a single LED reflector lamp is more expensive to purchase than a single incandescent reflector lamp, the LED option is less expensive over time and provides far superior consumer value, as shown in Table 1.

d. Absent the 2020 backstop, inefficient GSLs would continue wasting consumers’ money and US energy resources for decades to come.

Given the superior performance and attractive pricing of LEDs as documented above, it is tempting to assume that this new technology will replace incandescent lamps both rapidly and completely. But despite falling prices, increased choices and rising sales of LEDs, we should expect incandescent lamps to retain a large share of the US lighting market, but for the 2020 backstop standards. Historical experience with technology substitution indicates that legacy technologies, like the incandescent light bulb, usually persist in the market long after they stop being a cost-effective choice for consumers.

The U.S. Environmental Protection Agency has just released a report that finds that the “The highest saturation of CFLs in the country exists in areas where they were heavily rebated and promoted by utility efficiency programs, but even in these areas, the highest estimated saturation has topped out at around 35% of sockets.” and “Overall, LED bulbs sales are not yet dominating light bulb sales.”²⁴

A host of market barriers prevent complete adoption absent standards: Consumers lack information; they make choices, especially for something as mundane as a light bulb, in a rush; choices are determined more by habit than careful consideration of options; some consumers also do not trust information on product labels. In some cases (e.g. rental properties), the person responsible for buying the light bulbs does not pay the associated electricity bills, and has no reason to buy more efficient products. As a result, many cost-effective efficiency choices are neglected by consumers.²⁵

As described in its report *Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps* LBNL modeled future shipments for incandescent lamps that DOE added to the definition of GSLs in the rules published on January 19, 2017. LBNL modeled a base case where the 45 LPW GSL backstop standard was not applied. The shipments and installed stock of these new GSLs were projected as shown in Figure 5.

²⁴ *The Light Bulb Revolution*. US EPA. October 2017 (see Attachment 7).

²⁵ An extensive literature exists on the “efficiency gap.” Please see the Congressional Budget Office’s working paper *Addressing Market Barriers to Energy Efficiency in Buildings* (Attachment 8), and *Market Barriers to Energy Efficiency: A Critical Reappraisal of the Rationale for Public Policies to Promote Energy Efficiency* (Attachment 9).

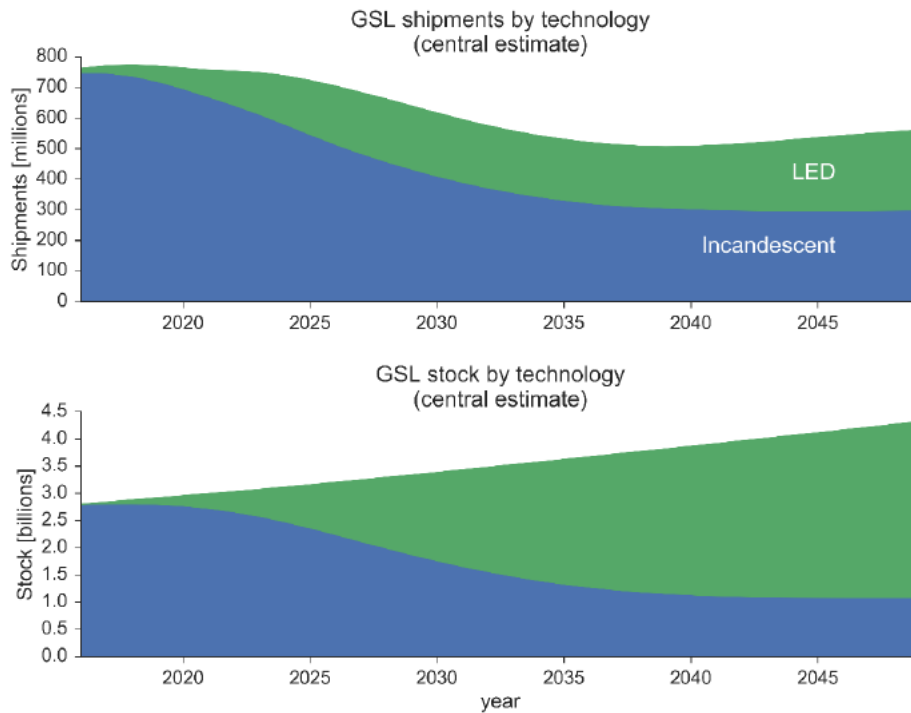


Figure 5- Shipments (top) and stock (bottom) volume by lamp technology, aggregated across lamp type and sector.

As shown in Figure 5, the shipments for these new GSLs are predominantly incandescent. Manufacturers have focused their market efforts to date on the most common light bulbs shapes and sizes, such as A-line lamps, rather than the less common sizes and shapes included in the revised definition. As a result market share for LEDs is much lower for the “new GSLs” than for lamps within the old GSL definition. The central estimate reported in the LBNL paper assumed that over half of all new GSL sales remain incandescent, but because LEDs are much longer-lived than incandescents, the installed stock of lamps eventually becomes about 75% LEDs as shown.²⁶ Because LEDs are also so much more energy efficient, the energy consumed by the installed stock of incandescent lamps continues to be several times the energy consumed by the much larger stock of LEDs as shown in Figure 6.

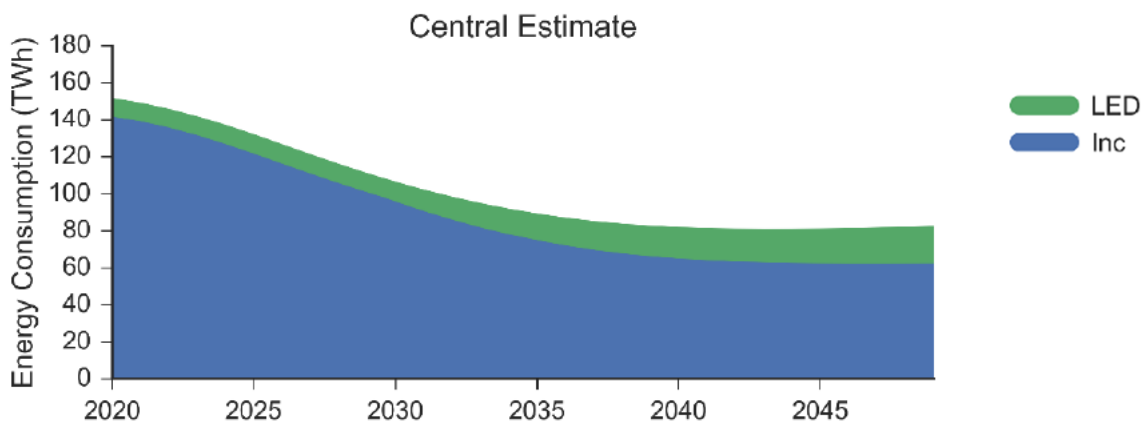


Figure 6 - LBL report central estimate case, lighting energy consumption

²⁶ For an explanation of LBNL’s methodology please refer to section 2.4.2 of the report.

The blue shaded area in Figure 6 represents lighting energy consumption that would be mostly wasted without the GSL 45 LPW standard. LBNL’s central estimate described above assumes LEDs will reach a market share substantially higher than was ever reached by compact fluorescent lamps (CFLs). According to the report, CFLs achieved at best a 50% stock penetration: the report’s central estimate for LEDs assumes a 75% stock penetration by 2049. In the *EISA Impact Report* LBNL also constructs a scenario where LEDs achieve the same stock penetration as CFLs did (50%), and a scenario where LEDs achieve 100% stock penetration over time (“No Holdouts” scenario).

We think that LBNL’s central estimate is reasonable. LEDs are superior to CFLs in several ways, which means they are likely to achieve more widespread adoption absent standards than CFLs ever did. As we discuss below, experience with A-line LEDs to date supports the 25% holdouts scenario.

However even in the “No Holdouts” scenario, the lost energy and economic savings from delaying the transition to LEDs by not applying the backstop standard to “new GSLs” is very large. As Figure 7 shows, under this unrealistic scenario the energy consumed by the installed stock of incandescent lamps will still be larger than the energy consumed by the installed stock of LEDs until sometime after 2030 (See figure 7). As discussed above, powerful market barriers significantly retard consumer adoption of even the most cost-effective and energy efficient technologies making a “no holdouts” scenario very unlikely which means that if the GSL backstop standard were not applied, the amount of energy wasted and missed cost savings would be significantly greater.

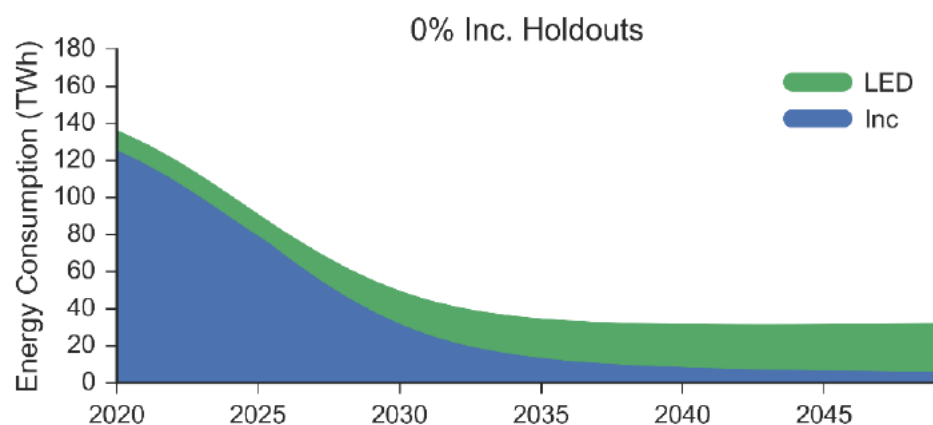


Figure 7 - LBL report 0% holdout case, lighting energy consumption

Experience with A-line LEDs to-date also suggests that the No Holdouts scenario is unrealistic. The rapid rise of LED A-line lamps seems, so far, to have been primarily at the expense of CFL market share, as opposed to cutting into the market share dominated by incandescent and halogen lamps. The National Electrical Manufacturers Association (NEMA) posts quarterly A-line lamp market shares as reported by its members. Changes in market share for LEDs, CFLs and incandescent and halogen lamps together are shown in Figure 8.

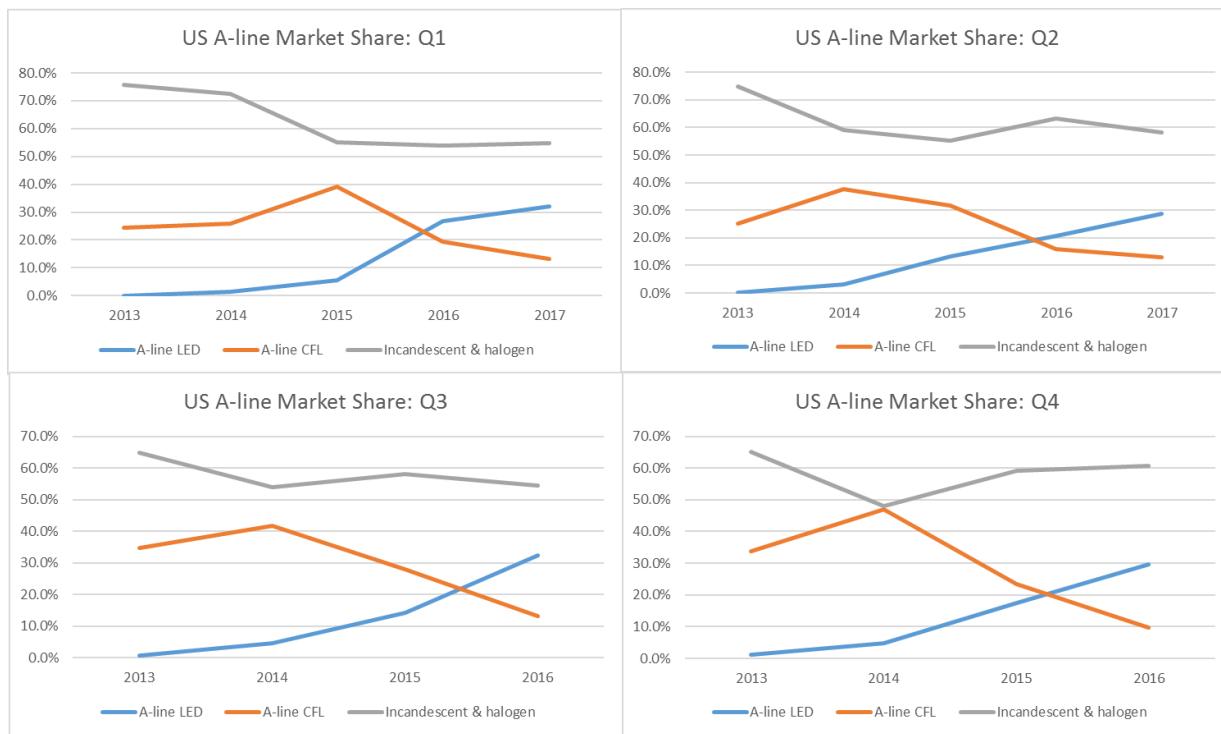


Figure 8- US A-line lamp market share by technology and quarter (NEMA lamp indices)

Figure 8 compares changes in US A-line lamp market share for LEDs, CFLs and incandescent and halogen A-line lamps combined as reported by NEMA’s members from 2013 through 2016. The reported data are graphed by quarter to avoid distortions caused by the seasonality of A-line lamp shipments. Quarters 2 and 3 are probably the most important because shipments are probably highest at these times to supply the peak lighting sales season which runs from September through March.

Figure 8 clearly shows the rapid, steady decline in A-line market share for CFLs after 2014 when they reached their historic peak above 40% market share. The decline in CFLs is countered by the rise of LEDs from almost nothing in 2013 to around a third of the market today. This increase in LED shipments is being driven by the same kind of big drops in prices and improvements in performance that CFLs experienced more than a decade ago. However, Figure 14 also shows that the market share for incandescent and halogen A-line lamps together has remained fairly steady since 2015. Despite the strong growth in LED sales, they have not yet proven to be more successful at taking market share from legacy light bulb technologies than CFLs ever were. The market experience of A-line LEDs so far certainly justifies LBNL’s choice of the 25% Holdout scenario for “new GSLs” for the central estimate in the EISA Impact Report. However, the 50% Holdout scenario is also a reasonable estimate. If LED market penetration follows a path similar to CFLs, the of energy wasted and missed cost savings from not applying the GSL backstop standard would be significantly greater.

The growth in LED market share has also been driven by energy efficiency programs. Energy efficiency programs and energy efficiency standards are complementary, part of a “virtuous cycle” of market influencers that creates incentives for industry to improve products and overcomes market barriers to consumer acceptance. Energy efficiency programs promote the most energy efficient products, expanding the range of options and preparing the market for standards to then remove the least efficient ones. Energy efficiency programs function by collecting funds from all ratepayers and providing financial incentives to consumers who purchase energy efficient products, who are the same consumers who will directly benefit from the savings those products provide. Standards equitably and efficiently allow all consumers to access the benefits

of better technology that the programs help introduce. LEDs are now established in the US market. The GSIL backstop standard will bring the clear economic benefits of LED lighting to all consumers.

III. DOE's amended GSL definition, developed through a fair and open public process, will protect consumers and cannot be rolled back.

As noted above, on January 19, 2017, DOE issued final rules determining which exemptions from the definition of general service light bulb should be ended. This section explains the benefits of that decision, the process that led up to the final rules and the limitations on DOE's authority to undo the rules.

a. DOE's amended GSL definition will protect consumers from deceptively-marketed, money-wasting light bulbs.

DOE completed its obligation to review the exemptions for certain light bulbs with publication of the January 19, 2017 final rules. The final rules, based on DOE's extensive analysis and public comment, "determined whether exemptions for certain incandescent lamps should be maintained or discontinued." 82 Fed. Reg. at 7276. Under EPCA, DOE has the authority to qualify lamps as GSLs upon determining that they are "used to satisfy lighting applications traditionally served by general service incandescent lamps." 42 U.S.C. § 6291(30)(BB)(i)(IV). As DOE explained amending the GSL definition, "The purpose, then, of the decision that Congress entrusted to DOE, to maintain or to discontinue a given exemption, was that DOE should assess the role of lamps of that type in the broader lighting market, bearing in mind the evident statutory purpose of achieving energy conservation by imposing efficiency standards for general lighting." 82 Fed. Reg. at 7277. The Department explained further: "DOE has assessed for each exemption whether lamps within that exemption are readily substitutable for lamps that are already categorized as general service lamps." *Id.* Thus, DOE has already completed a thorough and complete review of the potential for lamp switching.

The problem of lamp switching undermining the purpose of EPCA is well documented in the current Request for Data. Data provided in the notice show that sales sharply increased for two types of lamps exempted from the initial GSIL standards that came into effect between 2012 and 2014. Rough and vibration service incandescent lamps are legally defined by their filament configurations. Their original intended design purpose was for mobile, industrial, or other harsh applications. According to data presented in Table II.2 of the Request for Data, vibration service lamp sales grew from 914,000 in 2011 to more than 7 million in 2015, and rough service lamp sales grew by 4 million bulbs from 6.8 million to 10.9 million during the same period.²⁷ Nothing changed in the US economy to provoke such an explosion in sales, except the fact that sellers were able to market these lamps at prices slightly lower than lamps meeting current GSIL standards.

These loophole lamps are especially bad deals for consumers. For example, the 75 W rough service product shown in Figure 9 below looks like a traditional A-line incandescent bulb to the consumer and is marketed as appropriate for use for decorative lighting applications. However, it only produces 7 LPW, as compared to around 20 LPW for bulbs that meet the current GSIL standards. The rough service incandescent bulb in

²⁷ We are aware that the July 7, 2017 settlement of the lawsuit filed against DOE by the National Electrical Manufacturers Association (NEMA) requires DOE to codify packaging requirements and wattage limits for vibration service and rough service lamps under 42 U.S.C. § 6295(l)(4)(D)(ii), E(ii) because the sales increases have triggered these specific actions for these lamps under EPCA. These requirements must take effect one year after DOE issues a rule. These limitations do not supplant or replace the application of the 45 LPW backstop in 2020 for these particular lamps or any others included in the January 19, 2017 GSL definition.

Figure 9 produces about the same amount of light as a 29 W standards compliant halogen GSIL. The rough service bulb would increase a consumer's energy costs by more than 250% compared to a standards-compliant halogen bulb.



Figure 9 – Example of rough service lamp currently offered for sale at bulbcenter.com

Several similar products are available online at Amazon.com in multi-packs at prices slightly below the typical cost of a compliant lamp. Marketing materials suggest them for use in pendant, ceiling and wall mount, applications which provide general illumination.²⁸

BR reflector lamps offer another historical example of how manufacturers circumvent lighting standards when the scope of those standards is drawn too narrowly. Congress exempted BR and other unusual reflector lamps from initial standards for reflector lamps enacted in 1992 because they represented a niche market at the time. By the late 2000s, DOE reported that they represented 60% of non-halogen reflector lamp sales.²⁹ This loophole has increased consumer electricity costs for lighting by billions of dollars annually. According to the Request for Data, total reflector lamp sales are over 300 million units per year. As with vibration service and rough service lamps, the sheer volume of sales for these lamps demonstrates that they are being used for general illumination, and DOE's decision to include them in the definition of GSL makes sense.

In the January 19, 2017 amendments to the GSL definition, DOE properly looked ahead to the potential for other lamp types to be switched for GSLs. While manufacturers have circumvented current standards by shifting sales to rough service, vibrations service and exempted reflector lamps, once those exemptions are removed, it is likely that other easily-exploited exemptions will develop into unintended loopholes. That is

²⁸ <https://www.amazon.com/dp/B071NP1PM1?th=1>

²⁹ U.S. Department of Energy, *Final Rule Technical Support Document. Energy Conservation Standards for General Service Fluorescent Lamps and Incandescent Reflector Lamps*. Chapter 10. Shipments Analysis. July 2009 p. 40. Available in DOE docket EERE-2006-STD-0131-0147.

why Congress required DOE to examine the exemptions and empowered DOE to add lamps to the GSL definition. For example, shatter-resistant lamps are essentially a conventional inefficient incandescent lamp with an inexpensive silicone or rubber coating. Manufacturers could easily market shatter-resistant lamps to unsuspecting consumers once rough service and vibration service lamps must comply with GSL standards. Fortunately, DOE properly decided to include shatter resistant lamps in the expanded GSL definition, along with many other lamps that provide general illumination and which could easily be marketed as substitutes for GSILs.

b. DOE’s process and analysis for modifying the definition was fair, open and exhaustive.

DOE’s rulemaking process that resulted in the January 19, 2017 final rules included four public hearings and rounds of public comment. DOE thoroughly and carefully analyzed the market and technical characteristics of a wide variety of lamps. Industry and other stakeholders actively participated in this process and DOE revised proposed definitions based on this input and its own in-depth market analysis before arriving at an amended GSL definition. During the rulemaking process, DOE invited manufacturers to identify lamp types for which it would be difficult or impossible to make energy efficient substitutes. In response to manufacture input, the final rules included many more exemptions from the amended GSL definition than DOE had proposed in the NOPDDA issued October of 2016. The final rule included six categories of lamps that continue to be exempted, including many with special bases or narrow shapes. 82 Fed. Reg. at 7310.

Notably, DOE declined to expand the definition to mine service, traffic signal, marine, showcase, silver bowl, bug and plant light lamps as recommended by signatories to this letter 82 Fed. Reg. 7298. Nevertheless, we support the final rule because it is consistent with the statute and will achieve the large savings intended by Congress.

c. DOE cannot narrow the definition.

The “Request for Data” implies that DOE may decide to revisit the definition of GSILs. The notice states, “...any data received in response to this NODA could result in a reassessment of the assumptions and determinations made in the January 2017 definition final rules.” 82 Fed. Reg. at 38,616. However, DOE cites no statutory authority supporting any power to restore exemptions for specific lamp types. Nor does EPCA confer such unfettered discretion.³⁰ As described above, the backstop standard has been triggered, and compliance is required for all lamps within the definition of GSL that are sold on or after January 1, 2020. Any action to narrow the definition of GSL would increase the allowable energy use of lamps subject to the backstop standard, thereby violating EPCA’s anti-backsliding provision. *See* 42 USC § 6295(o)(1).

IV. The backstop standard level is now the baseline for DOE’s analysis of amended standards, regardless of lighting technology.

In the Request for Data DOE seeks comment to assist in its determination whether standards in effect for GSILs and/or other incandescent lamps should be amended. 82 Fed. Reg. at 38,616. Given that the GSL backstop standard has been triggered, and given the applicability of EPCA’s anti-backsliding clause, DOE’s only option now is to complete a rulemaking that would set standards that are stronger than 45 LPW.

³⁰ DOE’s narrow authority to exempt certain lamps after making specific findings only confirms there is no broad authority under EPCA to reassess the inclusion of lamps under the GSL definition. *See* 42 U.S.C. § 6291(30)(E) (authorizing the exclusion of certain incandescent lamps and fluorescent lamps); *see also id.* § 6295(i)(7)(B) (allowing increased energy use or decreased minimum required energy efficiency for “if such action is warranted as a result of other Federal action (including restrictions on materials or processes) which would have the effect of either increasing the energy use or decreasing the energy efficiency of such product”).

To the extent DOE is contemplating separate efficiency levels for GSIL, LED and CFL technologies that approach would also be contrary to EPCA. All of these products are GSLs, providing the same service of general illumination. DOE has no basis to conclude that any of these technologies possess a unique “capacity or other performance-related feature” that justifies a weaker standard under 42 U.S.C. 6295(q)(1)(B). Rather, DOE must continue to evaluate them as a single category, allowing each technology to compete against the other on an equal regulatory basis (i.e. meeting the same standard). However, if DOE nevertheless decides to develop technology-specific standards, each standard must individually exceed the 45 LPW requirement in the 2020 backstop standard, or else DOE would violate EPCA’s anti-backsliding clause.

V. Incandescent technology can achieve efficiency levels exceeding the 2012-2014 standards.

Even if DOE somehow believes it can both ignore the backstop standard and establish GSL standards that are technology-specific, the Department must conclude that strengthening the GSIL efficiency standards that took effect between 2012 and 2014 would save a significant amount of energy, is technologically feasible, and economically justified. As EPCA makes clear, DOE must improve standards if “technologically feasible and economically justified.” 42 U.S.C. § 6295(o)(2)(A).

The passage of EISA created increased interest and manufacturer R&D into technologies that could dramatically improve the efficacy of conventional incandescent and incandescent halogen lamps. As specified in [10 CFR 430.32\(x\)\(1\)](#), GSILs must meet efficiency requirements of 10.6 to 20.7 lumens per watt (LPW) depending upon rated wattage. Various advanced incandescent lamps have been developed that use halogen infrared (HIR) technology to recycle some of the infrared radiation generated by the filament into visible light. HIR technology has appeared in both A-line and reflector lamps produced by major manufacturers and products have been available with efficiencies up to 32 LPW.³¹

For example, the first generation of HIR lamps was brought to market by Philips in 2007. The Philips Halogena line included a 40 W lamp that produced 800 lumens (equivalent to a 60 W conventional filament lamp) for 20 LPW, and a 70 W lamp that produced 1600 lumens (equivalent to a 100 W conventional lamp) for 22.9 LPW as shown in Figure 10. The 100 W equivalent Halogena was ten percent higher than the 20.7 LPW that standards require for 100 W equivalent GSILs on the market today. The Halogena was also rated at 3,000 hours of life, triple that of most conventional bulbs.³²

In a second example demonstrating that improved GSIL standards are technologically feasible, Deposition Sciences Inc. developed advanced coatings and halogen capsule technology designed to cut lamp power consumption in half while delivering the same amount of light.³³ In 2013 the first generation of advanced HIR lamps based on Deposition Sciences technology was introduced and sold by Venture Lighting. Figure 11 shows the 100 W equivalent “Vybrant 2X” bulb rated at 50 W with an efficacy of 32 LPW, which was

³¹ 100w equivalent 2x bulbs were rated at 1600 lumens for 50W, yielding 32 LPW.

³² During earlier rulemakings, manufacturers argued that improved efficacy in incandescent light bulbs can come at the expense of product life. Since the Halogena lamp had a lifetime of 3000 hours, it is possible that by shortening to the more conventional incandescent lifetime of 1,000 hours efficacy could be even further improved.

³³ For more information on Deposition Sciences (owned by Advanced Lighting Technology) research see this ENERGY STAR products meeting presentation: <https://www.energystar.gov/sites/default/files/asset/document/Lighting%20Technology%20Updates%20Stockdale.pdf>

available at around \$3.50 per bulb in 2013.³⁴ Venture Lighting also offered a 60 W equivalent lamp that delivered 800 lumens for 30W with an efficacy of 26.7 LPW.



Figure 10 - Philips Halogena 70 W lamp



Figure 11 - Vybrant 2X 50 W HIR bulb

TCP, the manufacturer that controls the largest share of the U.S. CFL market, also worked to develop a similar HIR bulb offering (see Figure 12), though it is unclear whether this product was ever offered for retail sale. Further advances in high efficiency incandescent lamps continue as nanotechnology research at MIT has been reported to yield a new approach for recycling waste heat into visible light.³⁵



TCP Generation 2 Hybrid Halogen

TCP exclusive Hybrid Halogen technology

Highest efficacy ratings (50% more energy efficient) with a max efficacy rating = 32 LPW

Full range of products

50W = 100W @ 1600 lumens

40W – 75W @ 1150 lumens

30W = 60W @ 850 lumens

2,000 hour life rating

Figure 12 - TCP "Hybrid Halogen" Lamp with 50% higher efficiency

³⁴ According to discussion in an on-line lighting forum here:
[http://www.candlepowerforums.com/vb/showthread.php?363165-REVIEW-vybrant-50w-1600-lumen-\(100w-equivalent\)-A-19-incandescent-bulb&s=3903b6ff3c74e3920ee1ba032b2be6c6](http://www.candlepowerforums.com/vb/showthread.php?363165-REVIEW-vybrant-50w-1600-lumen-(100w-equivalent)-A-19-incandescent-bulb&s=3903b6ff3c74e3920ee1ba032b2be6c6)

³⁵ <http://news.mit.edu/2016/nanophotonic-incandescent-light-bulbs-0111>

Improved standards for GSILs beyond the EISA levels are obviously technologically feasible. While the vast majority of GSILs available on the market today only just meet the efficiency levels codified in EISA, incandescent light bulbs have been commercially available that significantly exceed the standards' minimums. From the consumer's perspective the Vybrant 2X halogen infrared A-type bulb in Figure 11 would cost 9% less to own and operate over its lifespan than a currently available halogen bulb, as shown in Table 2.

Table 2- Comparison of nominal lifecycle costs of GSIL standards compliant halogen bulb and 2X HIR bulb

| Lamp Type | Watts | Initial Lumens | Rated Life (hrs) | Elec Cost ⁱ | Bulb Price ⁱⁱ | Total Cost ⁱⁱⁱ |
|-----------|-------|----------------|------------------|------------------------|--------------------------|---------------------------|
| Halogen | 72 | 1490 | 1,000 | \$ 9.45 | \$ 1.49 | \$ 10.94 |
| 2X HIR | 50 | 1600 | 1,000 | \$ 6.56 | \$ 3.50 | \$ 10.06 |

Table 2 Notes:

- i Cost of electricity assumed to be \$0.1312/kilowatt-hour, the national average residential rate published by the US Energy Information in September 2017
(https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a)
- ii The price of the 72 W halogen bulb is for an EcoSmart 100 W equivalent bulb sold in a 4-pack on the Home Depot website in October of 2017. The price shown for the Vybrant 2X HIR bulb is from when it was available at retail in 2012. As with any new lighting product, the price of this 2X HIR bulb almost certainly would have dropped considerably had it ever been produced in volume by multiple manufacturers.
- iii Total cost is the cost of the electricity used plus the cost of buying one bulb.

EPCA requires DOE, in determining whether to amend standards, to fully assess and evaluate the technological feasibility and economic justification for potential improved standards. The information presented here clearly shows that GSILs that exceed the current standards are technologically feasible and are economically justified. Halogen IR products like the 2X lamps were unsuccessful in the market because of the same market failures discussed in section II. d. above. HIR bulbs also were introduced at about the same time as LEDs, which offered much higher efficacy, the potential for lower production costs, and other attractive features. The major lighting manufacturers quickly shifted their interest away from improving the efficiency of halogen incandescent light bulbs to developing the potential of LED technology. The clear market competition between various types of incandescent, CFL and LED light bulbs supports Congress' decision to group them all as general service lamps.

Today the major lighting manufacturers have obsolete, but fully amortized, halogen incandescent light bulb production lines and would like to continue selling outmoded light bulbs for as long as market failures allow demand for them to persist before they are replaced by LEDs. The best public policy for consumers is a single, technology neutral GSL standard, like the 45 LPW backstop. However, if DOE does decide to evaluate product types separately, the agency must conclude that improved GSIL standards are justified.

VI. The lighting industry has called a 2020 compliance date for the GSL backstop standards “Ideal”

Although the lighting industry has recently been working to undermine the GSL backstop standards, industry previously supported them and as recently as 2015 called a 2020 compliance date for the standards at LED performance levels “ideal.” The lighting industry supported the 2007 law that added the backstop provision to EPCA. The industry understood the plain meaning of the statute: that the minimum standard in 2020

would be at least as stringent as the backstop. In response, the industry invested appropriately and, in time, a new generation of light bulbs, LEDs, came to market and has become very successful in the market. That is the way that well thought-out regulation should work. Congress gave manufacturers a target, more than adequate time to meet it (13 years in this case), and then let innovation and market forces do the rest. In the case of GSLs, this approach exceeded expectations, as documented in these comments.

The lighting industry is global and the US was not the only market where policy makers pointed the industry toward efficiency improvements. The European Union (EU) has regulations covering non-directional (i.e. A-line, decorative, etc. lamps) and directional incandescent and halogen lamps (reflector lamps). The efficiency requirements in European regulation, which apply to lamps sold in all 27 EU countries, are at least as stringent as the US 45 LPW GSL backstop standard. The EU standards for line voltage directional lamps went into effect on September 20, 2016 and standards for non-directional lamps will go into effect on September 1, 2018. These effective dates are significantly earlier than the January 1, 2020 date which applies to equivalent products in the US and we are not aware of any issues relating to product availability or other technical concerns in the European lighting market.

LightingEurope is the European lighting industry trade association, NEMA's European equivalent. The major lighting companies - General Electric, Philips Lighting, Ledvance, and Osram – are represented by LightingEurope in the EU and NEMA here. A LightingEurope press release³⁶ includes the statement “The industry strongly supports—and has for years—the changeover to more energy efficient lighting solutions. While 2020 was the *ideal* date for a phase-out of the popular domestic halogens, 2018 is an acceptable compromise.” (*emphasis added*)³⁷

Similarly in the last month the Australian Equipment Energy Efficiency (E3) Program has released updated policy positions for lighting that includes a phase out of incandescent and halogen lighting in stages in Australia starting in 2019 and completed by the end of 2021. The updated policy positions reports broad support for the phase out from stakeholders including industry.³⁸ In other words, the same companies that have embraced energy efficient lighting for their European and Australian customers are now trying to slow progress in the United States and continue to sell inefficient, energy- and money-wasting products to American consumers.

In summary, for the legal and substantive reasons described above, we urge DOE to side with American consumers and reject the lighting manufacturers' efforts to derail, weaken or narrow DOE's standards for GSLs. We appreciate the opportunity to provide these comments.

Sincerely,

(See signature page)

³⁶ *LightingEurope Approves 2018 Halogen Phase-out Date*. 17 April, 2015.

https://www.lightingeurope.org/images/publications/pr/LightingEurope_approves_2018_halogen_phase-out_date.pdf

³⁷ The CFLs and LEDs that comply with the European 2016 or 2018 regulations, are technically very similar to the CFLs and LEDs that comply with the GSL backstop standard.

³⁸ <http://energyrating.gov.au/document/consultation-ris-lighting-updated-policy-proposals>



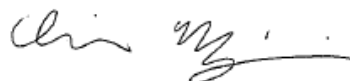
Christopher Granda
Senior Researcher/Advocate
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Northwest Energy Efficiency Alliance



Jennifer Thorne Amann
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Claire Miziolek
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Charlie Harak
Attorney
National Consumer Law Center, on behalf of its low-income clients



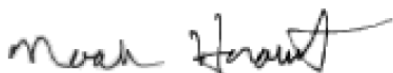
Daniel Bresette
Vice President, Policy & Research
Alliance to Save Energy



Mel Hall-Crawford
Director of Energy Programs
Consumer Federation of America



Tom Eckman
Senior Advisor
Northwest Power and Conservation Council



Noah Horowitz
Senior Scientist
Natural Resources Defense Council



Mandy Mahoney
President
Southeast Energy Efficiency Alliance

Appendix 1: ASAP simplified LED switch savings assumption

While the consumer savings estimates by lamp type presented in Table 1 draw upon physical characteristics, pricing and usage data from the *EISA Impact Report* (Attachment 6), the average household savings estimates and total U.S. residential savings estimates included in these comments are based on DOE's 2012 Residential Lighting End-Use Consumption Study: Estimation Framework and Initial Estimates.

| |
|---------------------------------------|
| 53.5 W per baseline lamp ⁱ |
| 11.0 W per LED |
| 42.5 W savings per bulb |

| |
|--|
| 1,500 hours, life of baseline lamp ⁱⁱ |
| 10,000 hours, life of LED |
| \$ 2.00 price baseline lamp |
| \$ 2.56 price LED ⁱⁱⁱ |

| |
|--|
| 1.6 hours per day usage per bulb |
| 365 days per year |
| 0.1312 \$/kWh average residential electricity tariff ^{iv} |

| |
|--|
| 67.4 lamps per home in US avg ⁱ |
| 118 million homes ^{vi} |

| |
|---|
| 24.82 kWh saved per lamp per year from 100% replacement |
| 1,672.9 kWh saved per home per year from 100% replacement |
| \$ 219.48 electricity savings per home per year from 100% replacement |
| \$ 2,194.80 electricity savings per home over 10 years |
| \$ 5.44 cost savings per bulb over 10 years |
| \$ 366.66 bulb savings per home over 10 years |
| \$ 2,561.46 Total LED savings per home over 10 years |
| \$ 302.25 billion saved for all consumers over 10 years |

Table Notes:

- i Estimated wattage of current installed mix of incandescent, CFL and LED lamps.
- ii Estimated average rated life of current installed mix of lamps.
- iii LED price from Consumer Federation of America research (see Attachment 4a).
- iv Avg U.S. national average residential electricity rate published by the US Energy Information in September 2017. (https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a)
- v Residential Lighting End-Use Consumption Study. DOE. October 2012
- vi DOE Residential Energy Consumption Survey, 2015 data

Attachments

1. Settlement Agreement between DOE and NEMA
2. Energy Conservation Standards Rulemaking Framework Document for General Service Lamps. DOE. December 2, 2013
3. Consent Decree, New York v. Bodman, No. 05-7807. United States District Court for the Southern District of New York. November 6, 2006.
4. Lawrence Berkeley National Laboratory. *Impact of the EISA 2007 Energy Efficiency Standard on General Service Lamps*. January 2017
5. Results of CFA light bulb retailer price survey
6. *Technical Support Document: Impacts on the Nation of the Energy Independence and Security Act of 2007*. U.S. Department of Energy–Office of Energy Efficiency and Renewable Energy, 2009.
7. *The Light Bulb Revolution*. US EPA. October 2017
8. *Addressing Market Barrier to Energy Efficiency in Buildings*. Congressional Budget Office Working Paper Series. August 2012
9. *Market Barriers to Energy Efficiency: A Critical Reappraisal of the Rationale for Public Policies to Promote Energy Efficiency*. LBNL. March 1996