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May 16, 2016

VIA EMAIL TO: GSL2013STD0051@ee.doe.gov

Ms. Brenda Edwards
US Department of Energy
Buildings Technologies Program
Mail Stop EE-5B
1000 Independence Ave, SW
Washington, DC 20585-0121

NEMA Comments on Energy Conservation Program: Energy Conservation Standards Rulemaking Notice of Proposed Rulemaking (NOPR) for General Service Lamps

Docket Number: EERE-2013-BT-STD-0051
RIN: 1904-AD09

Dear Ms. Edwards,

As the leading trade association representing the manufacturers of electrical, medical imaging, and radiation therapy manufacturers, the National Electrical Manufacturers Association (NEMA) provides the attached comments on the Department of Energy's Notice of Proposed Rulemaking for General Service Lamps. These comments are submitted on behalf of NEMA Light Source Section member companies.

NEMA, founded in 1926 and headquartered in Arlington, Virginia, represents nearly 400 electrical and medical imaging manufacturers. Our combined industries account for more than 400,000 American jobs and more than 7,000 facilities across the U.S. Domestic production exceeds $117 billion per year.

Please find our detailed comments attached. Our member companies count on your careful consideration of these comments and look forward to an outcome that meets their expectations. If you have any questions on these comments, please contact Alex Boesenberg of NEMA at 703-841-3268 or alex.boesenberg@nema.org.

Sincerely,

Kyle Pitsor

Kyle Pitsor
Vice President, Government Relations

COMMENTS OF THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

ON THE

DEPARTMENT OF ENERGY'S NOTICE OF PROPOSED RULEMAKING

FOR GENERAL SERVICE LAMPS

May 16, 2016

EXECUTIVE SUMMARY

In Part One of our Comments, NEMA devotes a considerable amount of time to reviewing the statutory language that reflects the intent of Congress with respect to this rulemaking. We do this for several reasons.

First, the DOE's Notice of Proposed Rulemaking (NOPR) for General Service Lamps, 81 FR 14528 (March 17, 2016) reveals that the Department is significantly exceeding its authority with respect to the scope of products it is proposing to apply "general service lamp" energy conservation standards to in this rulemaking. The DOE is proposing to define a "general service lamp" based on whether the lamp provides "overall illumination" to an area. 81 FR 14528, 14541 (March 17, 2016). Congress has never defined any "general service" lamp in those terms; Congress defined a general service lamp very differently and intended to define it differently: a general service lamp is a lamp that is "used to satisfy the majority of lighting applications." The NOPR's proposed definition of a "general service" lamp --- focusing as it does on "overall illumination" --- is wrong. By that definition, DOE is squeezing specialty lamps into the general service lamp category that Congress expressly excluded from that category.

DOE's proposed definition ignores the text of the statute and its legislative history dating back to the Energy Policy Act of 1992 through the Energy Independence and Security Act of 2007. See Part One, Section I and Section III.D. *infra*. Notwithstanding Congress' more limited definition of "general service lamps," the Department is not without authority to establish energy conservation standards for "specialty" lamps provided that specific statutory preconditions are met. *See:* Part One, Section III.B; Part Two, Sections I and II; and Part Three, Question 5, *infra*.

Second, the DOE has misconstrued the "Appropriations Rider's" restriction on the use of appropriated funds on its ability to analyze and make decisions about general service incandescent lamps and other incandescent lamps in connection with this rulemaking. The DOE appears to be consciously attempting to eliminate consumer choice for a variety of general service lamp products when that is contrary to the intent of Congress with respect to both the Energy Independence and Security Act of 2007 (EISA-2007) and the Appropriations Rider. DOE has ignored the fact that EISA-2007 and the Appropriations Rider are reconcilable, and DOE has made no effort to reconcile the two laws to comply with both laws. Congress directed the Secretary to undertake a rulemaking for various types of general service lamps, consider certain things, and make certain determinations. As NEMA demonstrates in these comments, the Secretary can easily meet its statutory obligations for this rulemaking without infringing the Appropriations Rider. See Part One, Section III.E.(3), *infra*. It is an arbitrary and capricious

abrogation of DOE's responsibility under EISA-2007 and EPCA to not do what Congress has directed when a legal pathway is available to the DOE consistent with the Appropriations Rider.

Third, DOE is proposing to adopt a new energy conservation standard for general service lamps at 10 CFR §430.32(z)(1)(vii) as follows:

> **(vii)** Effective beginning January 1, 2020, each general service lamp sold shall meet a minimum efficacy standard of 45.0 lumens per watt.

81 FR 14528, 14630 (March 17, 2016). Since the definition of "general service lamp" includes the general service incandescent lamp, the Department's proposed rule would implement a new minimum energy conservation standard prohibiting the *sale* of general service incandescent lamps effective January 1, 2020, that is not technologically feasible for the general service incandescent lamp to meet and cannot be economically justified. The Department avoids all analysis of incandescent lamps and the impact of DOE's proposed regulatory action regarding those lamps because of a failure to reconcile the Appropriations Rider with EISA-2007 and EPCA procedure.

In addition to ignoring that EISA-2007 and the Appropriations Rider can be reconciled, DOE has misinterpreted the "Backstop" provision that the NOPR would standardize as a regulation. Congress never intended that the Secretary adopt a rule based on the Backstop provision *in this rulemaking procedure* prohibiting the sale of general service lamps with an efficacy of less than 45 lumens per watt. The statute clearly and unambiguously demonstrates that *that* determination is to be made separately, after this rulemaking procedure is completed and an analysis made of whether the "final rule . . . produce(s) energy savings that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt." That analysis cannot be undertaken until *after* a rule developed in this proceeding is final. See Part One, Section III.E.(4), *infra*.

In Part Two of NEMA's comments, we apply our comments in Part One to the NOPR. NEMA identifies the lamps that are within the scope of the term "general service lamp" and those that are not. NEMA discusses the application of the statutory requirement to determine whether exemptions for certain incandescent lamps should be maintained or discontinued and proposes energy conservation standards for certain of those lamps for which exemptions should be discontinued as part of this rulemaking. See Part Two, Section II, and Part Three, Question 5, *infra*.

NEMA further explains what the Secretary can and must do in the rulemaking to comply with EISA 2007 consistent with the Appropriations Rider. This includes a discussion of why higher energy conservation standards for the general service incandescent lamp cannot be economically justified and therefore the current standards for these lamps cannot be amended due to higher consumer lifecycle costs, elimination of domestic jobs (these lamps are produced in the United States in significant quantity), substantial negative impact on the industry's net present value while stranding production assets, and reduction in consumer choice. See Part Two, Section III, *infra*. The determination that energy conservation standards for general service incandescent lamps cannot be amended is not an implementation of 10 CFR 430.32(x)

prohibited by the Appropriations Rider. It is consistent with congressional intent behind both the Appropriations Rider and EISA-2007.

NEMA also addresses developments in the lighting market for general service lamps. NEMA and its members foresee (1) substantial socket penetration of general service LED lamps in general service lamp sockets by 2020 and beyond, and (2), absent some unforeseen or disruptive development, the medium screw base compact fluorescent lamp will largely disappear from retail store shelf space before 2020 solely due to lamp demand and consumer preference. DOE's analysis forecasts a significant decline in CFL shipments prior to 2020, but does not appear to anticipate this outcome. NEMA market data demonstrates that this trend has already begun, and our member company views on this prospect are in accord. The DOE's proposed standard, by its own admission, will certainly kill the CFL product once and for all, but market forces prior to 2020 will likely have a greater impact on this consequence than governmental regulation. The Secretary could do nothing about the compact fluorescent lamp in this rulemaking and it will not likely make a material difference. See Part Two, Section IV, *infra.* The Department, however, does not have the authority to eliminate a "covered product type" from the market through an amendment of an energy conservation standard, because every amendment of a standard must be technologically feasible and economically justified. 42 U.S.C. §6295(o)(2)(A). The NOPR's proposed amendment of the energy conservation standard for medium base compact fluorescent lamps, which eliminates this CFL product from the market altogether because the product cannot technologically meet the requirements of the standard, is, *ipso facto*, not technologically feasible. It also cannot be economically justified. NEMA encourages the Department to maintain the current energy conservation standard for the CFL, or adopt EL-2 for the CFL if it can be economically justified. Market forces should determine the fate of the CFL.

NEMA would not have envisioned these market developments in 2007, nor would NEMA have envisioned these developments two years ago in early 2014 when NEMA submitted comments on the DOE Framework document in this proceeding. Changes in the lighting market are occurring more rapidly than expected: the speed with which costs and prices for medium screw base light emitting diode (LED) lamps have declined and the rapid market penetration for these LED lamps exceeds earlier expectations. The market trajectory for socket penetration of LED lamps at this point in time (2015-16) from time of introduction to market is far greater than the compact fluorescent lamp achieved at a similar point in time, and NEMA members expect this to accelerate without governmental regulation. Based on current trends, it is foreseeable that the general service LED lamp will replace nearly all "general service" compact fluorescent lamps and a substantial number of general service halogen incandescent lamps in sockets in the not too distant future absent some unforeseen development. We reasonably forecast that the general service lamp market will realize energy savings from a "fleet" of various lamp technologies in general service sockets greater than or equal to the energy consumed by a 45 lumen per watt lamp in every socket. Public reports to DOE from DOE consultants are consistent with this outcome. This is significant for the backstop proceeding that Congress intended to take place *after* this rulemaking is completed. It anticipates that there is no reason to conclude the backstop should be implemented or enforced. A preliminary analysis is included in Appendix A.

Having said that, the NOPR's analysis of the proposed rule's impact on market shipments at the time the rule goes into effect presents a serious problem for consumers, manufacturers, and the distribution channel. The NOPR casually dismisses without any explanation a very serious consequence of the proposed rule --- lack of production capacity and product shortages --- which is largely the creation of the DOE's misinterpretation of the Appropriations Rider and the backstop provision. See Part Two, Section IV, *infra*.

In Part Two, Section V, *infra*, NEMA recommends changes to DOE's efficacy equation (or efficacy curve) for general service LED lamps. NEMA learned at the DOE's public meeting on April 20, 2016 that the efficacy equation was based on an investigation of LED products in the market over two years ago. Testifying to the rapid LED innovation that has occurred, those products are no longer representative of LED lamp products available today. Today's LED products are available at lower wattages than those evaluated. The NOPR's efficacy equation presents substantial problems for LED lamps at low wattages and lower lumen levels. The equation no longer works.

Finally, NEMA addresses the application of EPCA's express preemption provisions, 42 U.S.C. §6297, to state regulation and urges the DOE to include in the Code of Federal Regulations, 10 CFR §430.2, an express recognition of the covered products (in the definition of covered product) to which preemption applies. This would be consistent with DOE's past practice. See 71 FR 42178 (July 25, 2006) and Part Two, Section V, *infra*.

In Part Three of NEMA's comments, we respond to the specific questions the DOE has asked the public to comment upon in the NOPR. Table C in our response to Question 5 in Part Three of our comments contains a complete summary of how NEMA believes DOE should address whether to maintain or discontinue exemptions for certain specialty lamps of each lamp technology.

In Appendix B to these comments, we provide proposed text for the Final Rule based on our comments and analysis. We propose three new definitions for "MR lamp," "Specialty lamp," and "Specialty base lamp." These terms are important to simplify and clarify the lamps subject to general service lamp standards as authorized by Congress. We further propose revising the definition of "Covered product" and "Vibration service lamp," and we propose revisions to DOE's proposed definitions of "General service lamp" and "General service light-emitting diode (LED) lamp."

Finally NEMA proposes revisions to the new standards paragraph proposed at 10 CFR §430.32(z). We recommend leaving the existing provision at 10 CFR §430.32(x)(incandescent lamps) alone and intact. Given the DOE's apparent concern with the Appropriations Rider, this is the only course of action consistent with that concern. We also propose leaving the paragraph at 10 CFR §430.32(u)(CFL) alone and intact as well. We propose revising the newly proposed paragraph at 10 CFR 430.32(z) and propose new standards for certain incandescent lamps, including the MR incandescent lamp, vibration service incandescent lamp, and rough service incandescent lamp. We propose that a 45 LPW standard for non-integrated compact fluorescent lamps be adopted. For technical reasons, we propose that the efficacy curve proposed for general service LEDs be modified slightly as our members discussed at the April

20 public meeting. We further propose energy conservation standards for the MR LED lamp, and certain LED specialty lamps --- the three-way LED lamp, the candelabra base LED lamp, and the intermediate-base LED lamp.

PART ONE: LEGISLATIVE HISTORY OF LAMP REGULATION IN ENERGY POLICY AND CONSERVATION ACT

I. The Energy Policy Act of 1992 (EPAct 1992) and the Meaning of "General Service"

The term "general service," as applied to lamps, was first introduced into the Energy Policy and Conservation Act (EPCA) lexicon by the Energy Policy Act of 1992. Pub.L. 102-486, 106 STAT. 2776 (EPAct 1992). Used to identify "general service fluorescent lamps" and "general service incandescent lamps" that would or could be regulated by DOE under EPCA, the term "general service" had a quantitative meaning based on the lamp type's market penetration in lamp sockets: a "general service" lamp, whether incandescent or fluorescent, was "used to satisfy the majority of lighting applications":

> "The term 'general service incandescent lamp' means any incandescent lamp (other than a miniature or photographic lamp) that has an E26 medium screw base, a rated voltage range at least partially within 115 and 130 volts, and which can be *used to satisfy the majority of lighting applications*, *but does not include* any lamps specifically designed for---
>
> (i) traffic signal, or street lighting service;
> (ii) airway, airport, aircraft, or other aviation service;
> (iii) marine or marine signal service;
> (iv) photo, projection, sound reproduction, or film viewer service;
> (v) stage, studio, or television service;
> (vi) mill, saw mill, or other industrial process service;
> (vii) mine service;
> (viii) headlight, locomotive, street railway, or other transportation service;
> (ix) heating service;
> (x) code beacon, marine signal, lighthouse, reprographic, or other communication service;
> (xi) medical or dental service;
> (xii) microscope, map, microfilm, or other specialized equipment service;
> (xiii) swimming pool or other underwater service;
> (xiv) decorative or showcase service;
> (xv) producing colored light;
> (xvi) shatter resistance which has an external protective coating; or
> (xvii) appliance service."

Pub.L. 102-486, 106 STAT. 2776, 2819 (emphasis supplied).

> "The term 'general service fluorescent lamp' means fluorescent lamps which can be *used to satisfy the majority of fluorescent applications*, *but does not include* any lamp designed and marketed for the following nongeneral lighting applications:
>
> (i) Fluorescent lamps designed to promote plant growth.
> (ii) Fluorescent lamps specifically designed for cold temperature installations.
> (iii) Colored fluorescent lamps.
> (iv) Impact-resistant fluorescent lamps.

(v) Reflectorized or aperture lamps.

(vi) Fluorescent lamps designed for use in reprographic equipment.

(vii) Lamps primarily designed to produce radiation in the ultra-violet region of the spectrum.

(viii) Lamps with a color rendering index of 82 or greater."

Pub.L. 102-486, 106 STAT. 2776, 2818; 42 U.S.C. §6291(30)(B)(emphasis supplied).

The statutory list of lamps excluded from the definitions of both incandescent and fluorescent "general service" lamps in EPAct 1992 are *specialty* lamps that did *not* satisfy a majority of lighting applications; accordingly, they were and are not "general service" lamps. They are used in special applications representing a minority of lighting applications. In focusing its regulatory gaze on "general service" lamps *used to satisfy the majority of lighting applications*, Congress was fixated on establishing energy conservation standards for those lighting products where standards would have the greatest impact for significant energy savings: those lamps that were used the most; not those lamps that were used in smaller quantities in special applications, that typically had different designs, and where the burden of regulation would weigh more heavily. Consistent with this intent, Congress assigned to the Secretary the authority to exclude additional specialty incandescent and fluorescent lamps from regulation because they "would not result in significant energy savings *because such lamp is designed for special applications or has special characteristics* not available in reasonably substitutable lamp types." Pub.L. 102-486, 106 STAT. 2776, 2819; 42 U.S.C. §6291(30)(E).

Notably, several specialty incandescent and fluorescent lamps on the EPAct 1992 list of excluded lamps are capable of providing "an interior or exterior area with overall illumination," including "shatter resistant," "street lighting service," "airway" and "airport" service incandescent lamps, as well as fluorescent lamps "specifically designed for cold temperature installations," "impact-resistant fluorescent lamps," and fluorescent "lamps with a color rendering index of 82 or greater." An excluded 60 watt shatter-resistant incandescent lamp can provide overall illumination just like its 60 watt general service incandescent lamp counterpart. This legislative fact leads to the inescapable conclusion that "general service" lamps are not and cannot be defined in terms of their capacity to provide "overall illumination." Congress never included the phrase "overall illumination" in the definition of a "general service" lamp. The phrase was never part of EPAct 1992. In contrast, Congress did specify a quantitative market penetration measure of use in its definition of "general service" lamps.

It should also be noted that some of the lamp applications excluded from the EPAct 1992 definition of general service incandescent lamps include types of lamps that are not consumer products, but are distinctly commercial products: headlight, locomotive, railway, and other transportation lamps; signal beacon and marine signal lamps; mine service lamps; photo, projection, sound reproduction, or film viewer service; stage, studio, or television service; mill, saw mill, or other industrial process service; medical or dental service; microscope, map, microfilm, or other specialized equipment service. The general service incandescent lamp was inherently a consumer product that was also used to a lesser extent in some commercial settings. These exclusions assured there was no regulation of these specialty commercial products as a general service incandescent lamp, a consumer product.

IN EPAct 1992, Congress enacted energy conservation standards for only two of the four types of lamps it considered for regulation in EPAct 1992: general service fluorescent lamps and incandescent reflector lamps. Pub.L. 102-486, 106 STAT. 2776, 2824; 42 U.S.C. §6295(i)(1)(A). Congress did not enact standards for general service incandescent lamps or high-intensity discharge lamps. In the case of general service incandescent lamps, Congress directed the Secretary to initiate a rulemaking procedure in the future "to determine if standards in effect for . . . incandescent lamps[1] should be amended so that they would be applicable to . . . general service incandescent lamps", Pub.L. 102-486, 106 STAT. 2776, 2825; 42 U.S.C. §6295(i)(5), and in the case of high intensity discharge lamps Congress directed the Secretary to "make a determination that energy conservation standards would be technologically feasible and economically justified, and would result in significant energy savings." Pub.L. 102-486, 106 STAT 2776, 2832; 42 U.S.C. §6317(a)(1).

Congress could expect significant energy savings from the standards that it enacted into law in 1992 for general service fluorescent lamps and incandescent reflector lamps. In these two lamp categories, there were lamps on the market that were less efficacious than Congress' standards, and those less efficacious lamps would be eliminated from the market leaving only the more efficacious lamps available for sale. Not so for general service incandescent lamps: this lamp type came in four flavors --- the familiar 40 watt, 60 watt, 75 watt, and 100 watt light bulbs, each correlated with a common level of light output (lumens); "less" efficacious general service incandescent lamps were not generally available on the market, nor were more efficacious products available at lower wattages that would maintain the common lumen levels on the market. An energy conservation standard for general service incandescent lamps in 1992 would accomplish nothing. Absent an obvious opportunity for significant energy savings, Congress delegated to the Secretary authority to determine by rulemaking whether that would change in the future.[2] It was also not obvious to Congress in 1992 that standards for high

[1] The "standards in effect for . . . incandescent lamps" is a reference to the standards for incandescent reflector lamps that Congress established in EPAct 1992.

[2] DOE never initiated a rulemaking procedure for general service incandescent lamps. DOE allocated its appliance efficiency rulemaking resources as it deemed most effective, and it accomplished this by prioritizing the mandated rulemakings in terms of "high," "medium," or "low," based on public stakeholder input that focused on opportunities for significant energy savings, see U.S. Government Accountability Office, Long-standing Problems with DOE's Program for Setting Efficiency Standards Continue to Result in Forgone Energy Savings at 14-15 (January 2007)(hereinafter "GAO Report"), and described its priorities in a published notice each year. *See e.g.* Introduction to The Regulatory Plan and the Unified Agenda of Federal Regulatory and Deregulatory Actions, 68 F.R. 72401, 72467 (Dec. 22, 2003). *See also*, GAO Report, *id.* DOE designated general service incandescent lamps low priority for energy conservation standards for essentially the same reason that Congress was unable to establish energy conservation standards for this product in 1992. The only more efficient lamp product available on the market that was "designed as a direct replacement for a general service incandescent lamp" was the medium screw base compact fluorescent lamp, which Congress defined in EPAct 1992, Pub.L. 102-486, 106 STAT 2776, 2820; 42 U.S.C. §6291(30)(S)(i). Unlike general service incandescent lamps, Congress provided no express authority to the Secretary in EPAct 1992 to regulate the compact fluorescent lamp (CFL). It was widely recognized that the CFL had consumer acceptance and technology issues that made it inappropriate to regulate the general service incandescent lamp from the market in favor of this more efficient lamp. Pacific Northwest National Laboratory, *Compact Fluorescent Lighting in America: Lessons Learned on the Way to Market*, 2.1-2.9 (June 2006)(hereinafter "PNNL CFL Report"). Available at

intensity discharge lamps "would be technologically feasible and economically justified, and would result in significant energy savings," and Congress left it to the Secretary to make that determination.[3]

II. The Energy Policy Act of 2005 (EPAct 2005)

As stated above (see note 2, *supra*), Congress did not provide any express authority in EPAct 1992 for the Secretary to determine whether energy conservation standards for the medium screw base compact fluorescent lamp (CFL) would be economically justified, technologically feasible or would result in significant energy savings, notwithstanding the fact that Congress defined the CFL product in EPAct 1992. The market penetration of the CFL was not significant in 1992.[4] In the absence of express authority to establish energy conservation standards for the CFL, the Secretary would have to rely on its authority under Section 322(b) of EPCA, 42 U.S.C. §6292(b), to "classify a type of consumer product as covered product" in order to initiate a rulemaking procedure for the CFL.

That changed in 2005. In enacting the Energy Policy Act of 2005, Pub.L 109-58, 119 STAT. 594 (EPAct 2005), Congress established an energy conservation standard for this compact fluorescent lamp product that it defined in 1992 as "a direct replacement for a general service incandescent lamp." The market penetration of the CFL by 2005 was now significant,[5] and there were more efficacious CFLs on the market. Under EPAct 2005, the most common medium screw base CFL would require a minimum efficacy level of 45 lumens per watt. In adopting an energy conservation standard for this CFL product, however, Congress also modified its definition of the medium screw base compact fluorescent lamp consistent with its EPAct 1992 distinction between "general service" lamps and lamps that were used in "special applications":

> **"(ii)**The term 'medium base compact fluorescent lamp' does not include--
> **(I)** any lamp that is--
> **(aa)** specifically designed to be used for special purpose applications; and
> **(bb)** unlikely to be used in general purpose applications, such as the applications described in subparagraph (D); or
> **(II)** any lamp not described in subparagraph (D) that is excluded by the Secretary, by rule, because the lamp is--
> **(aa)** designed for special applications; and

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http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/cfl_lessons_learned_web.pdf In a very limited way, Congress would alter its perspective toward the CFL in the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007.

[3] The lack of obviousness in the case of high intensity discharge lamps was borne out in 2014, when the Secretary made a negative determination that standards for high intensity discharge lamps could not be economically justified and would not result in significant energy savings. 79 F.R. 62910 (October 21, 2014)(NOPD); 80 F.R. 76355 (December 19, 2015)(final rule).

[4] PNNL CFL Report, *supra* note 2 at 5.1 (June 2006).

[5] *Id.* See text accompanying note 72, *infra*.

(**bb**) unlikely to be used in general purpose applications."

Pub.L 109-58, 119 STAT 594, 624-25; 42 U.S.C. §6291(30)(S)(ii). Thus, Congress effectively defined this covered product as the medium screw base CFL that was a "direct replacement" for the incandescent lamp that was used to satisfy a majority of the lighting applications, and excluded the same types of specialty lamps that were used in a minority of lighting applications. The definition said nothing about the capacity of the medium screw base CFL to provide "overall illumination." That phrase was nowhere in the statute.

III. The Energy Independence and Security Act of 2007 (EISA 2007)

Two years after enacting EPAct 2005, Congress revisited the regulation of "general service" lamp products under EPCA in a significant way and passed the Energy Independence and Security Act of 2007. Pub.L 110-140, 121 STAT. 1492 (EISA 2007). Three developments in lighting technology provided the backdrop for this legislation's lighting efficiency provisions.

A key intervening event between the 2005 and 2007 amendments to EPCA that made this new attention possible was the creation of a medium screw base halogen incandescent lamp by Philips Lighting, twenty-eight percent (28%) more efficient than the 40 watt, 60 watt, 75 watt, and 100 watt incandescent lamps that had been on the market for a century. Halogen lamps utilize a fused quartz capsule (instead of a heat sensitive soda lime glass capsule) allowing for higher temperatures than the traditional incandescent lamp. Inside the quartz capsule is a vapor (typically bromine). Like a traditional incandescent bulb, the tungsten filament of the halogen bulb evaporates when heated, but the higher temperatures are sufficient to cause the tungsten to mix with the vapor instead of depositing on the capsule. Some of the evaporated tungsten is re-deposited on the filament. The combination of redepositing tungsten on the filament and higher filament temperature results in a bulb that has a longer life and higher efficiency than the traditional incandescent bulb. The higher temperature filament also produces the "white" light often associated with halogen bulbs.

In 2007, members of Congress could touch and see the new halogen incandescent lamp that was about to come on the market. It was now possible to recommend energy conservation standards for the general service incandescent lamp, because a more efficacious alternative general service incandescent lamp was available. In EISA 2007, Congress enacted energy conservation standards for general service incandescent lamps based on halogen incandescent technology that were phased-in from January 1, 2012 through January 1, 2014. Pub.L 110-140, 121 STAT. 1492, 1577. The Secretary codified these standards at 10 CFR §430.32(x)(1).

Second, there was another announcement from the lighting industry in February 2007 as discussions in Congress over what later became EISA 2007 began. General Electric was researching a different approach to incandescent efficiency than Philips had commercialized. In February 2007, GE announced "advancements to the light bulb invented by GE's founder Thomas Edison that potentially will elevate the energy efficiency of this 125-year-old technology

to levels comparable to compact fluorescent lamps (CFL)."[6] At that time, most CFL lamps had an efficacy of 45 lumens per watt.

Third, there was an incipient market development at this time that also impacted Congress' direction of lamp regulation under EPCA. Lighting manufacturers were devoting increasing research and development resources to the possibility of producing a general service lamp, based on light-emitting diode (LED) technology, even more efficacious than the general service incandescent and fluorescent lamps. Notably, this product did not exist yet (certainly in the commercial sense for general service applications and most specialty applications), and there were significant technology hurdles to overcome before anyone could apply an energy conservation standard to a product that did not yet exist --- LED technology was naturally suitable for "directional" lamps, but an omnidirectional LED lamp that could compete for the sockets with a majority of the lighting applications was still a work in process. The research, development, and commercialization trajectory for this lamp was anything but clear in 2007. PNNL CFL Report, *supra* note 2 at 7.4. Nevertheless, despite the uncertainties, there was considerable enthusiasm for the possibility and the potential of this new technology, even among a few members of Congress.[7] With no more than an enthusiastic hope in lighting industry innovation, Congress authorized the Secretary to initiate this rulemaking procedure "not later than January 1, 2014 . . . to determine whether standards in effect for general service lamps should be amended to establish more stringent standards than the standards [for halogen incandescent lamps] in paragraph (1)(A), and [whether] the exemptions for certain incandescent lamps should be maintained or discontinued based, in part, on exempted lamp sales collected by the Secretary from manufacturers." Further, the Secretary was not to limit the rulemaking procedure to incandescent lamp technologies, thereby creating the opportunity to consider standards for other technologies in this proceeding --- such as fluorescent and LED --- that

[6] http://www.businesswire.com/news/home/20070223005120/en/GE-Announces-Advancement-Incandescent-Technology-High-Efficiency-Lamps . Unfortunately, GE's enthusiasm was short-lived. Further research showed that the technological pathway GE was working on would produce a lamp with an extremely short life at a high cost that no consumer would seriously consider buying.

[7] "Last month I talked to a major manufacturer of electric lights. What he told me is that in 4 or 5 years, there will be lights on the market, LED lights, which will last for 20 years when plugged in and consume about one-tenth of the electricity that is currently being consumed. Those are the kinds of breakthroughs we are making right now." Cong.Rec. at S7626 (Statement of Sen. Sanders)(June 13, 2007); "As co-author with Fred Upton of the lightbulb provisions, let me underscore how important they are. In this bill, we ban, by 2012, the famously inefficient 100-watt incandescent bulb, which emits 10 percent of its energy as light and wastes the remaining 90 percent. Sounds like this House. We phase out remaining inefficient bulbs by 2014, and by 2020 light bulbs will be three times more efficient, paving the way for the use of superefficient LEDs manufactured in the U.S. by 2020." Cong.Rec. at H14266 (Statement of Rep.Harman)(December 6, 2007); "As an engineer by training, I am fascinated by the promise of new and emerging technologies and what they mean for our future. In addition to CFLs, new halogen technologies are expected to become commercially available later this year. Further down the road, LEDs (light-emitting diodes) will revolutionize the lighting industry, leading to vastly more efficient lighting and the prospect of bulbs that do not burn out. Much of this technology represents American ingenuity and innovation, and provides hope for a brighter future. And with the Federal government purchasing large quantities of these high efficiency bulbs, this next generation of technology will be less costly to put in American homes." Cong.Rec at E662 (Statement of Rep. Lipinski on introduction of BRIGHT Act)(March 27, 2007).

might be technologically feasible and economically justifiable, and Congress stated that the rulemaking "shall include consideration of a minimum standard of 45 lumens per watt for general service lamps." The final rule is to be published not later than January 1, 2017 with an effective not earlier than three years after the date the rule is published. The Secretary was to consider phased-in effective dates. Pub.L. 110-140, 121 STAT. 1492, 1579-80; 42 U.S.C. §6295(i)(6)(A)(i)-(iv). Congress also authorized a second rulemaking for general service lamps to begin not later than January 1, 2020 to consider the same criteria as the first rulemaking. Pub.L 110-140, 121 STAT. 1492, 1580-81; 42 U.S.C. §6295(i)(6)(B).

A. Revisions to the Definition of General Service Incandescent Lamp and Other New Definitions

With energy conservation standards established for general service incandescent lamps and the prospect of future regulatory development of energy conservation standards for incandescent lamps by 2017 (a decade later), Congress amended the definition of general service incandescent lamp and introduced a host of new definitions of certain incandescent lamps. General service incandescent lamp was defined:

> "(D) GENERAL SERVICE INCANDESCENT LAMP.—
> (i) IN GENERAL.—The term 'general service incandescent lamp' means a standard incandescent or halogen type lamp that—
> (I) is intended for general service applications;
> (II) has a medium screw base;
> (III) has a lumen range of not less than 310 lumens and not more than 2,600 lumens; and
> (IV) is capable of being operated at a voltage range at least partially within 110 and 130 volts.
> (ii) EXCLUSIONS.—The term 'general service incandescent lamp' does not include the following incandescent lamps:
> (I) An appliance lamp.
> (II) A black light lamp.
> (III) A bug lamp.
> (IV) A colored lamp.
> (V) An infrared lamp.
> (VI) A left-hand thread lamp.
> (VII) A marine lamp.
> (VIII) A marine signal service lamp.
> (IX) A mine service lamp.
> (X) A plant light lamp.
> (XI) A reflector lamp.
> (XII) A rough service lamp.
> (XIII) A shatter-resistant lamp (including a shatter-proof lamp and a shatter-protected lamp).
> (XIV) A sign service lamp.
> (XV) A silver bowl lamp.
> (XVI) A showcase lamp.
> (XVII) A 3-way incandescent lamp.
> (XVIII) A traffic signal lamp.

(XIX) A vibration service lamp.
(XX) A G shape lamp (as defined in ANSI C78.20–2003 and C79.1–2002 with a diameter of 5 inches or more.
(XXI) A T shape lamp (as defined in ANSI C78.20–2003 and C79.1–2002) and that uses not more than 40 watts or has a length of more than 10 inches.
(XXII) A B, BA, CA, F, G16–1/2, G–25, G30, S, or M–14 lamp (as defined in ANSI C79.1–2002 and ANSI C78.20–2003) of 40 watts or less.''

Pub.L 110-140, 121 STAT. 1492, 1573-74; 42 U.S.C. §6291(30)(D).

There are several observations about this paragraph (D) worth noting.

First, Congress recognized that "halogen" technology was an incandescent technology.

Second, Congress replaced the reference to the lamp being "used to satisfy a majority of the lighting applications" and substituted a phrase that the lamp "is intended for general service applications." In this circular definition (a "general service lamp" means a lamp "intended for general service applications"), Congress was not abandoning the market penetration measure that defined a "general service" lamp. Notably, the definition of general service fluorescent lamp was unchanged from EPAct 1992, and there "general service" applications referred to a covered product that was "used to satisfy a majority of the fluorescent lighting applications." In the modified definition of general service incandescent lamp, "general service" still retained the market penetration meaning that Congress assigned to it in EPAct 1992. Nowhere in the definition is the concept of a lamp that provides "overall illumination" mentioned. *That would be inconsistent with the fact that a number of lamps excluded from the definition of general service incandescent lamp also provide overall illumination to an area.* Nowhere is the phrase "general lighting applications" mentioned in this definition. Instead, the 110th Congress used the same words introduced in EPAct 1992: *general service.*[8]

The reason for this essentially editorial revision of the definition: Congress envisioned that the new "majority of lighting applications" would be shared by general service incandescent lamps, medium screw base compact fluorescent lamps, and potentially the general service LED lamp. It turns out that, ten years later, Congress' vision in 2007 has become a reality. See Part Two, Section IV, *infra*. Incandescent lamps now occupy a minority of general service lamp sockets as consumers have shifted to more efficacious lamps.

Third, the list of lamps *excluded* from the definition of general service incandescent lamp expanded. There are new references in the list of excluded lamps to "black light lamp", "bug lamp", "plant light lamp", "reflector lamp", "rough service lamp", "silver bowl lamp", "3-way incandescent lamp", "vibration service lamp", as well as a number of other specialty lamps that had unique bulb shapes. The "heat service lamp" was retitled "infrared lamp" in this list, and the

[8] It is a general principle of statutory construction that when "Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Barnhart v. Sigmon Coal Co.*, 534 U.S. 438, 452 (2002).

lamp "producing colored light" was retitled a "colored lamp." *Id. Importantly, as with EPAct 1992, a number of the newly added "excluded" lamps provide "overall illumination" to an area --- rough service lamps, 3-way incandescent lamps, and vibration service lamps --- further confirming that "overall illumination" of an area is not a defining characteristic of a general service lamp. This characteristic applies to specialty lamps serving a minority of applications as well.*

Most, but not all of the specialty incandescent lamps used in distinctly commercial applications were removed from the list of exclusions as they could only be regulated apart from consumer products under separate authority as commercial or industrial electric lighting. 42 U.S.C. §6311(2)(B)(v)("electric lights"). The general service incandescent lamp is a consumer product. 42 U.S.C. §6292(a)(14).

Congress defined the candelabra base and intermediate base incandescent lamps for which it developed energy conservation standards *independent of* general service incandescent lamp standards. See Pub.L 110-140, 121 STAT. 1492, 1578. Congress expressly did not designate or consider these two types of specialty lamps to be "general service" lamps. Congress treated these specialty lamps differently from general service incandescent lamps: it regulated them by imposing maximum energy use standards on them. Candelabra base and intermediate base lamps are not "general service" lamps. Nor are they lamps "exempt" from regulation, and therefore incandescent lamps with these bases are not part of this rulemaking. See Part One, Section III.B.(1), *infra*.

Congress also introduced and defined a new term, "general service lamp," that was clearly tied to the lexicon that Congress adopted in EPAct 1992 when it defined general service incandescent lamp and general service fluorescent lamp:

> (i) The term general service lamp includes ---
> (I) general service incandescent lamps;
> (II) compact fluorescent lamps;
> (III) general service light-emitting diode (LED or OLED) lamps; and
> (IV) any other lamps that the Secretary determines *are used to satisfy lighting applications traditionally served by general service incandescent lamps.*
> (ii) EXCLUSIONS.--- The term general service lamp does *not include* ---
> (I) *any lighting application or bulb shape described in any of subclauses (I) through (XXII) of subparagraph (D)(ii); or*
> (II) *any general service fluorescent lamp or incandescent reflector lamp.*

Pub.L 110-140, 121 STAT. 1492, 1576; 42 U.S.C. §6291(30)(BB)(emphasis supplied).

The "lighting applications traditionally served by general service incandescent lamps" are those lamps that historically ("traditionally") served a majority of the lighting applications. "General service" clearly did not take on a new meaning in EISA 2007. The words chosen by Congress and the structure of the entire Act reflect that intent. What Congress did anticipate in

EISA 2007 with this definition was that the general service lighting market *might* change with the development of new technologies, such as LED, and it was conceivable that the technology composition of the "majority of lighting applications" traditionally served by general service incandescent lamps would change and the general service LED lamps would share that majority with the general service incandescent lamp and medium screw base CFLs.

What is also clear from Congress' definition of "general service lamp" and its "Exclusions" clause is that it does not include *any* of the specialty lighting applications or bulb shapes that are on the list of lighting applications and bulb shapes excluded from the general service incandescent lamp definition at 42 U.S.C. §6291(30)(D)(ii)(I-XXII).[9] It is clear from the text of this definition that these lighting applications and bulb shapes are expressly *excluded* by Congress from the definition of "general service lamp," whether they are represented by incandescent, fluorescent or LED technologies: the terms "lighting application" and "bulb shape" in this clause are generic, without reference to a single lamp technology. Congress did not say: "[*incandescent*] lighting applications or bulb shapes" are excluded from the definition of general service lamps; Congress was referring to *all* lighting applications or bulb shapes listed in subclauses (I)-(XXII) of 42 U.S.C. §6291(30)(D)(ii) regardless of the technology. Congress was not inviting the Secretary to use this rulemaking to lump together general service lamps and specialty lamps and apply a common energy conservation standard to the excluded lamp applications and bulb shapes that were not traditionally satisfying a majority of the lighting applications. In 2007, Congress was legislating consistent with the regulatory pathway it chose in EPAct 1992: *specialty lamps* follow a different regulatory pathway than "general service" lamps. Nowhere mentioned in the definition of general service lamp is the concept of a lamp that provides "overall illumination."

Since 1978, the Secretary has had authority under EPCA, Pub.L. 95-619, 92 STAT. 3206, 3259, to regulate additional consumer products not designated for regulation by Congress, and to initiate a rulemaking procedure under 6295(*l*) for each new covered product. 42 U.S.C. §6292(b). But Congress required the Secretary to make a threshold determination whether that product's average annual energy use is likely to exceed 100 kilowatt hours per household per year. *Id.* (originally 150 kWh annually in the 1978 Act). This metric served as a screen for agency regulation prior to the Secretary even determining "whether the benefits of [an energy conservation] standard exceeds it burdens," and that the improvement in energy savings is "technologically feasible" under 42 U.S.C. §6295(o). This has always been a statutory pathway for the Secretary to consider energy conservation standards for specialty lamps excluded from the definition of general service lamps. It is still the pathway today.

[9] Appliance lamps, black light lamps, bug lamps, colored lamps, infrared lamps, left-hand thread lamps, marine lamps ,marine signal service lamps, mine service lamps, plant light lamps, reflector lamps, rough service lamps, shatter-resistant lamps (including a shatter-proof lamp and a shatter-protected lamp), sign service lamps, silver bowl lamps, showcase lamps, 3-way incandescent lamps, traffic signal lamps, vibration service lamps, G shape lamps (as defined in ANSI C78.20–2003 and C79.1–2002 with a diameter of 5 inches or more, T shape lamp (as defined in ANSI C78.20–2003 and C79.1–2002) and that uses not more than 40 watts or has a length of more than 10 inches, A B, BA, CA, F, G16–1/2, G–25, G30, S, or M–14 lamps (as defined in ANSI C79.1–2002 and ANSI C78.20–2003) of 40 watts or less.

By amalgamating and bootstrapping numerous individual specialty, non-general service lamps with general service lamps and purportedly analyzing them in a common pool of products in this general service lamp rulemaking, the Secretary is circumventing the statutory process for classifying "a type of consumer product as a covered product," 42 U.S.C. §6292(b),[10] and likely concealing a host of regulatory sins: (1) not determining for each specialty lamp whether the product uses an average of 100 kilowatt hours of electricity per household per year; (2) no independent analysis of whether the energy savings from the proposed energy conservation standard for each specialty product is "significant"; (3) no independent assessment for each specialty lamp "whether the benefits and burdens of [an energy conservation] standard exceeds it burdens," and that the improvement in energy savings is "technologically feasible," 42 U.S.C. §6295(o); and (4) no independent assessment of the regulatory burdens for compliance testing, certification, and reporting for each specialty lamp.[11] When DOE improperly bootstraps specialty lamps with unique design characteristics that serve unique applications in with its analysis of general service lamps, the regulated parties and the public do not see the impact on the manufacturers and employees and consumers and the nation for regulating each of these niche, specialty lamp products and cannot see whether a standard for each of those specialty lamps was economically justified or would generate significant energy savings.

This is not an academic legal point. We have already seen in the recent incandescent reflector lamp rulemaking that when the analysis is focused on a narrow range of products that an energy conservation standard may not be economically justified. 80 F.R. 4042 (January 26, 2015).

B. Congressional treatment of certain specialty incandescent lamps in EISA 2007

In connection with this general service lamp rulemaking, Congress invited the Secretary to determine whether any of the specialty lamps exempt from regulation *should be regulated as specialty lamps.* Pub.L. 110-140, 121 Stat. 1492, 1580, 42 U.S.C. §6295(*i*)(6)(a)(i)(II)("determine whether *exemptions* for certain incandescent lamps should be maintained or discontinued").

[10] See *Hearth, Patio & Barbecue Ass'n. v. United States Dept of Energy*, 706 F.3d 499, 500-03 (D.C. Cir. 2012)(improper to lump decorative hearth products that mimic the aesthetic of a conventional fireplace with log fire together with fireplace heaters designed as "direct heating equipment" for regulation as common covered product).

[11] *Id.* at 504-05: "On one hand, Congress recognized the importance of flexibility to a functioning administrative scheme. In support of that cause, it authorized DOE to not only amend the substance of the regulations, see 42 U.S.C. § 6295(e)(4)(A), but to expand its regulatory scope as well, see 42 U.S.C. § 6292(a)(20). On the other, Congress understood that if left unchecked, DOE would expand its power in a manner contrary to what the legislature intended in enacting the EPCA. To combat this, Congress inserted threshold jurisdictional requirements, see 42 U.S.C. § 6292(b), and discrete substantive limits, see 42 U.S.C. § 6295(l), that would curtail the way in which DOE could regulate consumer goods not previously classified as "covered." In essence, Congress designed this statutory scheme to protect a defined class: manufacturers of products not specifically enumerated in the EPCA."

In fact, Congress did exactly that with respect to establishing energy conservation standards for some specialty incandescent lamps in EISA-2007:

- Candelabra base incandescent lamps, 60 watts maximum energy use,
- Intermediate base incandescent lamps, 40 watts maximum energy use
- Vibration service lamps, 60 watts maximum energy use
- Appliance lamps, 40 watts maximum energy use
- T shape lamp (as defined in ANSI C78.20–2003 and C79.1–2002), 40 watts maximum energy use
- B, BA, CA, F, G16–1/2, G–25, G30, S, or M–14 lamp (as defined in ANSI C79.1–2002 and ANSI C78.20–2003), 40 watts maximum energy use

When Congress imposed a maximum quantity of energy use standard for these specialty lamps it had the actual effect of eliminating higher wattage versions of these lamps from the market and saving energy. These wattage caps are energy conservation standards. 42 U.S.C. §6291(6)(A). These specialty lamps are not "exempt" from energy conservation standards. They are regulated specialty lamps to which energy conservation standards apply. This has significance for this rulemaking under 42 U.S.C. §6295(i)(6)(a)(i)(II), which clause only calls upon the Secretary to determine whether "exemptions for certain incandescent lamps should be maintained or discontinued." See Part One, Section III,E.(3), *infra*. The clause does not apply to lamps to which Congress applied an energy conservation standard.

The statutory pathway for amending the energy conservation standards for these specialty incandescent lamps to which Congress applied an energy conservation standard in EISA-2007 is pursuant to 42 U.S.C. §6295(o).

Congress' use of different terms with different meanings, "exempt[ion]"[12] in 42 U.S.C. §6295(i)(6)(A)(i)(II) and "exclusion"[13] in 42 U.S.C. §§6291(30)(D)(ii), is an intentional difference.[14] The NOPR appears mistakenly to treat these two terms as synonymous. They are not synonymous. Even if the two words enjoyed "mutual synonyms and can be used interchangeably in some contexts . . . [s]uch similarities. . . provide an insufficient basis for concluding that Congress unambiguously intended the two words to have the same meaning--something it could have accomplished quite simply by using the same word." *Vonage Holdings Corp. v. FCC*, 489 F.3d 1232, 1240 (D.C. Cir. 2007). As noted immediately above, not all

[12] "Exemption" means: "The action of freeing or state of being free from an obligation or liability imposed on others: *** 'regulatory exemptions'." Oxford Dictionary of English (2010).

[13] "Exclusion" means: "The process of excluding or the state of being excluded." "Exclude" means: Deny access to a place, group, or privilege." Oxford Dictionary of English (2010).

[14] Again, it is a general principle of statutory construction that when "Congress includes particular language in one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Barnhart v. Sigmon Coal Co*., 534 U.S. 438, 452 (2002).

"excluded" lamps are "exempt" lamps. With the word "Exclusions," Congress is saying that the law does not recognize these lamps with specialty applications or special globe shapes as a part of the group of "general service incandescent lamps" or "general service lamps." They are "excluded" from that group. By the word "exemptions" in a separate part of the Act, Congress is telling the Secretary of Energy that he is authorized to determine whether those *excluded* specialty lamps to which no energy conservation standard applies should continue to be *exempt* from energy conservation standards regulation or not. 42 U.S.C. §6295(i)(6)(A)(i)(II) is ***not*** a congressional invitation to the Secretary to designate these specialty lamp applications and globe shapes as "general service" lamps or to remove them from Congress' list of exclusions in the definitions of "general service incandescent lamps" and "general service lamps."[15] It was an invitation to determine whether these specialty lamps should be regulated as *specialty lamps*.

Nothing in EISA-2007 compels the Secretary to apply the general service incandescent lamp standards, 10 C.F.R. §430.32(x), or other "general service lamp" standards to these specialty incandescent lamps. Each specialty lamp for these applications or globe shapes has to be individually evaluated for whether a standard is technologically feasible or economically justified and whether energy savings from a standard is significant. See *Hearth Patio & Barbecue Association v. U.S. Department of Energy*, *supra* notes 10 & 11. The Secretary was not limited to establishing an efficacy standard for these lamps (as in the case of the general service lamp), but could limit energy use by capping wattage, for example.[16] Importantly, Congress used the word "exempt" in this section (as in exempt from energy conservation standards regulation) so that Congress could consider whether "an" energy conservation standard should be applied to those *specialty lamps* that had no standards.

NEMA's treatment of "general service" and "specialty" lamps is essentially the same as the Federal Trade Commission (FTC), which regulates the lamp labeling provisions of EPCA pursuant to 42 U.S.C. §6294. The FTC incrementally decided to expand its lighting label rule beyond general service lamps and chose to recognize certain specialty lamps as "specialty consumer lamps . . . instead of amending the Rule's definition of general service lamp." 80 FR 67285, 67286 (November 2, 2015). See 15 CFR §305.3(z). The government should be consistent and follow the Commission's statutorily correct treatment of these lamps.[17]

[15] Congress did not say in 42 U.S.C. §§6291(30)(D)(ii)(II) that the Secretary should "determine whether the [exclusions] for certain incandescent lamps should be maintained or [deleted]." But that is the rewriting of the statute that the DOE's NOPR is engaged in by treating specialty lamps as "general service" lamps in this rulemaking.

[16] 42 U.S.C. §6291(6)(A)(definition of "energy conservation standard").

[17] Notably, the FTC's information disclosure requirements were modified in some aspects to recognize that these specialty lamps were different than general service lamps and required different labeling in some situations than general service lamps.

(1) Candelabra base and intermediate base incandescent lamps

In EISA-2007, Congress separately regulated two types of specialty incandescent lamps that were not used to satisfy a majority of lighting applications: candelabra base and intermediate base incandescent lamps. Here, Congress defined these two types of incandescent lamps and applied wattage caps as an energy conservation standard: 60 watts for candelabra base incandescent lamps and 40 watts for intermediate base incandescent lamps. Pub.L. 110-140, 121 STAT. 1492, 1574-75, 1578. Notably, Congress expressly did not recognize these lamps as "general service" incandescent lamps. They do not serve a majority of the lighting applications. Congress enacted different energy conservation standards for these two specialty incandescent lamp types than it did for general service incandescent lamps and placed them in a paragraph separate and apart from the paragraph for general service incandescent lamps, specifying maximum energy use as the energy conservation standard further evidencing that Congress was treating them differently than "general service" incandescent lamps. These lamps were not included in the list of lamps "excluded" from the definition of general service incandescent lamp for an obvious reason: they do not have a medium screw base; they were already excluded by definition.

These legislative facts have significance for the NOPR's proposal to treat these lamps as general service lamps: the NOPR's proposed general service lamp standards cannot apply to those specialty lamps because Congress does not recognize them as "general service" lamps and they don't satisfy the lighting applications historically served by general service incandescent lamps used in medium screw base sockets. These are decorative specialty lamps and energy conservation standards for specialty lamps must be separately deemed technologically feasible and economically justified.

(2) Five categories of excluded lamps.

The need to define certain specialty incandescent lamps[18] became imperative because of other provisions in EISA 2007 that required the Secretary to consider energy efficiency standards in the future for rough service lamps, vibration service lamps, 3-way incandescent lamps, 2601-3300 lumen general service incandescent lamps, and shatter resistant lamps if their respective lamp sales exceeded their predicted growth rate after 2006 (based on historical growth rate for that type of lamp). Pub.L. 110-140, 121 STAT. 1492, 1581-84; 42 U.S.C. §6295(*l*)(4). The concern here was that these categories of unregulated specialty lamps might directly replace some portion of the regulated general service incandescent lamps that were used to satisfy a majority of the lighting applications,[19] and therefore should be regulated in some manner.

[18] Rough service, 3-way incandescent, shatter resistant, vibration service, and colored incandescent lamp were also defined by Congress for the first time. Pub.L 110-140, 121 STAT. 1492, 1575-76; 42 U.S.C. §6291(30)(X – AA, EE). These definitions delineate their special technical and functional differences.

[19] In theory, this could happen if the price point for the unregulated specialty incandescent lamps dropped below the price of the regulated halogen incandescent lamp. Historically, the price points for specialty incandescent lamps were higher than the traditional general service incandescent lamp. Congress actually took steps to

Here, Congress specified the conditions precedent when these specialty lamps might be regulated either prior to, during, or after this rulemaking. Congress required the Secretary to track the sales of these incandescent lamps annually. *Id.* If their respective sales after 2010 exceeded their respective historic sales trend line by 100%, the Secretary could initiate an accelerated rulemaking. *Id*. The Secretary has undertaken the required analysis of these incandescent lamps each year in accordance with the law.[20]

Congress imposed an energy conservation standard on one of those five specialty lamps: a 60 watt maximum energy use requirement for vibration service lamps. 42 U.S.C. §6291(AA)(ii). Since this particular incandescent lamp, unlike the other four specialty lamps whose sales are monitored by the Secretary, does not enjoy an exemption, there is no exemption from energy conservation standards to maintain or discontinue under 42 U.S.C. §6295(i)(6)(a)(i)(II). However, very recently, sales of vibration service lamps *exceeded* the historic sales trend line, and DOE has recently indicated it would initiate an accelerated rulemaking. NEMA proposes that this be addressed simultaneously in this rulemaking. See Part Two, Section II.B, *infra*.

What Congress did not do in EISA 2007 with respect to any of these five specialty lamps is dictate or specify to the Secretary what type of energy conservation standard needed to be prescribed. Congress simply said the Secretary shall prescribe "*an* energy conservation standard" in an "accelerated" one year period if the congressionally specified market penetration occurred. *See* Pub.L 110-140, 121 STAT. 1492, 1581-84; 42 U.S.C. §6295(*l*)(4)(emphasis supplied). Like any energy conservation standard, the Secretary is to select a standard that is technologically feasible and economically justified, and that standard does not have to be an efficacy standard. It can be a standard that imposes a maximum quantity of energy use. 42 U.S.C. §6291(6)(A). This conclusion is reinforced by other provisions of EISA 2007 respecting these same lamps. Congress specified that if the Secretary failed to enact an energy conservation standard for these specialty incandescent lamps in a timely manner after the historic sales trend was exceeded for regulation was met, the Secretary had to impose a maximum 40 watt cap on vibration service, rough service, and shatter resistant lamps, a 95 watt cap on high lumen incandescent lamps above 2601 lumens, or that three-way incandescent lamps would have to meet the standards for halogen incandescent lamps.[21] The wattage caps

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disincentivize this possibility in EISA 2007 for one of these specialty lamps (vibration service) that was perceived by some as most vulnerable to this possibility. Congress specified that vibration service incandescent lamps only enjoyed their exclusion from regulation if they sold at retail in packages of 2 lamps or less (thereby increasing their cost) and imposing a 60 watt energy use cap on the product. Pub.L. 110-140, 121 STAT. 1492, 1576; 42 U.S.C. §6291.

[20] 76. F.R 18424 (April 4, 2011); 77 F.R. 16183 (March 20, 2012); 78 F.R. 15891 (March 13, 2013); 79 F.R. 15058 (March 18, 2014); 80 F.R. 13791 (March 17, 2015); 81 FR 20261 (April 7, 2016). Notably, the Department has never claimed that its analysis of this incandescent lamp data was restricted by the Appropriations Rider. NEMA agrees that it is not.

[21] 42 U.S.C. §6295(*l*)(4)(D)(ii), (E)(ii), (F)(ii), and (H)(ii).

represent a maximum energy use standard, and this is not the same as the *efficacy* (modified lumens per watt) energy conservation standard applied to general service halogen incandescent lamps in 10 CFR 430.32(x).[22] *This differential treatment in the statute further demonstrates that Congress was not treating these specialty lamps as "general service" lamps, merely because their sales tracked higher than the trend line.* In fact, the sales of these specialty lamps are not a growing share of the market as the data collected by the Department demonstrates. See Part Two, Section II.B, *infra*.

(3) Other types of excluded specialty incandescent lamps that are not exempt

Congress imposed a maximum energy use requirement on appliance lamps of 40 watts. 42 U.S.C. §6291(30)(T).

Congress imposed a maximum energy use requirement on T shaped incandescent lamps of 40 watts. 42 U.S.C. §6291(30)(D)(ii)(XXI).

Congress also imposed a maximum energy use requirement of 40 watts on B, BA, CA, F, G16–1/2, G–25, G30, S, and M–14 shape incandescent lamps. 42 U.S.C. §6291(30)(D)(ii)(XXII).

Like candelabra base, intermediate base, and vibration service lamps, since these particular specialty incandescent lamps do not enjoy an exemption, there is no exemption from energy conservation standards to maintain or discontinue under 42 U.S.C. §6295(i)(6)(a)(i)(II) in this rulemaking. The statutory pathway for amending the energy conservation standards for these specialty incandescent lamps to which Congress applied an energy conservation standard in EISA-2007 is pursuant to 42 U.S.C. §6295(o).

(4) Other types of excluded specialty incandescent lamps that are exempt.

Congress authorized the Secretary to "determine whether the *exemptions* for certain incandescent lamps should be maintained or discontinued *based*, *in part, on exempted lamp sales collected by the Secretary from manufacturers*." Pub.L. 110-140, 121 STAT. 1492, 1579; 42 U.S.C. §6295(i)(6)(A)(i)(II)(emphasis supplied). This provision was intended to authorize the Secretary to consider in this rulemaking procedure whether to maintain or discontinue the *exemptions* for four of the five specialty incandescent lamps discussed above that were under annual review and potentially subject to an accelerated rulemaking procedure (as discussed above) *as well as* other lighting applications and globe shapes that Congress had *excluded* from the definition of general service incandescent lamps and were exempt from energy conservation standards.

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[22] EPCA is clear that energy conservation standards can be either a minimum level of energy efficiency or a maximum quantity of energy use. 42 U.S.C. §§6291(6)(A), 6295(o)(1).

These exempt lamps include black light lamp, bug lamp, colored lamp, infrared lamp, left-hand thread lamp, marine lamp, marine signal service lamp, mine service lamp, plant light lamp, rough service lamp, shatter-resistant lamp (including a shatter-proof lamp and a shatter-protected lamp), sign service lamp, silver bowl lamp, showcase lamp, 3-way incandescent lamp, traffic signal lamp, and a G shape lamp (as defined in ANSI C78.20-2003 and C79.1-2002 [FN2] with a diameter of 5 inches or more. These also include certain lamps with specialty lamp bases as well. In Part Two, Section II, *infra*, NEMA provides information that enables the Secretary to determine whether the exemptions for any of these specialty lamps should be maintained or discontinued. See also, Part Three, Question 5, *infra*.

C. Congressional Treatment of Reflector Lamps in EISA-2007

NEMA agrees with the DOE that reflector lamps are excluded from the definition of "general service incandescent lamps" in EISA-2007 for a different and unique reason: the incandescent reflector lamp was a separate covered product already subject to a separate energy conservation standard. 81 FR 14528, 14542 (March 17, 2016). They are not "exempt" from regulation. The incandescent reflector lamp was already long regulated under EPCA, and a separate follow-on rulemaking for incandescent reflector lamps authorized by Congress was already underway at the Department in 2007. See 74 FR 34080, 34086 (July 14, 2009)(incandescent reflector lamp rulemaking initiated May 30, 2006).[23] NEMA recommended to Congress in 2007 that incandescent reflector lamps be excluded from the definition of general service incandescent lamps so it would be clear they would not become part of the same rulemaking as general service incandescent lamps. Incandescent reflector lamps do not produce the same lumen output at the same wattage as a general service incandescent lamp and serve different functions and applications, and need to be analyzed separately.[24] Congress agreed with NEMA's recommendation. It is for the same reason that NEMA recommended to Congress a parallel provision governing this rulemaking that expressly excluded the other long-regulated covered lamp products: incandescent reflector lamps and general service fluorescent lamps. Congress again agreed. Pub.L 110-140, 121 STAT. 1492, 1576; 42 U.S.C. §6291(30)(BB)(ii)(II).

The incandescent reflector lamp regulated by Congress in EPAct 1992 was a significant part of the general service lighting market at that time. Initially, the definition of an incandescent

[23] This point is not new. NEMA has previously made this same point to the Department of Energy outside of this rulemaking. *See* Petition of the National Electrical Manufacturers Association To Undertake Rulemaking To Exclude Expressly Infrared Heat Lamps, Shatterproof Lamps, and Plant Lights from Coverage of Energy Conservation Standards for Incandescent Reflector Lamps dated July 29, 2014 at page 3 ("The need for this change was compelled by the congressional adoption of energy conservation standards, for the first time, applicable to general service incandescent lamps, and it was necessary that the statute continue to recognize that standards and future rulemakings for incandescent reflector lamps were separate from those from other incandescent and general service lamps.").

[24] Incandescent reflector lamps have a 24% lower efficiency than a general service incandescent lamp partially due to the light lost by redirecting and reflecting the light through the front face of the reflector lamp and partially due to the longer lamp life of a reflector lamp. They are a different type of lamp on many levels.

reflector lamp included only PAR and R shape lamps, which were the vast majority of this lamp type installed in sockets at the time. These were not considered specialty lamps. The original congressional definition expressly excluded elliptical reflector (ER) and bulged reflector (BR) shape lamps from the definition of incandescent reflector lamp, because at the time they were specialty lamps. Pub.L. 102-486, 106 STAT. 2776, 2819 ("except ER or BR"). *See also*, 62 FR 29222, 29227 (May 29, 1997)(DOE acknowledging ER and BR lamps as "specialty" lamps). In 1992, ER and BR shape lamps were a very small portion of the lighting market and they had unique applications. Over time, the market penetration of the ER and BR lamps grew substantially, no longer serving just their original special applications, and Congress ultimately recognized in EISA 2007 that ER, BR and BPAR shape lamps were incandescent reflector lamps just like PAR and R shape lamps. Pub.L. 110-140, 121 STAT. 1492, 1587; 42 U.S.C. 6291(30)(C)(ii)(I).

Given the unique purpose of the exclusion of incandescent reflector lamps from the definition of general service incandescent lamps, NEMA agrees with the NOPR that most CFL and LED reflector lamps can be treated as general service lamps in this rulemaking,[25] and NEMA agrees with the definition of "reflector lamp" as proposed in the NOPR. 81 FR 14528, 14548 (March 17, 2016). NEMA does not believe CFL reflector lamps should have standards applied to them, and DOE should not apply them to these lamps. They are disappearing from the market, and DOE should not be regulating a disappearing act on its last legs.

There are certain reflector lamps that are truly niche products for unique applications that will truly be confined to a minority of lighting applications and should not be regulated. These reflector lamps involve special lamp bases with unique connections to a power source that are not common and do not contribute significantly to energy consumption because of the low quantities in service. They also include certain multifaceted reflector (MR) lamps with very small diameters (MR8) used in commercial applications. See Part Two, Section I, Table A. NEMA proposes an energy conservation standard for halogen MR reflector lamps that are general service lamps. See Part Two, Section III.(B). NEMA also proposes an energy conservation standard for LED MR lamps that are general service lamps. See Part Two, Section V, *infra*.

D. Overall Illumination of an Area Is Not an Attribute of the Definition of General Service Lamp

It is clear from the preceding discussion that the phrase "general service" was first introduced in EPAct 1992, and conspicuously missing from EPAct 1992 (and any subsequent amendment of EPCA) is any statutory text that defines a "general service" lamp in terms of "lighting that provides an interior or exterior area with overall illumination." On the other hand,

[25] While agreeing with DOE's conclusion, NEMA does not agree with the DOE's rationale for this conclusion, *i.e.,* because these lamps provide "overall illumination." Market penetration is the basis of regulation of general service lamps, not overall illumination. See discussion at Part One, Section D, *infra.*

Congress expressly referred to lighting that is "used to satisfy the majority of lighting applications" when defining "general service" lamps.

Nor did the EISA 2007 amendment to EPCA introduce the phrases "general lighting applications" or "provides . . . overall illumination" to the definitions of "general service incandescent lamp" or "general service lamp." These phrases were introduced to EPCA in an entirely different section of EISA 2007[26] for an entirely different purpose: regulation of "metal halide lamp fixtures." Pub.L. 110-140, 121 STAT. 1492, 1592; 42 U.S.C. §6291(61) and (64).[27] The term "general service" is never used with reference to metal halide lamp fixtures.

Rather than examining the definition of "general service" as it is and has been used in EPCA for nearly 25 years, DOE is scoping this rulemaking with an outcome determinative approach. DOE decided that its objective was to make "a broad interpretation for what can be considered a GSL, analyzing non-GSIL lamps intended to serve in general lighting applications," *see* 81 FR 14528, 14541-42 (March 17, 2016), and then cobbled together a rationale for that pre-determined objective based on the concept of "overall illumination of an area" that ignores the statutory definition and the history and structure of the statute NEMA has described. It does not withstand statutory construction.

In its effort to make "a broad interpretation for what can be considered a GSL, analyzing non-GSIL lamps intended to serve in general lighting applications," *see* 81 FR 14528, 14541-42 (March 17, 2016), the Department's NOPR impermissibly patches together disparate sections of EPCA, using different terminology in a manner never intended by Congress, and ignores the prior history of the meaning of "general service" since EPAct 1992. This is *not* a case where "identical words [are] used in different parts of the same act." See e.g., *Environmental Defense v. Duke Energy Corp*., 549 U.S. 561, 574 (2007)("natural presumption that identical words used in different parts of the same act are intended to have the same meaning . . . is not rigid and readily yields whenever there is such variation in the connection in which the words are used as reasonably to warrant the conclusion that they were employed in different parts of the act with different intent."). This is a case where *different* words are used. See *Vonage Holdings Corp. v. FCC,* 489 F.3d 1232, 1240 (D.C. Cir. 2007) ("[W]e have repeatedly held that where different terms are used in a single piece of legislation, the court must presume that Congress intended the terms to have different meanings."). When Congress inserts a word or policy in one section of a statute, it does not mean that an agency can borrow it to construe a different section to bolster its efforts at statutory construction that is not consistent with the structure and text of the act. See *Univ. of Tex. Southwestern Med. Ctr. v. Nassar*, 133 S.Ct. 2517, 2528-29 (2013). It is a general principle of statutory construction that when "Congress includes particular language in

[26] These terms were used in an entirely different Section 324 ("Metal Halide Lamp Fixtures") of EISA-2007, not Section 321 ("Efficient Light Bulbs").

[27] The Department strangely attempts to weave in a standard developed by the Illuminating Engineering Society (IES) that refers to "general lighting" and contends that this is "similar" to "overall illumination". 81 FR 14528, 14542 (March 17, 2016). This is wrong. The definition in ANSI/IES RP-16 says that general lighting means lighting designed to provide a substantially uniform level of illuminance throughout an area. It does not refer to "overall illumination." Uniform illumination and overall illumination are not similar concepts.

one section of a statute but omits it in another section of the same Act, it is generally presumed that Congress acts intentionally and purposely in the disparate inclusion or exclusion." *Barnhart v. Sigmon Coal Co*., 534 U.S. 438, 452 (2002). The NOPR's construction of the term "general service" transgresses all of these principles.

The phrases "general lighting application" and "overall illumination of an area" have nothing legally to do with the statutory term "general service lamp" that Congress has defined very differently.

E. Congress Did Not Intend to Eliminate or Ban the General Service Incandescent Lamp or Other Incandescent Lamps By This General Service Lamp Rulemaking Procedure

The text of EISA 2007 itself confirms, and the legislative history of EISA 2007 demonstrates, as revealed in text of prior versions of bills introduced in the 110th Congress that were not enacted, that Congress was not interested in and did not intend to eliminate general service incandescent and other incandescent lamps from the market by this rulemaking. But that is what the Secretary is proposing to do in this rulemaking.

In authorizing this rulemaking, Congress provided in EISA 2007:

> ''(i) IN GENERAL.—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); . . ."

Pub.L. 110-140, 121 STAT. 1492, 1579; 42 U.S.C. §6295(i)(6)(A)(i).

Notably, Congress used these words when it authorized a second, follow-on rulemaking procedure for general service lamps to be initiated no later than January 1, 2020:

> "(i) IN GENERAL.—Not later than January 1, 2020, the Secretary shall initiate a rulemaking procedure to determine whether—
> ''(I) standards in effect for *general service incandescent lamps* should be amended to reflect lumen ranges with more stringent maximum wattage than the standards specified *in paragraph (1)(A)*; . . ."

Pub.L. 110-140, 121 STAT. 1492, 1580; 42 U.S.C. §6295(i)(6)(B)(i)(emphasis supplied).

It is logically inconceivable that Congress would authorize a second rulemaking beginning no later than January 1, 2020 to examine specifically whether energy conservation standards for general service incandescent lamps should be made more stringent than the standards for halogen incandescent lamps that Congress placed "in paragraph (1)(A)" in EISA 2007 if it was envisioned that this first rulemaking procedure would eliminate or ban the more efficient halogen incandescent lamps from the market by January 1, 2020. The text and structure of the Act do not support the hypothesis that Congress intended to ban general service incandescent lamps or other incandescent lamps in this rulemaking. In fact, everything about the Act and its history informs that it was Congress' intent to ensure the continuing presence of

incandescent lamps in the market: the only question was whether it was technologically feasible and economically justifiable to require that general service incandescent lamps be made more efficient? NEMA will address that issue in Part Two, Section III of these comments.

The next clause in each of these same paragraphs confirms this same Congressional intent for other specialty incandescent lamps:

> ‘‘(i) IN GENERAL.—Not later than January 1, 2014, the Secretary shall initiate a rulemaking procedure to determine whether— ***
>
> (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.

Pub.L. 110-140, 121 STAT. 1492, 1579; 42 U.S.C. §6295(i)(6)(A)(ii).

Congress would not have used the word “maintained” in reference to the exemptions for these “certain incandescent lamps” thereby maintaining their unregulated status if it envisioned eliminating these incandescent lamps from the market by January 1, 2020 as a result of regulation. That would be illogical. And this conclusion remains true for the second authorized rulemaking procedure to be initiated no later than January 1, 2020:

> “(i) IN GENERAL.—Not later than January 1, 2020, the Secretary shall initiate a rulemaking procedure to determine whether— ***
>
> (II) the exemptions for *certain incandescent lamps should be maintained* or discontinued based, in part, on exempted lamp sales data collected by the Secretary from manufacturers.

Pub.L. 110-140, 121 STAT. 1492, 1580; 42 U.S.C. §6295(i)(6)(B)(ii). Clearly, Congress envisioned that certain incandescent lamps would remain unregulated even after a *second* rulemaking procedure ended no later than January 1, 2022.

(1) <u>The Legislative History of EISA 2007</u>

(a) <u>House legislative action</u>.

Congressional action on what culminated in the passage of EISA 2007’s light bulb efficiency provisions began on July 30, 2007 with the introduction of H.R. 3221 (110th Cong., 1st Session). The House bill would have banned even the new halogen incandescent lamp that was just being introduced to the market. Section 9021 of H.R. 3221 provided as follows:

> (a) Prohibition.--
> (1) REGULATIONS.--
> Not later than 1 year after the date of enactment of this Act, the Secretary of Energy shall issue regulations--
> (A) prohibiting the sale of 100 watt general service incandescent lamps after January 1, 2012, unless those lamps emit at least 60 lumens per watt;

(B) prohibiting the sale of general service lamps manufactured after the effective dates shown in the table below that do not meet the minimum efficacy levels (lumens/watt) shown in the following table:

Minimum Efficacy Levels and Effective Dates

Lumen Range (Lumens)	Minimum Efficacy (Lumens/Watt)	Effective Dates
200-449	15	1/1/2014
450-699	17	1/1/2014
700-999	20	1/1/2013
1000 – 1500	22	1/1/2012
1501 – 3000	24	1/1/2012

(C) after January 1, 2020, prohibiting the sale of general service lamps that emit less than 300 percent of the average lumens per watt emitted by 100 watt incandescent general service lamps that are commercially available as of the date of enactment of this Act;
(D) establishing a minimum color rendering index (CRI) of 80 or higher for all general service lamps manufactured as of the effective dates in subparagraph (B); and
(E) prohibiting the manufacture or import for sale in the United States of an adapter device designed to allow a lamp with a different base to fit into a medium screw base socket manufactured after January 1, 2009.

(2) EXEMPTIONS.--
The regulations issued under paragraph (1) shall include procedures for the Secretary to exempt specialty lamps from the requirements of paragraph (1). The Secretary may provide such an exemption only in cases where the Secretary finds, after a hearing and opportunity for public comment, that it is not technically feasible to serve a specialized lighting application, such as a military, medical, public safety application, or in certified historic lighting applications using bulbs that meet the requirements of paragraph (1). In addition, the Secretary shall include as an additional criterion that exempted products are unlikely to be used in the general service lighting applications.

NEMA opposed this section of H.R. 3221 for a number of reasons. Paragraph (1) would actually ban by 2012 – 2014 the new 28% more efficient halogen incandescent lamp about to be introduced to the market leaving medium screw base compact fluorescent lamps as the only other product on the market that could comply with the lumens per watt metrics in H.R. 3221. The new halogen incandescent lamp was approximately 1-2 lumens per watt below those standards specified in H.R. 3221, and as noted above, there were still significant consumer acceptance issues with the CFL (e.g. color of light, dimmability, mercury) for some consumers in 2007 despite some significant improvements in the product. *See generally* PNNL CFL Report, *supra* note 2. NEMA also opposed the House bill's strict lumens per watt approach to lamp efficiency regulation in favor of a modified lumens per watt approach because it could have the perverse effect of driving consumers to buy higher wattage light bulbs that would increase energy consumption. NEMA further opposed the proposal to prohibit, beginning in 2020, the

sale of general service lamps that had less than 3 times the average lumens per watt of a 100 watt general service incandescent lamp that was then commercially available. This banned all incandescent lamps by 2020, leaving only CFLs on the market and a bet that LED technology would be sufficiently advanced by 2020 at an economically justified price point acceptable to consumers.

H.R. 3221 passed the House of Representatives on August 4, 2007 by a vote of 241 – 172. No action was taken in the Senate on HR 3221 and the House bill died in the Senate.

(b) Senate legislative action.

Formal Senate action on lighting efficiency legislation began on September 4, 2007 with the introduction of S. 2017 (110th Cong., 1st Session). The Senate bill included findings that it was "in the national interest to … (A) establish the efficiency requirements to ensure that replacement lamps will provide consumers with the same quantity of light while using significantly less energy; [and] (B*) ensure that consumers will continue to have multiple product choices, including energy saving halogen, incandescent, compact fluorescent, and LED light bulbs. . .*" S. 2017, Sec. 2 (3)(emphasis supplied).

Section 102(c) of S. 2017 established new standards for general service incandescent lamps that mirrored the energy conservation standards for those lamps that were ultimately included in EISA 2007: instead of enacting the strict lumens per watt approach the Senate bill adopted the modified lumens per watt approach advocated by NEMA that linked lamp wattage levels to certain lumen output "bins." S. 2017 included provisions similar to those in EISA 2007 that authorized two future rulemaking procedures for general service lamps, including a clause that called upon the Secretary to "include consideration of a minimum efficacy standard of 45 lumens per watt in both rulemaking procedures. *Id.*

The Senate parted company with the House's approach to lighting efficiency regulation that would have prohibited incandescent lamps from being sold in favor of an approach that preserved the presence of the incandescent lamp in the market.

NEMA supported the Senate approach with minor exception.

(c) Final congressional action.

While S.2017 had a hearing in the Senate Energy and Natural Resource Committee, it did not see legislative action. The House of Representatives was moving comprehensive energy legislation, H.R. 6, titled the Energy Independence and Security Act of 2007, and lighting provisions nearly identical to those in the Senate bill were incorporated in H.R. 6. The House abandoned the approach to lamp efficiency regulation it had taken in H.R. 3221 in favor of the Senate bill.

The demise of the H.R. 3221's lighting efficiency provisions that would have banned general service incandescent lamps by 2020 and given preference to the compact fluorescent

lamp confirms the construction of EISA 2007's legislative text that Congress did not intend to eliminate or ban incandescent lamps from the market in this rulemaking or a future rulemaking.

(2) Consideration of a Minimum 45 Lumen Per Watt Standard

EISA 2007's requirement that the Secretary "include c*onsideration of* a minimum standard of 45 lumens per watt for general service lamps," as part of this rulemaking, Pub.L. 110-140, 121 STAT. 1492, 1579; 42 U.S.C. §6295(i)(6)(A)(ii)(II), was also not intended to exclude the general service incandescent lamp from the market. It was aimed at *including* incandescent lamps meeting standards that were technologically feasible and economically justified.

The 45 lumens per watt metric was not pulled out of thin air. As noted earlier, in February 2007, before federal lighting efficiency legislation was introduced, General Electric announced "advancements to the light bulb invented by GE's founder Thomas Edison that potentially will elevate the energy efficiency of this 125-year-old technology to levels comparable to compact fluorescent lamps (CFL)."[28] If GE's research panned out, and such a product could be developed and commercialized, it could mean that a general service incandescent lamp with an efficacy of 45 lumens per watt might be on the market in the more distant future.

The traditional 100 watt general service incandescent lamp that was on the market in 2007 had a common lumen output of about 1500 lumens; therefore, this particular lamp's "lumens per watt" was 15. The House bill described above, H.R. 3221 (110th Cong., 1st Session) included a provision that prohibited "after January 1, 2020, . . . the sale of general service lamps that emit less than 300 percent of the average lumens per watt emitted by 100 watt incandescent general service lamps that are commercially available as of the date of enactment of this Act." In other words, the House bill would prohibit the sale of general service lamps whose lumens per watt were less than 45 (3 x 15), which also corresponded to EPAct 2005's standard for CFLs. See Part One, Section II, *supra*.

The problem with the House approach in H.R. 3221 was that it legislated a product prohibition based on the speculative prospect that GE's incandescent lamp research project would come to fruition and leave only the CFL on the market. The Senate and ultimately the Congress were uncomfortable with that proposition. Instead, Congress asked that the Secretary only give "*consideration* of a minimum standard of 45 lumens per watt for general service lamps."[29] Consistent with all the other general service lighting provisions of EISA 2007,

[28] See text accompanying note 6, *supra*.

[29] "To 'consider' means to 'reflect on,' 'think about,' 'deliberate,' 'ponder' or 'study.' WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY, UNABRIDGED 483 (1993). It does not mean to 'adhere to,' 'be bound by' or 'follow.'" *U.S. v. Bruce*, 285 F.3d 69, 73 (D.C. Cir. 2002); "This instruction to 'consider' such information as is "relevant" can hardly be read as a strict dictate. 'Consider' means 'examine' or 'inspect.' Black's Law Dictionary 306 (6th ed. 1990)." *J.H. Miles & Co., Inc. v. Brown*, 910 F.Supp. 1138, 1156 (E.D.Va.,1995). Accord, Oxford Dictionary of English (2010)("consideration/n. careful thought, typically over a period of time."); Oxford Dictionary of English (2010)("consider/v. think carefully about something, typically before making a decision").

this text was not intended as a direction to the Secretary to exclude general service incandescent lamps from the market in this rulemaking, but it was to determine whether general service incandescent lamps were available at a higher efficiency level (assuming the research and development effort panned out and the more efficient incandescent lamps could be made).[30]

(3) The Appropriations Rider[31]

In this rulemaking, notwithstanding that DOE has proposed a rule that would ban general service incandescent lamps and a number of specialty incandescent lamps desired by consumers from the market by adopting a 45 lumens per watt standard, the DOE has apparently decided it will not undertake any analysis about general service incandescent lamps and other incandescent lamps because of a congressional restriction on the use appropriated funds to "implement or enforce" 10 C.F.R. 430.32(x). 81 FR 41528, 14540-541 (March 17, 2016). NEMA's earlier comment in this rulemaking procedure stated that this was not the most obvious interpretation of the Appropriations Rider and NEMA cited a more natural reading of the restriction, consistent with language of the Appropriations Rider as well as the statutory construction of EISA 2007 in these comments:

> NEMA does not believe that the appropriation restriction prevents the Secretary from making a decision for each of the classes of general service lamps and satisfying all the obligations of 42 USC §6295(i)(6)(A)(i-iv). For example, under the first or second approach, the Secretary can affirmatively decide not to amend the standards in 10 CFR §430.32(x) while amending or promulgating new standards for some other classes of general service lamps, and it would not constitute an implementation of 10 CFR 430.32(x) to make that decision.[32]

NEMA continues to disagree with DOE's interpretation of the Appropriations Rider. NEMA has opposed the Appropriations Rider in Congress because NEMA believes it is unnecessary and could discriminate against lamp manufacturers who comply with EISA 2007's lighting efficiency provisions. NEMA has also disagreed with some of the assertions made on behalf of sponsors of the Appropriations Rider as well as opponents of the Appropriations Rider. Yet there is a common sentiment that is shared by both the proponents and the opponents of

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[30] This was in effect what Congress was doing in EISA 2007 by legislating energy conservation standards for general service incandescent lamps at levels consistent with the product that was available on the market.

[31] The Consolidated and Further Continuing Appropriations Act, 2015, Public Law 113-235 (Dec. 16, 2014)("the Appropriations Rider") and its predecessors containing the same appropriations restriction including, but not limited to, the Consolidated Appropriations Act of 2012, the Consolidated Appropriations Act, 2014 §322 (Pub.L. 113-76), which continued the same restriction in Fiscal Year 2014("None of the funds made available in this Act may be used— (1) to implement or enforce section 430.32(x) of title 10, Code of Federal Regulations;").

[32] NEMA Comments on Energy Conservation Program: Energy Conservation Standards Rulemaking Framework Document for General Service Lamps at 6-7, Docket Number 34: EERE-2013-BT-STD-0051 (February 7, 2014).

the Appropriations Rider that NEMA does agree with that is consistent with the core of EISA 2007: consumer choice among different lighting technologies with different efficiencies. See Part One, Section III.E.(1), (2), *supra*. This dialogue on the floor of the House between Rep. Burgess, who supported the Appropriations Rider, and Rep. Kaptur, who opposed the Appropriations Rider, on July 10, 2013 in connection with the Energy and Water Development and Related Agencies Appropriations Act, 2014 displays the shared sentiment:

> Mr. Burgess: *** *This Congress should be on the side of the consumer and on the side of consumer choice.* If the new energy-efficient light bulbs save money and if they're better for the environment, we should trust our constituents to make the choice on their own toward these bulbs. Let the market decide. We should not be forcing these light bulbs on the American people. The bottom line is the Federal Government has no business taking away the freedom of choice from Americans as to what type of light bulbs to use in their homes.
>
> Ms. Kaptur: *** It is a common misunderstanding that there is some type of ban on the incandescent light bulb *that effectively requires people to have the limited choice of only a compact fluorescent bulb. This is simply not true*. Regulations require only that bulbs be more efficient. *** Further, while claiming that the incandescent bulb is dead makes for a great sound bite, it just doesn't reflect reality. As a result of the 2007 law, *manufacturers already are making a variety of new energy-saving bulbs for homes, including more efficient incandescent bulbs*. These bulbs look like and turn on like the bulbs we have been using for decades, but are upwards of 28 to 33 percent more efficient. And that's good for everyone. This is amazing progress in a very short time, considering that previously the basic technology of incandescent bulbs had not changed substantially since they were first introduced over 125 years ago.

159 Cong Rec H 4322 (July 10, 2013).

Neither side of the debate over the Appropriations Rider disagreed that an objective of the underlying law, EISA 2007, is to provide consumers with choices of lamp technologies; they only disagree about how broad the choices should be, with the disagreement limited only to the higher wattage incandescent lamps that EISA 2007 regulated out of the market. As discussed previously in these comments, the findings articulated in the Senate lighting efficiency bill, S.2017, that ultimately became the basis of EISA-2007's lighting provisions that authorized this rulemaking procedure stated it was in the national interest to establish the efficiency requirements "(A) to ensure that replacement lamps will provide consumers with the same quantity of light while using significantly less energy; *[and] (B) ensure that consumers will continue to have multiple product choices, including energy saving halogen, incandescent, compact fluorescent, and LED light bulbs. . .*" S. 2017, Sec. 2 (3) (110th Cong., 1st Session)(emphasis supplied). NEMA's construction of the Appropriations Rider and what the Secretary can do consistent with the Appropriations Rider is the only construction that is consistent with these consensus sentiments about the Appropriations Rider and EISA 2007 itself. The DOE's construction of the Appropriations Rider is inconsistent with congressional intent about consumer choice and EISA 2007.

Finally, as discussed above, see Part One, Section III.B, *supra*, with respect to the *specialty* lamp applications and globe shapes that are not considered "general service" lamps, nothing compels the Secretary to adopt the same energy conservation standards applied to general service incandescent lamps at 10 C.F.R. §430.32(x), if the Secretary was to decide to discontinue their exemption from standards. In the case of the incandescent versions of these specialty lamp applications and globe shapes, adopting a standard (assuming economically justified and technologically feasible) need not implement 10 C.F.R. §430.32(x). This is because they are not "general service" lamps. *See* Part One, Section III.B, *supra*.

The DOE's construction of the Appropriations Rider is simply an arbitrary decision to punt all agency analysis so that consumers will have fewer choices among lamps in 2020 by purportedly triggering the statute's "backstop" provision. 81 FR 14528, 14540 (March 17, 2016). This makes no sense under anyone's perspective of the Appropriations Rider and EISA 2007, and DOE makes an arbitrary and capricious decision not to reconcile the Appropriations Rider with EISA-2007. The term "implement" in the Appropriations Rider has a well-understood common sense, dictionary meaning: "**implement** / *vt* 1: to carry out: ACCOMPLISH: esp. to give practical effect to and ensure of actual fulfillment by concrete measures." *Webster's New Collegiate Dictionary* at 576 (1973).[33] Conducting an analysis of something is not "implementing" or "enforcing" an energy conservation standard. *City of Burbank v United States*, 273 F.3d 1370, 1381 (Fed. Cir. 2001) ("According to the term's plain meaning, as well as common sense, "implementation" of PF rates simply cannot refer to every action the BPA takes that references (or is based on) those rates."). Furthermore, if that analysis demonstrates that no action should be undertaken, *e.g.*, affirmatively deciding not to amend 10 CFR 430.32(x), the Secretary is not ensuring actual fulfillment of this regulation by concrete measures; the Secretary is not implementing the regulation when analysis shows that an amendment cannot be justified. In its present form, 10 CFR §430.32(x) was already "implemented" long before the Appropriations Rider was enacted into law.[34] In Part Two of our comments, NEMA provides the factual record for the Secretary determining not to amend 10 CFR 430.32(x) standards for general service incandescent lamps. See Part Two, Section III, *infra*.

Finally, DOE's interpretation of the Appropriations Rider --- that it prevents the Secretary from *analyzing* any factual record relating to incandescent lamps --- represents a fundamental conflict with a core principle of EPCA itself. EPCA operates by determining whether a more energy efficient version of a covered product is technologically feasible and available, and whether an energy conservation standard based on that more energy efficient product is economically justified and yields significant energy savings. 42 U.S.C. §6295(o). Only if an energy conservation standard meets this test are less efficient covered products removed from

[33] Accord, Oxford Dictionary of English (2010)("implement/v. put (a decision, plan, agreement, etc) into effect").

[34] This same point was made by the D.C. Circuit Court of Appeals in *Independent U.S. Tanker Owners Committee v. Skinner*, 884 F.2d 587, 596 (D.C. Cir. 1989) when it held that "a restriction on the expenditure of appropriated funds . . . is inherently prospective." The Court of Appeals held that a restrictive appropriations rider did not nullify a preexisting rule. *Id.*

the market by regulation. The Department interprets the Appropriations Rider in this rulemaking to conclude that it can ignore this core principle of EPCA, adopt an energy conservation standard of 45 lumens per watt that would eliminate the general service incandescent halogen lamp from the market, without conducting any analysis. That interpretation also deprives interested persons from showing that a proposed standard is likely to result in the unavailability in the United States in any covered product type in features, sizes, capacities and volumes, as the Secretary is proposing in this rulemaking with respect to the general service halogen incandescent lamp. 42 U.S.C. §6295(o)(4). Nothing in the text of the Appropriation Rider suggests that Congress was preventing the Secretary from fulfilling its statutory responsibilities.

(4) The Backstop Provision[35]

The "Backstop" provision was a direct response to the DOE's history of delay in meeting EPCA's congressionally mandated rulemaking schedule.[36] It was an incentive to the agency and the stakeholders to complete the rulemaking prescribed by Congress on time. The first several words of the backstop provision, 42 U.S.C. §6295(i)(6)(A)(v)("If the Secretary fails to complete a rulemaking in accordance with clauses (i)-(iv) . . ."), plainly reflects this intention.[37] The Secretary has commenced this rulemaking procedure on time as prescribed by Congress,

[35] Pub.L. 110-140, 121 STAT. 1492, 1580; 42 U.S.C. §6295(6)(A)(v).

[36] By 2005, the DOE was significantly behind the statutorily mandated schedule for considering amendments to a number of energy conservation standards. U.S. Government Accountability Office, *Long-standing Problems with DOE's Program for Setting Efficiency Standards Continue to Result in Forgone Energy Savings* (January 2007)(hereinafter "GAO Report"). While some rulemakings were underway and some of these nearing completion, other mandated rulemakings had not been initiated. A principal explanation for the delay was that congressional appropriations for this rulemaking activity had not kept pace with the increase in activity mandated by Congress. GAO Report at 19. DOE was forced to allocate its appliance efficiency rulemaking resources as it deemed most effective, and it accomplished this by prioritizing the mandated rulemakings in terms of high, medium and low, based on public stakeholder input, and described its priorities in a published notice each year. In September 2005, the State of New York and others filed suit seeking declaratory and injunctive relief alleging that the DOE had not timely met its standards promulgation requirements for twenty-two categories of consumer and commercial products and equipment. *State of New York v. Bodman*, 05 Civ 7807 (S.D.N.Y). The 2005 litigation was settled by consent decree in 2006 with DOE committing to complete the 22 categories of rulemakings, according to an agreed schedule, between February 28, 2007 and June 30, 2011. Congress took note of this situation and required, in EPAct 2005, that the Secretary file semi-annual reports with Congress regarding "each new or revised energy conservation or water use standard which the Secretary has failed to issue in conformance with the deadlines established in the Energy Policy and Conservation Act." 109 Pub.L 58, 119 STAT. 594, 648; 42 U.S.C. §15834 note. This was supplemented in EISA 2007 by a requirement that the reports to Congress include statements of compliance with the consent agreement in *State of New York v. Bodman*. Pub.L. 110-140, 121 STAT. 1492, 1554. DOE completed these rules in time to meet the court order, putting DOE on track to meet EPCA's mandates that DOE undertake two reviews of the energy conservation standards originally established by Congress in 1987, 1988, and 1992.

[37] Congress' choice of words here --- "fails to complete a rulemaking" --- connects to the same words in Section 305 of EISA 2007 about "failures to comply with deadlines", Pub.L. 110-140, 121 STAT. 1492, 1554, and the same words in EPAct 2005 regarding "standard[s] which the Secretary has failed to issue in conformance with the deadlines." 109 Pub.L 58, 119 STAT. 594, 648; 42 U.S.C. §15834 note. See note 36, *id*.

and appears to intend to complete it on time as prescribed by Congress. The NOPR proposes to determine whether standards in effect for general service lamps should be amended. The NOPR states that DOE has considered a 45 lumens per watt standard, and the Secretary has indicated it considered phased-in effective dates for the final rule. 81 FR 14528, 14584 (March 17, 2016). The Secretary appears to be electing to avoid making required determinations about certain incandescent lamps on the *mistaken belief* that the agency cannot undertake any analysis of those lamps in this rulemaking. Several other commenters in this rulemaking proceeding have reached the same conclusion, but for different reasons. *Id.* at 14540-41.

The next few words of the backstop provision --- "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 lumens per watt" --- provide another condition precedent in this case before the backstop provision is triggered. Here, Congress was unambiguously saying that if the final rule *does* produce energy savings that are greater than or equal to the energy savings from a minimum efficacy standard of 45 lumens per watt --- then forget about the prohibition in the backstop provision. Importantly, these words --- "*if the final rule* does not produce savings" --- plainly indicate this can only be determined *after the public knows what the final rule requires and what amount of energy consumption it produces*. The Department's mistaken interpretation of the Appropriation's Rider leading to the proposed adoption of a minimum 45 lumen per watt standard "for each general service lamp" sold after January 1, 2020 avoids the energy savings analysis as well.

The phrase "*savings* that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt" logically signifies that the Secretary has ***not*** adopted a minimum efficacy standard of equal to or greater than 45 lumens per watt for all general service lamps. It means that there are some general service lamps that are lawfully less than 45 lumens per watt under the final rule and other general service lamps that are equal to or higher than 45 lumens per watt, but the energy consumption from all the "fleet" of general service lamps is less than the energy consumption --- hence the word "savings"[38] --- from a minimum efficacy standard of 45 lumens per watt. To interpret the statute differently renders the words "if the final rule does not produce *savings* greater than or equal to" meaningless. If the Secretary was to determine that a 45 lumens per watt standard could be economically justified and was technically feasible for all general service lamps (and NEMA submits that it cannot in the case of general service incandescent lamps), there would be no need to make a determination about whether energy savings from a final rule is greater than or equal to anything. Such a final rule would establish that "savings" *ipso facto*.

Once a final rule is completed that does not have a minimum 45 lumen per watt standard for all general service lamps, a separate inquiry turns to: is the nation going to experience energy savings greater than or equal to a 45 lumen per watt lamp in every socket? Congress chose the word "savings" to focus on energy consumption outcomes; Congress did not say that the Secretary shall implement the backstop provision "if the Secretary fails to adopt a 45 lumens

[38] Stated another way: "the final rule . . . produce[s] savings that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt."

per watt or greater energy conservation standard for general service lamps."[39] That completely circular statement is not consistent with the text of the statute or the clear intent that this rulemaking was not to eliminate general service incandescent lamp from the market. See discussion in Part One, Section III.E, *supra*.

NEMA's comment to DOE on the framework document in this proceeding expressly stated that a "fleet" approach to energy conservation standards for different types of general service lamps, including halogen incandescent lamps, was part of the congressional design for this reason.[40]

In Part Two, Section IV and Appendix A, *infra*, NEMA demonstrates that it is now reasonably foreseeable that Congress' energy savings objectives will be achieved and that DOE's proposal to ban the sale of general service lamps with a minimum efficacy of less than 45 lumens per watt is premature if not clearly erroneous.

F. Technology Neutral Standards

NEMA repeats its comments made in February 2014 in this proceeding: EISA envisioned that different energy conservation standards for different types of general service lamps might be economically justified and technologically feasible in this proceeding. (NEMA Comments dated February 7, 2014, pages 5-6, EERE-2013-BT-STD-0051, Docket No. 34) Technology neutral standards for all general service lamp types are not mentioned or compelled by the statutory text of EISA 2007. The more logical, and congressionally intended construction of EISA-2007 is that different standards for general service lamps are warranted for reasons already cited above. See Part One, Section III.E.(4), *supra*.

As stated earlier, the DOE may not eliminate the CFL or any other type of covered product from the market by adopting a standard that the covered product type cannot meet. The Department is proposing to amend the energy conservation standards for the medium base compact fluorescent lamp enacted in EPAct 2005 to establish a lumens per watt efficacy requirement that the CFL cannot technologically meet. The Department acknowledges this in the NOPR. 81 FR 14528, 14618 (March 17, 2016). EPCA requires that every "amended energy conservation standard prescribed by the Secretary . . . for any type (or class) of covered product shall be designed to achieve the maximum energy savings . . . [that] is technologically feasible and economically justified." 42 U.S.C. §6295(o)(2)(A). Without question, the medium base compact fluorescent lamp is a "type" of "covered product." 10 CFR §430.2 (definition of "covered product"). Yet the Department, by its own admission, is proposing to amend the current standard for this type of covered product," the medium base compact fluorescent lamp, to such a high level that a CFL cannot be designed to meet or exceed. This proposal violates EPCA.

[39] That language would have been totally inconsistent with Congress' choice of words that the Secretary only give "consideration to" a 45 lumens per watt standard. See text accompanying note 29, *supra.*

[40] NEMA Comments dated February 7, 2014 at pages 3 – 7. EERE-2013-BT-STD-0051, Docket No. 34. The practical significance of this approach will be addressed *infra* in Part Two of these comments.

In connection with the NOPR, the Department considered another candidate standard --- denominated “EL2” --- that is technologically feasible for the CFL to meet, and would increase energy savings over the baseline. Given the unfavorable current long-run market prospects for the CFL, see Part Two, Section IV, *infra*, and the significant manufacturer investment it would take to redesign the CFL to meet EL2, few, if any, manufacturers may invest in the CFL’s future, but that would be the market’s determination, not the government’s unauthorized action.

NEMA recommends DOE maintain the current energy conservation standard for the medium base CFL, but go no higher than EL-2 if that standard is economically justified. Consistent with our comments elsewhere in this submission, we expect the market will likely reduce the presence of this lamp in the market to near-zero at some point.

PART TWO: GENERAL COMMENTS ABOUT THE NOPR

I. The Product Scope of General Service Lamps in this Rulemaking Procedure

Table A below presents a listing of products that have been identified by DOE as possibly impacted by this rulemaking procedure. Applying the statutory construction analysis in Part One of these comments, NEMA identifies whether the various products are "general service lamps" or not under the Energy Policy and Conservation Act. Table B explains why each excluded lamp will not serve a majority of the lighting applications.

TABLE A

Lamp Technology →	Incandescent		Compact Fluorescent		LED	
Lamp Type ↓	GSL?	Available in market?	GSL?	Available in market?	GSL?	Available in market?
Medium Screw Base Integrated Non-Reflector 310-2600 initial lumens		No	Yes	Yes	Yes	Yes
Medium Screw Base Non-Integrated Non-Reflector 310-2600 initial lumens	Yes	Yes		No		No
GU-24 base Integrated non-reflector 310-2600 lumens		No	Yes	Yes	Yes	Yes
GU-24 base Non-integrated non-reflector 310-2600 lumens		No	Yes	Yes		No
REFLECTOR LAMPS						
Medium screw base MR (11, 14, 16, 20) shape	Yes	Yes		No	Yes	Yes, in lower lumens
Pin base (GU5.3) MR (11, 14, 16, 20) shape	Yes	Yes		No	Yes	Yes, in lower lumens
Pin base (GX5.3) MR (11, 14, 16, 20) shape	Yes	Yes		No	Yes	Yes, in lower lumens
Pin base (GU10) MR (11, 14, 16, 20) shape	Yes	Yes		No	Yes	Yes, in lower lumens
MR8 (all bases)	No	Yes		No	No	Yes
Screw terminal base (G54) reflector lamps	No	Yes	No	No	No	Yes
Medium side prong base (G12.7) reflector lamps	No	Yes	No	No	No	No
Mogul prong base reflector lamp	No	Yes	No	No	No	No
SPECIALTY NICHE APPLICATIONS – MINORITY OF LIGHTING APPLICATIONS						
Appliance	No	Yes	No	No	No	Yes some (in

						lower lumens), but not all appliance applications (e.g. ovens won't work)
Black light	No	Yes	No	Yes	No	Yes
Bug	No	Yes	No	Yes	No	Yes
Colored	No	Yes	No	Yes	No	Yes
Infrared	No	Yes	No	No	No	No
Left hand thread	No	Yes	No	No	No	No
Marine	No	Yes	No	No	No	No
Marine signal	No	Yes	No	No	No	No
Mine service	No	Yes	No	No	No	No
Plant light	No	Yes	No	Yes	No	Yes
Rough service	No	Yes	No	No. CFL lamp has a short cathode that is inherently robust. No filament.	No	No. LED lamp has no filament to protect. Inherently robust
Shatter resistant	No	Yes	No	Yes	No	Not presently made.
Showcase	No	Yes	No	Yes	No	No
Sign service	No	Yes	No	Yes (cold cathode only)	No	Yes (but may have technical/performance issues with flashing signs)
Silver bowl	No	Yes	No	Yes	No	Yes
Three-way	No	Yes	No	Yes	No	Yes
Traffic signal	No	Yes	No	No	No	Yes
Vibration service	No	Yes	No	No. CFL lamp has a short cathode that is inherently robust. No filament	No	No. LED lamp has no filament to protect. Inherently robust.
SPECIAL GLOBE SHAPES – MINORITY OF LIGHTING APPLICATIONS						
B-shape	No	Yes	No	Yes	No	Yes
BA-shape	No	Yes	No	Yes	No	Yes
CA (candle) shape	No	Yes	No	No	No	Yes

F (flame) shape	No	Yes	No	Yes	No	Yes
G16-1/2 shape	No	Yes	No	No	No	Yes
G25 shape	No	Yes	No	Yes	No	Yes
G30 shape	No	Yes	No	Yes	No	Yes
G-shape (G40) with diameter greater than 5”	No	Yes	No	Yes	No	Yes
M14 shape	No	Yes	No	No	No	No
S shape	No	Yes	No	No	No	Yes, in low lumens only
SPECIAL BASES – MINORITY OF LIGHTING APPLICATIONS						
Intermediate base	No	Yes	No	Yes	No	Yes
Candelabra base	No	Yes	No	Yes	No	Yes
Bayonet base	No	Yes	No	No	No	Yes
Double ended base	No	Yes	No	No	No	No
Recessed Single Contact base	No	Yes	No	No	No	No
Mogul Screw and mogul bi-post base	No	Yes	No	No	No	No
G53 base	No	Yes	No	No	No	No
Double Contact Prefocus base	No	Yes	No	No	No	No
2-pin bases	No	Yes	No	No	No	No
Other Excluded						
Lamps greater than 2600 lumens	No	Yes	No	Yes	No	No

TABLE B

Lamp Type	Why These Specialty Lamps Are Confined to a Minority of Lighting Applications
REFLECTOR LAMPS	
Screw terminal base (G54) reflector lamps	Base used with low voltages (typically 12 volts or less) in a limited number of specialized fixtures. Allows lamp and fixture to have a very flat profile and prevents accidental use on 120 volt systems. Used almost exclusively in commercial applications. Rarely ever used in consumer residential applications.
Medium side prong base (G12.7) reflector lamps	Specialized base used in limited commercial applications such as Mine lamps. Allows lamp and fixture to have a very flat profile and prevents misapplications. Never used in residential consumer applications.
Mogul prong base reflector lamp	Used with lamps having a very high wattage or very high current. Commercial use only.
MR8	Used with equipment and for decorative, accent --- landscape lighting outdoors

SPECIALTY NICHE APPLICATIONS – MINORITY OF LIGHTING APPLICATIONS	
Appliance	Energy use is already capped by Congress at 40 watts. Incandescent technology is the only available option for Oven lamps. LED lamps can be used in cold temperature applications.
Black light	Produces no useful visible illumination.
Bug lamp	Only produces light in the yellow and red part of the spectrum. Designed to emit light outside the typical perception of night-flying insects.
Colored	Only produces light in one part of the color spectrum for creative, aesthetic, and entertainment effects. Examples include mood lighting, party lamps, and garden lamps.
Infrared	Lamps used for heating purposes and not illumination. The lamp's highest radiant power peaks in the infrared region of the electromagnetic spectrum.
Left hand thread	Certain lighting applications require a special bulb with specific voltages and wattages. In such applications, if a common light bulb were to be installed and turned on, it would instantly fail, potentially exploding. Left-hand threads and sockets were created to prevent such situations. These lamps are also used in some public areas where risk of theft is problematic; the design deters theft. This lamp cannot be used in the common "right hand" thread socket. Very low volume.
Marine	Designed for use on Boats, primarily with unique base, unusual voltage or water-resistant/vibration resistant applications. Designed to operate with direct current.
Marine signal	Primarily designed for signaling systems used on seaways. Not a residential consumer product.
Mine service	Designed for use in Mines. Not a residential consumer lamp.
Plant light	Designed to provide the majority of light in the red and blue parts of the spectrum most important for plant growth.
Rough service	Special filament supports with special filament configurations used with this lamp to protect the integrity of an incandescent lamp filament and the life of the lamp in areas where the lamp may be exposed to movement and other rough applications. Unique to incandescent technology.
Shatter resistant	Lamp has a special coating applied to it that contains glass and other elements in lamps. Used in both incandescent and fluorescent technologies. Primarily used in food service applications, where local food codes may require the lamp to be used.
Showcase	Narrow and long lamps designed for use in cabinets used to showcase items. Generally showcase lamps will not fit in common fixture types.
Sign service	Sign service lamps are designed to withstand vibration from wind and traffic and are designed to withstand special effects such as frequent flashing or chasing. Not a residential consumer lamp.
Silver bowl	Special silver or opaque coating applied to glass inside the bowl of lamp to direct light upward. Used largely to create an ambience/low light environment as pendant lighting.
Three-way	Designed to allow user to select one of three different levels of light

	output. Incandescent version contains two different filaments.
Traffic signal	Used in unique application as described by its name. Not a residential consumer lamp.
Vibration service	Special filament configurations used with this lamp to protect the integrity of an incandescent lamp filament and the life of the lamp in areas where vibration occurs. Unique to incandescent technology.
SPECIAL GLOBE SHAPES – MINORITY OF LIGHTING APPLICATIONS	
B-shape	Incandescent energy use already capped at 40 watts. Decorative Candle shaped lamp with blunt tip blunt tip for specialty aesthetic applications.
BA-shape	Incandescent energy use already capped at 40 watts. Miniature light source commonly used in recreational vehicles for specialty aesthetic applications.
CA (candle) shape	Incandescent energy use already capped at 40 watts. Decorative Candle shaped lamp with bent tip for specialty aesthetic applications.
F (flame) shape	Incandescent energy use already capped at 40 watts. Decorative Candle shaped lamp with blunt tip and decorative “flame patterns” in glass for specialty aesthetic applications.
G16-1/2 shape	Incandescent energy use already capped at 40 watts. Decorative round globe shape lamp for specialty aesthetic applications. Often with candelabra base or intermediate base.
G25 shape	Incandescent energy use already capped at 40 watts. Decorative round globe shape lamp for specialty aesthetic applications often used in bathroom vanity applications. Larger than G16-1/2 globe.
G30 shape	Incandescent energy use already capped at 40 watts. Decorative round globe shape lamp for specialty aesthetic applications. Larger than G25 globe.
G-shape (G-40) with diameter greater than 5”	Decorative globe shape lamp for specialty aesthetic applications. Lamp is too large to fit in most general service lamp fixtures.
M14 shape	Incandescent energy use already capped at 40 watts. Mushroom shaped decorative lamp for specialty aesthetic applications.
S shape	Incandescent energy use already capped at 40 watts. Straight sided lamp often used in sign or signaling applications.
T3 shape	Single ended quartz halogen lamp, which allows high lumen output from a very small lamp size only possible with halogen technology.
SPECIAL BASES – MINORITY OF LIGHTING APPLICATIONS	
Intermediate base	Rarely used screw base type that has a base size in between the popular medium screw base and the candelabra base size often used with decorative lamps. This non-exempt specialty lamp is already regulated by an energy use standard.
Candelabra base	Common small screw base type often used with decorative lamps. This non-exempt specialty lamp is already regulated by an energy use

	standard.
Bayonet base	Small base type used on miniature light sources, typically at low voltages and often found in boating, RV, car map lights, cabin light, or specialty equipment applications.
Recessed Single Contact base; Double ended base.	Used on double ended halogen lamps typically at very high wattages from 100 to 2000 watts for high lumen output. The most common is 500 watts. Commonly used for sports and floodlight applications of large areas such as garden illumination.
Mogul Screw and mogul bi-post base	Used with lamps that have very high current or very high wattages for very high lumen output. Used in special commercial/industrial/ transportation applications (e.g., warehouses). Not used in consumer applications.
G53 base	Used on a specialty commercial AR111 reflector lamp. These types of lamps and bases are not found in homes or consumer applications.
Double Contact Prefocus base	Used in specialized equipment where it is important to "focus" the base and lamp in a particular orientation for the equipment to operate properly. Commercial product only.
2-pin bases	Used on very small quartz halogen lamps that are often 3/8" in diameter and less than an inch long. Primarily used on special commercial applications where high light output and small fixture size is required or preferred. While some of these lamp types can occasionally be found in homes in very small specialty fixtures, they cannot fit into general service lighting fixtures. It is impossible to fit an LED chip and driver into this type of space and generate the high lumen levels of these lamp types. No CFL or LED alternatives.

Based on the foregoing, the Secretary's proposed definition of "general service lamp" should be revised as follows and new definitions for "specialty lamp" and "specialty base lamp" added:

> *General service lamp* means a lamp that has an ANSI base, but is not a specialty base lamp, ~~operates at any voltage~~ has a rated voltage from 110 to 130 volts or has a rated voltage from 11 to 13 volts, has an initial lumen output of 310 lumens or greater (or 232 lumens or greater for modified spectrum general service incandescent lamps) and an initial lumen output of 2600 lumens or less, is not a light fixture, is not a specialty lamp, is not an incandescent reflector lamp or a general service fluorescent lamp, and is used ~~in general~~ to satisfy a majority of lighting applications. General service lamps include, but are not limited to, general service incandescent lamps, compact fluorescent lamps, general service light-emitting diode lamps, general service organic light emitting diode lamps, and reflector lamps (that are not a specialty base lamp, specialty lamp, or incandescent reflector lamp). ~~, but do not include general service fluorescent lamps; incandescent reflector lamps; mercury vapor lamps; appliance lamps; black light lamps; bug lamps; colored lamps; infrared lamps; traffic signal lamps; and medium screw base incandescent lamps that are left-hand thread lamps, marine lamps, reflector lamps, rough service lamps, shatter-resistant lamps (including a shatter-proof lamp and a shatter-protected lamp), silver bowl lamps, showcase lamps, 3-way incandescent lamps, vibration service lamps, G shape lamps as defined in ANSI C78.20 (incorporated by reference; see §430.3) and ANSI C79.1-2002 (incorporated by reference; see §430.3) with a diameter of 5 inches or more; T shape lamps as defined in ANSI C78.20~~

~~(incorporated by reference; see §430.3) and ANSI C79.1-2002 (incorporated by reference; see §430.3) and that use not more than 40 watts or have a length of more than 10 inches; and B, BA, CA, F, G16-1/2, G-25, G30, S, or M-14 lamps as defined in ANSI C79.1-2002 (incorporated by reference; see §430.3) and ANSI C78.20 (incorporated by reference; see §430.3) of 40 watts or less.~~

Specialty lamp means a lamp designed for and used in special applications that is an appliance lamp, black light lamp, bug lamp, colored lamp, infrared lamp, left-hand thread lamp, marine lamp, marine signal lamp, mine service lamp, plant light lamp, rough service incandescent lamp, shatter-resistant lamp (including a shatter-proof lamp and a shatter-protected lamp), showcase lamp, sign service lamp, silver bowl lamp, 3-way incandescent lamp, traffic signal lamp, vibration service incandescent lamp, G shape lamp as defined in ANSI C78.20 (incorporated by reference, see §430.3) and ANSI C79.1-2002 (incorporated by reference, see §430.3) with a diameter of 5 inches or more, T shape lamp as defined in ANSI C78.20 (incorporated by reference, see §430.3) and ANSI C79.1-2002 (incorporated by reference, see §430.3) and that use not more than 40 watts or have a length of more than 10 inches, or B, BA, CA, F, G16-1/2, G-25, G30, S, or M-14 lamps as defined in ANSI C79.1-2002 (incorporated by reference, see §430.3) and ANSI C78.20 (incorporated by reference, see §430.3) of 40 watts or less, or MR lamp designated MR8.

Specialty base lamp means a lamp with an intermediate base, candelabra base (E12), mini-candelabra base (E11), bayonet base, double ended base, screw terminal base, or medium side prong base; or mogul prong base, recessed single contact, mogul screw, mogul bi-post, G53, Double Contact Prefocus, 2-Pin GY6.35, 2-Pin G8, 2-Pin G9 and 2-pin G4 when used on non-reflector lamps.

These definitions provide the needed clarity that the NOPR fails to achieve with respect to the scope of this rulemaking.

II. Determination Whether Exemptions for Certain Incandescent Lamps Should be Maintained or Discontinued

As discussed in Part One, Section III.B, *supra*, EISA-2007 authorized the Secretary to determine in this rulemaking whether "the exemptions for certain incandescent lamps should be maintained or discontinued based, in part, on exempted lamps sales data collected by the Secretary from manufacturers," and further provided that the "rulemaking shall not be limited to incandescent lamp technologies." 42 U.S.C. §6295(i)(6)(A)(i). In the case of the five categories of specialty incandescent lamps, Congress gave guidance as to the sales trend that would trigger an accelerated rulemaking to establish "*an* energy conservation standard" for these specialty lamps. The energy conservation standard for each specialty lamp would have to meet the economic justification and technologically feasible requirements of 42 U.S.C. §6295(o). In the case of other exempted specialty lamps, the Secretary would have to determine whether the requirements of 42 U.S.C. §6292(b) --- average annual per household energy use likely to exceed 100 kWh --- and then the energy conservation standard would have to meet the economic justification and technologically feasible requirements of 42 U.S.C. §6295(o).

A. The specialty incandescent lamps in subparagraph (D) that are exempt from energy conservation standards except the five categories of specialty lamps whose sales are monitored

There are a number of exempt specialty incandescent lamps described in Tables A and B above that are exclusively commercial lamps. Since the Secretary has initiated this rulemaking under Part A of EPCA, which established the Energy Conservation Program for Consumer Products Other Than Automobiles. 81 FR 14528, 14530 (March 17, 2016), the Secretary can easily determine to maintain the exemptions for these commercial lamps. These include: medium side prong base reflector lamps, mogul prong base reflector lamps, marine signal lamps, mine service lamps, sign service lamps, and traffic signal lamps.[41] This determination would not involve an implementation of 10 CFR 430.32(x).

There are a number of specialty incandescent lamps that are not significantly installed in households across the United States such that their use cannot possibly produce an average annual per household energy use in excess of 100 kilowatt hours per year, and therefore may not be classified as a covered product under 42 U.S.C. §6292(b). The Secretary can easily determine to maintain the exemptions for these specialty lamps. These include: medium side prong base reflector lamps, black lights, bug lights, colored lights, infrared lights, left-hand thread lights, plant lights, showcase lights, silver bowl lights, and G shape lamps greater than 5 inches in diameter (G-40). This determination would not involve an implementation of 10 CFR 430.32(x).

To illustrate the point in the preceding paragraph, consider all globe-shape lamps (G16-1/2, G25, G30, and G40), one of the most popular decorative specialty lamps sold. Globe shape lamps are commonly used in bathroom and dressing room vanity applications, and other aesthetic applications. Their average hours of use are relatively low as they tend to be used in areas that are not continuously occupied. There are an estimated 210 million medium screw base Globe shape lamps installed in the United States. According to NEMA data, approximately 70 million globe shape lamps are sold annually. As these lamps have a three-year life and sales have been relatively stable, it is reasonable to assume that these lamps are installed in approximately 210 million sockets. The average operating power of globe shape lamps is 40 watts or less because Congress capped the energy use for the medium screw base G16-1/2, G25, and G30 lamps in EISA 2007. The larger G40 lamps (which account for approximately 5% of all G shape lamps, as they are too large to fit in most fixtures) are exempt from energy conservation standards and are also sold in 60 and 100 watt versions. It is estimated that there are 132,832,000 million households in the United States.[42] If we very conservatively and generously assume that globe shape lamps operate 2 hours per day or 730 hours per year, and conservatively assume that the average wattage of a globe shape lamp is 40 watts (the average is undoubtedly less) then we can compute an average annual household energy use of all globe lamps at less than 100 kWh per year:

[41] The Secretary has authority to consider energy conservation standards for commercial "electric lighting" under Part B of EPCA, 42 U.S.C. §§6311(2)(B)(v) and 6312(b).

[42] U.S. Census Bureau, 2013 American Housing Profile: American Housing Survey Factsheet (May 2015).

((40 watts x 210,000,000 million installed G shape lamps x 730 hours per year)/1000)/ 132,832,000 million households in the United States = 46.16 kWh average annual energy use per household.

This calculation demonstrates that all globe shape lamps consume well under an average of 100 KWh of energy per year per household, and therefore the Secretary would not be able to justify regulating any Globe shape lamp under EPCA. Most of the specialty lamps listed in Table A occupy significantly fewer sockets than Globe shape lamps occupy and the average household energy use of those other specialty incandescent lamps is significantly less.

As previously discussed, there are several *non-exempt* specialty incandescent lamp products currently subject to energy conservation standards. The wattage levels of these lamps allowed by law are very low --- 40 watts, and even if the Secretary was authorized to amend energy conservation standards during this rulemaking, the amendment would not yield significant energy savings and a further reduction in wattage would impair their utility. These include: appliance lamps (40 watts),[43] A, B, BA, CA, F, G16-1/2, G-25, G30, S, or M14 lamps (40 watts or less)[44], T shape lamps (40 watts or less).[45] This determination would not involve an implementation of 10 CFR 430.32(x).

B. The specialty lamps whose sales in the five categories whose sales are monitored

1. Shatter-resistant, three-way and high lumen lamps

NEMA notes that for three of the five categories of specialty lamps whose sales are monitored, shatter-resistant incandescent lamps, three-way, and incandescent lamps from 2601-3300 lumens, their sales have plummeted substantially since the baseline period 1990-2006.[46] In 1997, the data shows sales of 67 million three-way lamps, and in 2015 less than half that amount --- 32 million units --- is sold. In 1997, 39 million high lumen (2601-3300 lumens) were sold, and in 2015 about 10% of that amount --- 4 million units--- were sold. In 1997, 1.9 million shatter resistant lamps were sold, and in 2015 about one-third of that amount --- 689,000 units --- were sold. These figures are considerably lower than the Globe shape lamps, and therefore their energy consumption is even less than the globe lamp. Each of these three specialty incandescent lamps are costly to make and consequently have higher retail prices than incandescent, fluorescent or LED lamps used in a majority of lighting applications. Based on this factor alone the Secretary can easily determine in this rulemaking that the exemptions must be maintained for these three categories of specialty lamps.

2. Vibration-service lamps

[43] 42 U.S.C. §6291(30)(T)(i). See also Table B, *supra.*
[44] 42 U.S.C. §6291(30)(D)(ii)(XXII).
[45] 42 U.S.C. §6291(30)(D)(ii)(XXI).
[46] See 2015 Spreadsheet Model at https://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-NOA-0013-0017 (3-way lamp, 2601-3300 lumen, and shatter-resistant tabs on spreadsheet).

Recently, DOE published a Notice in the Federal Register that one of the five categories of exempt specialty incandescent lamps --- vibration service lamps --- exceeded the sales threshold that Congress specified for "an energy conservation standard." 81 FR 20261 (April 7, 2016). NEMA proposes that the Secretary incorporate the accelerated rulemaking for vibration service lamps in this rulemaking and adopt the following energy conservation standard for this specialty incandescent lamp in this rulemaking:

(I) have a maximum 40-watt limitation; and

(II) be sold at retail only in a package containing 1 lamp.

See 42 U.S.C. §6295(*l*)(4)(E)(ii). This standard is technologically feasible and economically justified.

3. Rough-service lamps

NEMA further proposes that the Secretary adopt the same standard for exempt rough service incandescent lamps:

(I) have a maximum wattage of 40-watts; and
(II) be sold at retail only in a package containing one lamp.

This standard is technologically feasible and economically justified.

For rough service lamps, sales have apparently fallen as well since 1990-2006, but they just haven't fallen as fast as the 1990-2006 trend line declined. In 1997, 11 million units of rough service lamps were sold, and in 2015 about half that amount --- 6.7 million units were sold. NEMA believes that if the above energy conservation standard --- 40-watt maximum energy use and packaging limitation --- is applied to vibration service lamps that certain retailers who promote the sale of this product will shift purchases to a higher wattage rough service lamp and will likely trigger the threshold rather quickly.

C. Intermediate base and candelabra base incandescent lamps are not part of this rulemaking

Two types of specialty incandescent lamps --- candelabra base and intermediate base incandescent lamps --- are not appropriate for regulation in this rulemaking because they do not enjoy an exemption. Congress has in fact regulated candelabra base and intermediate base lamps and applied an energy conservation standard to those lamps. 42 U.S.C. §6295(i)(6)(A)(i)(II), only calls on the Secretary to determine whether incandescent lamps currently exempt from regulation should have that exemption discontinued or maintained.

D. CFL or LED versions of certain specialty incandescent lamps

As noted earlier, this "rulemaking shall not be limited to incandescent lamp technologies," and therefore the statutory invitation to determine whether "the exemptions for certain incandescent lamps should be maintained or discontinued based, in part, on exempted lamps sales data" authorizes the Secretary to further determine in this rulemaking whether an energy conservation standard is economically justified or technologically feasible for certain specialty CFL and LED lamps whose applications and globe shapes that are also currently exempt from regulation. There are two points that must be made, however:

(1) it is inappropriate to regulate or attempt to regulate under this provision a CFL or LED specialty application or globe shape listed in subclauses (I) – (XXII) of subparagraph (D)(ii) where the CFL or LED version of that lamp is not made or sold because (a) there is no energy to save when none is being consumed, (b) there is no "lamp sales data" to consider, and (c) such a lamp may never be manufactured;

(2) establishing an energy conservation standard for a specialty CFL or LED lamp does not make them a "general service lamp": they remain specialty lamps and a standard is appropriate if, and only if, the standard is economically justified and technologically feasible, has significant energy savings, and will likely consume an average of over 100 kWh per household annually.

The NOPR proposes imposing a 45 lumen per watt standard for several of these exempt specialty lamps. Most of these specialty lamps have an average annual household energy use of less than 100 kWh. See Part Three, Question 5, *infra*.

DOE should also avoid establishing any energy conservation standards for specialty CFLs as these products will disappear from the market without any governmental regulatory action within the next few years. It is unnecessary to impose regulatory burdens associated with energy conservation standards for products that are not going to survive in the marketplace (at least in any significant or material way).

NEMA proposes energy conservation standards for three types of specialty LED lamps: candelabra base, intermediate base, and three-way LED lamps and would designate these specialty LED lamps covered products under EPCA.

(1) <u>Rough service and vibration service CFL and LED lamps do not exist</u>

There is no reason to consider separate standards for CFL and LED versions of these two specialty incandescent lamps because there are no specialty CFL versions or LED versions of these lamps. As NEMA has explained previously, the CFL and LED general service lamps are inherently robust and have no filament that needs to be protected by special design from vibration, rough service or other abuse. 81 FR 14528, 14548 (March 17, 2016). The definitions of vibration service and rough service lamps are unique to incandescent technology. The Secretary should not attempt or purport to regulate a product that does not exist. The Secretary may want to consider recognizing in the definitions of general service LED lamp and compact fluorescent lamp that these CFL and LED lamps include lamps "marketed as 'rough service' or 'vibration service'" – or equivalent." This would discourage firms from potentially gaming the

efficiency regulations through a strictly marketing ploy and running into enforcement issues later.

(2) Other specialty CFL and LED lamps

Table A identifies a number of other CFL and LED versions of other specialty incandescent lamps that have not been manufactured and are not sold and may never be manufactured or sold in CFL or LED technology. For the reasons stated above, these are not appropriate for regulation as specialty lamps. These include: screw terminal base (G54) reflector lamps, medium side prong base (G12.7) reflector lamps, mogul prong base reflector lamps, infrared lamps, left-hand thread lamps, marine lamps, marine signal lamps, mine service lamps, showcase lamps, G-shape CFL lamps with diameter greater than 5", bayonet base CFL lamps, and double ended base lamps. The Secretary can easily decide to maintain the exemption for these lamps.

Furthermore, a number of the foregoing lamps are exclusively commercial lamps and are not consumer products within the scope of this rulemaking. These include: mogul prong base reflector lamps, marine signal lamps, mine service, and traffic signal lamps. They would also include commercial lamps designed for airway, airport, aircraft or other aviation service, photo, projection, stage, studio or television service, headlight, locomotive, street railway, or other transportation service, medical or dental equipment service that were excluded from the definition of general service incandescent lamps because they are exclusively commercial lamps. The Secretary can easily decide to maintain the exemption for these lamps.

There are a number of other specialty CFL and LED lamp applications and bulb shapes on the market or that remain to be developed that will remain small niche products that will not likely consume an average of more than 100 kWh per household per year and therefore cannot be designated a covered product. These include:

> Lamps with a unique spectral output including black light lamps, bug lamps, colored lamps, and plant light lamps.
>
> Lamps designed for a unique use or low operating hour applications such as appliance lamps, showcase lamps and shatter-resistant lamps.
>
> Lamps designed for decorative applications including lamps with the following shapes: G, B, BA, C, CA, F, S, A15, M14, silver bowl lamps and lamps specially designed and marketed as a blunt, candle, flame, flame tip, torpedo or torpedo tip shape or similar decorative shapes.

The reasons for this conclusion can be found in Table B. The Secretary can easily decide to maintain the exemption for these CFL and LED lamps.

NEMA proposes that the Secretary adopt the following energy conservation standards

for three specialty LED lamps that are available on the market at the time of this rulemaking and for which a standard would be technologically feasible and economically justified: intermediate base LED lamps, candelabra base LED lamps, and 3-way LED lamps.

For intermediate base LED lamps and candelabra base LED lamps NEMA proposes a 10 watt maximum energy use standard. These smaller decorative lamps present technical challenges for LED technology in general due to greatly increased thermal management issues. In contrast to a maximum energy use standard, an efficacy standard exacerbates those challenges and inhibits the ability of lighting manufacturers to find solutions that enhance the functionality of the lamp as well as satisfying consumer requirements for aesthetics.

For the 3-way LED lamp, NEMA proposes that the efficacy standard for the general service LED lamp be applied to the 3-way LED lamp to be measured at the highest power level of the 3-way lamp.

III. Higher or More Stringent Energy Conservation Standards For The General Service Incandescent Lamp Cannot be Economically Justified

A. The halogen incandescent A-line lamp

A technologically feasible energy saving improvement in incandescent technology over the current halogen incandescent technology is halogen infrared ("halogen IR") technology.[47] Two NEMA members previously brought a general service incandescent lamp to market utilizing this technology, and in both cases the product was a commercial failure and the products were withdrawn from the market. The halogen IR lamp was a commercial failure for the same reason that the technology cannot be economically justified under EPCA. For product safety and other reasons, the halogen IR lamp has significant extra costs related to design and therefore must sell at a much higher price to the consumer. The increased price of such a lamp over the price of the current general service halogen incandescent lamp cannot be recovered during the life of the halogen IR product from the marginal energy savings that *some* halogen IR product provides over current halogen incandescent technology.

General Electric developed during 2008-2009 a halogen IR lamp product to market in Canada and the United States, and GE produced and sold this lamp from 2009-2011. The product was withdrawn from the market in 2012 because it did not sell. The product had a rated life of 3000 hours[48] and rated wattages of 45 watts (870 lumens) and 65 watts (1530 lumens). This represented a 2 watt ***increase*** over the 43 watt halogen incandescent lamp (that replaced the traditional 60 watt incandescent lamp with similar lumen output) and 7 watt ***reduction*** over

[47] This lamp uses an infrared reflective coating. The lamp's quartz filament tube is coated with a multi-layered dichroic coating which allows visible light to be emitted while reflecting a portion of the infrared radiation back onto the filament. As a result, the lamp requires less power to achieve the same lumen output as other types of incandescent lamps.

[48] The higher rated life of 3000 hours was deemed necessary to entice the consumer to consider the significantly higher price of the product. It never did that.

the 72 watt halogen incandescent lamp (that replaced the traditional 100 watt incandescent lamp with a similar lumen output). It was not technologically feasible to manufacture a halogen IR lamp at wattages below 30 watts (and hence market a halogen IR lamp at lumen outputs lower than ~500 lumens) because the 120 volt halogen IR filament will not work effectively under 30 watts.

The current 1000 hour rated life halogen incandescent product on the market sells at retail for approximately $1.25 per lamp. The price of the General Electric halogen IR product when it was on the market was originally $9.00 per lamp and fell to an average of $7.00/lamp while it was on the market. General Electric reports that reducing the price below $6.00 was not a long-term economic option because of the high cost of the product.[49] Even retailers that reduced the price of these lamps to a $5 promotional or "fire sale" price at no profit before the product was removed from the market failed to sell many.

Assuming the cost of electricity is $0.11 per kilowatt hour, the reduced wattage of the halogen IR lamp represents a savings of $2.31 over the life of the 3000 hour 65 W halogen IR lamp compared to the 72 watt 1000 hour halogen incandescent lamp. However, the average initial acquisition cost of the 65 watt halogen IR lamp is $5.75 higher than the 72 watt halogen incandescent lamp. The consumer can buy two more 1000 hour halogen incandescent lamps at $1.25 each and still has negative cost savings from buying a 3000 hour 65 watt halogen IR lamp.[50] Assuming 3 hours per day of lamp operation, the consumer loses $2.44 per year by purchasing the 65 watt halogen IR lamp instead of the 72 watt halogen incandescent lamp. The halogen IR lamp has a negative lifecycle cost for the consumer compared to the current halogen incandescent lamp. DOE has never economically justified a possible candidate standard where the consumer's lifecycle cost was negative.

In order for the 65 watt halogen IR product to achieve a neutral lifecycle cost with the current halogen incandescent product, the price of the halogen IR lamp would have to fall to $3.65 per lamp.[51] That will never happen, because of material and production costs (rendering the product unprofitable) and low volume demand due to competitive market forces. As the price of this halogen IR lamp is higher than the price of the compact fluorescent lamp as well as the price of a general service LED lamp, there will limited (likely zero) demand for the halogen IR product compared to these other two types of general service lamps. As a practical matter, however, under these circumstances, no rational lamp manufacturer will invest in manufacturing

[49] The halogen IR tube is 6 to 8 times more expensive than the halogen incandescent capsule. The multi-layer coating process used to produce halogen-IR filament tubes is a slow and expensive batch manufacturing process. Manufacturers have advised us that there are distinct safety issues with the halogen IR lamp. One manufacturer's safety protocol required the lamp to be sold in an expensive heavy glass outer jacket to contain a filament tube rupture. The halogen IR filament tube operates at a much higher pressure than standard halogen capsules. Another manufacturer addressed the safety issue by operating its halogen IR filament tube at a low voltage, but this required an expensive electronic transformer in each lamp. Either solution was very expensive.

[50] Determined using the energy calculator at http://www.bulbs.com/learning/energycalc.aspx

[51] Determined using the same energy calculator. *Id.*

a halogen IR lamp[52] in this economic scenario and all investable resources of a lamp manufacturer will be directed to LED technology (as they are now). No manufacturer will invest in a technological improvement that brings negative economic benefits to the consumer and no reasonable return on investment to the manufacturer. It is a sheer fantasy to think that the halogen IR lamp will achieve any kind of competitive price parity with other general service lamps. And from a total lifetime owning cost point of view, the halogen IR lamp would make no sense to the consumer when comparing it to a general service CFL or LED.

For the 45 watt halogen IR lamp that consumes *2 more watts of energy* than the comparable 43 watt halogen incandescent lamp, the consumer economics are clearly worse. The consumer loses $3.52 per year on each light bulb by purchasing the 45 watt 3000 hour halogen IR lamp compared to purchasing the 43 watt halogen lamp on the market.[53]

Philips Lighting's experience was no different. Philips introduced the halogen IR lamp in the United States in 2007. It withdrew the product from the market in 2012 because it was not commercially viable due to the high initial cost. At least one retailer did briefly offer the Philips halogen IR in packages of two lamps for $8.97 at retail, but the lamp still did not sell. Even at $5.00 per 65 watt halogen IR lamp, the consumer's lifecycle cost is negative $0.98 per year compared to the halogen incandescent lamp.

If, hypothetically, an energy conservation standard modeled on the halogen IR lamp was ever inconceivably determined to be economically justified under 42 U.S.C. §6295(o) of EPCA, no one will make the lamp because no one will buy it. Retailers would not sell it. Even the current halogen incandescent product on retail store shelves is finding shrinking retail shelf space today as greater shelf space is being devoted to LED lamps. Establishing an energy conservation standard around the halogen IR product therefore risks presenting the problem that 42 U.S.C. §6295(o)(4) addresses. That paragraph provides:

> (4) The Secretary may not prescribe an amended or new standard under this section if the Secretary finds (and publishes such finding) that interested persons have established by a preponderance of the evidence that the standard is <u>likely to result in the unavailability in the United States in *any covered product type* (or class) of performance characteristics (including reliability), features, sizes, capacities, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding</u>. The failure of some types (or classes) to meet this criterion shall not affect the Secretary's determination of whether to prescribe a standard for other types (or classes). (Emphasis supplied).

Without any legal doubt, the general service incandescent lamp is a "covered product type." Congress gave it that designation in 42 U.S.C. §6292(a)(14)(specifying that a general service

[52] This was one of the reasons the Secretary could not economically justify an energy conservation standard for incandescent reflector lamp based on halogen IR technology. 80 FR 4042, 4141 (January 26, 2015). The burdens and costs associated with deploying the halogen IR technology in the smaller general service incandescent lamp are even greater here, as documented in these comments.

[53] Determined using the same energy calculator, *supra* note 50.

incandescent lamp is a "covered product"). 42 U.S.C. §6291(2) defines a "covered product" as "a consumer product of a type specified in section 6292 of this title."

Establishing an energy conservation standard around the halogen IR lamp product results "in the unavailability in the United States of [a] covered product type of . . . volumes[54] that are substantially the same as those generally unavailable in the United States at the time of the Secretary's finding." The Secretary could never eliminate the general service incandescent lamp from the market in this rulemaking by prescribing an energy conservation standard for general service incandescent lamps around halogen IR technology.

There is independent confirmation from Europe that the halogen IR lamp will never be produced. As the DOE's NOPR Technical Support Document, Section 3.4.3.5 at 3-37 – 3-40 (February 2016) summarizes, the European Union enacted standards for these types of lamps in 2009 effective in six stages between 2009 through 2016. COMMISSION REGULATION (EC) No 244/2009 (March 18, 2009). The European regulation involves a complex equation that translates into an energy efficiency index calculation, and which is further translated into different classes denominated "A, B, C, D, E." Under the European regulation, Class D (which permits the sale of the halogen incandescent lamp) is the current standard. Class D was originally intended to be eliminated from the European market in 2016 in favor of Class B (which standard was designed around the halogen IR lamp), but the European Commission delayed the implementation of Class B because no one was producing the halogen IR product and an enormous supply problem would have occurred.[55] NEMA members operating in Europe confirm that they have no plans to make a halogen IR lamp to meet the Class B requirements because, for reasons articulated above, it makes no economic sense to do so --- from their manufacturer point of view as well as the view of the consumer.

In considering whether the halogen IR lamp is ever economically justified, the Secretary would also have to consider the views of the Attorney General on any lessening of competition caused by the elimination of a lower cost substitute product for general service CFL and LED lamps. 42 U.S.C. §6295(o)(2)(B)(i)(IV) and (o)(2)(B)(ii). The initial acquisition cost of the general service halogen incandescent lamp has served as a powerful driver for innovations lowering costs for general service LED lamps and the corresponding retail price of the general service LED lamp to make the latter more competitive with the former. Eliminating the halogen incandescent lamp from the market removes that substantial competitive force from the market. A general service halogen IR lamp, assuming it would ever be produced, will not be competitive with the general service LED lamp.

In considering whether the halogen IR lamp is ever economically justified the Secretary will also have to consider the elimination of production of general service halogen incandescent

[54] Incandescent lamps, including the halogen incandescent lamp enjoy a compatibility with all existing dimming switches and systems, and the dimmer control can dim an incandescent lamp down to very low levels without flicker. This feature and capacity is not shared with CFL or LED lamps. While there is now similarity, the color of light from CFLs and LEDs is not exactly the same as halogen incandescent lamps either.

[55] https://ec.europa.eu/energy/en/news/phase-out-inefficient-lamps-postponed-1-september-2018

lamps in the United States and the consequent loss of jobs when no one makes these lamps in the United States anymore. General Electric repatriated production of general service incandescent lamps to the United States from Mexico in 2014 to its plant in Bucyrus, Ohio, where it employs 50-100 persons in the production of halogen incandescent lamps. These are new American jobs. Osram Sylvania has continuously manufactured general service incandescent lamps and components at its facilities in St. Mary's Pennsylvania and Kentucky, where it employs 500-700 persons in connection with the production of incandescent lamps. In addition there would be job losses beyond manufacturing including transportation, retail, sales representatives, raw material and packaging suppliers if an energy conservation standard built around halogen IR lamps was ever, inconceivably selected. The Secretary would have to explain the loss of manufacturing and ancillary jobs in the United States due to this decision, and further explain that in establishing an energy conservation standard based on halogen IR technology that leads to those job losses the consumer of that product would be negatively impacted as well. Implementation of the backstop would have the same effect.

The Secretary would also have to consider the impact of a rule based on halogen IR technology on manufacturers and the industry's net present value. The manufacturer impact analysis in this rulemaking takes no account of the impact on cash flows to manufacturers of halogen incandescent lamps arising out of the proposed 45 lumen per watt standard that eliminates the halogen incandescent lamp on or after January 1, 2020. It takes no account of the stranded assets of domestic manufacturers of halogen incandescent lamps. For certain, incandescent lamp manufacturers' reduced cash flow from a halogen IR standard or the 45 lumen per watt standard is significantly negative and means the actual reduction in industry net present value (INPV) from the proposed rule is much greater than the -24.3% (-$221 million) reduction in INPV estimated in the proposed rule. 81 FR 14528, 14531 (March 17, 2016). And this negative impact is on top of the cumulative reduction in industry net present value resulting from DOE's prior rulemakings over the past ten years.

It is inconceivable that an energy conservation standard for general service incandescent lamps based on halogen IR technology will ever be economically justified. It makes no sense for the consumer; it makes no sense for the manufacturer; it makes no sense for the factory worker; it makes no sense for the nation.

The only other possible "improvement" in energy consumption for the general service halogen incandescent lamp is to reduce the wattage of the halogen incandescent lamp. NEMA lamp manufacturers have investigated this option. To maintain the lumen output of that halogen incandescent lamp while reducing the wattage results in sacrificing rated lamp life substantially. Each one watt per lamp reduction in energy use causes rated lamp life for the halogen incandescent to fall by approximately 12.5%. Thus a two watt reduction in energy use would reduce rated lamp life by nearly 25%, and a three watt reduction in energy use would reduce rated lamp life by approximately 37.5%. For example, to reduce the wattage of a 72 watt, 1490 lumen, 1000 hour rated lamp to 70 watts and maintain light output at 1490 lumens, the lifetime of that lamp will be reduced by 200 – 250 hours. This results in a negative lifecycle cost to the consumer who must purchase a replacement lamp at quicker intervals than 1000 hours. DOE

has previously decided that it cannot economically justify this outcome.[56] This reduction in lamp life is material to the consumer, particularly when considering the longer lamp life of CFLs and LEDs and the paltry energy savings from a 1-2 watt reduction in energy consumption. This again triggers Congress' concerns expressed in 42 U.S.C. §6295(o)(4): "likely to result in the unavailability in the United States in any covered product type (or class) *of performance characteristics* (including reliability), features, sizes, *capacities,* and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding." Rated lamp life is undeniably a "performance characteristic" and "capacity" of a general service incandescent lamp. Congress specifically called out rated lamp life in EISA-2007 when it established energy conservation standards for general service incandescent lamps. Pub.L. 110-140, 121 STAT. 1492, 1574-75. Without doubt, reducing the rated lamp life of a halogen incandescent lamp below 1000 hours will also reduce demand for the current general service halogen incandescent lamp significantly and result in the unavailability of a covered product type in "performance characteristics, features, and volumes that are substantially the same as those generally available in the United States at the time of the Secretary's finding."

The NOPR's Technical Support Document, TSD at 7.3.1 (February 2016), as well as comments at the Public Meeting in this rulemaking recognize that consumers preferentially install and use more energy efficient CFLs and LEDs in sockets with higher hours of use while using lower cost, less efficient incandescent in lamp sockets with lower hours of use. It is an economically rational choice for the consumer to install less efficacious lamps with lower initial first costs in sockets where there are lower hours of use. There are many installed lamps that are never illuminated in a given week, because the area of the building is not regularly used. The halogen incandescent lamp with a rated life of 1000 hours used in a closet or a garage that is on for an average of 5 minutes per day or 30.5 hours per year could potentially have a useful life of 32 years. A 9 watt LED lamp with rated life of 15000 hours purchased for $3.00 for a residential closet application that consumes electricity an average of 5 minutes per day to replace a 43 watt 1000 hour rated life halogen incandescent lamp purchased for $1.25 has a simple payback period of 14 years, while saving the consumer only $0.11 per year in energy costs at $0.11 per kWh.[57] Double the usage to an average of 10 minutes per day and the simple payback period for the LED lamp is nearly 7 years saving the consumer a mere $0.24 per year.[58] There are lots of lamps in residential sockets that experience these low hours of use for which the consumer's payback period exceeds either the duration of the consumer's home ownership or occupancy and the higher initial acquisition cost makes no sense. This all too common situation occurring in every United States household in one or more locations in the

[56] Determined using the same energy calculator, *supra* note 50. DOE acknowledged this same point in deciding not to amend energy conservation standards for incandescent reflector lamps in 2015. 80 FR 4042, 4141 (January 26, 2015) ("DOE determined that if manufacturers shorten the lifetime of IRLs, consumers would experience negative LCC savings in both the residential and commercial sectors.").

[57] Determined using the same energy calculator, supra note 50.

[58] *Id*.

home does not provide the Department the opportunity to conclude that only "a fraction of customers run their [lamps] very few hours per year," *compare* 75 FR 10874, 10917 (March 9, 2010)(small electric motor final rule). The Department has previously recognized that energy conservation standards that result in "long payback periods and significantly greater first costs for some customers" cannot be economically justified. 72 FR 58190, 58229, 58231, 58232 (October 12, 2007) (distribution transformer final rule).

Not only does the preponderance of evidence establish that amending the general service incandescent lamp standard to require the lamp meet any higher standard would result in the unavailability of this covered product type with [features, capacities] volumes substantially the same as those generally available at the time of this rulemaking, 42 U.S.C. §6295(o)(4), but this evidence is clear and convincing.

For the foregoing reasons, the Secretary can easily determine in this rulemaking that amending the energy conservation standards for general service incandescent lamps in 10 CFR 430.32(x)(1) in this rulemaking cannot be economically justified. That determination does not transgress the Appropriations Rider's restriction on implementing that provision.

B. The halogen multifaceted-reflector (MR) lamp

MR lamps are typically pin-base (e.g., GU5.3, GU10) and to a smaller extent medium screw base. These lamps are not, by definition, incandescent reflector lamps, and they are currently exempt from energy conservation standards. The most common are MR16 lamps. They are manufactured and sold in four wattage levels: 20 watts, 35 watts, 50 watts, and 70/75 watts at either 12 volts or 120 volts. They are fully dimmable and dimmable to very low lumen levels. There are no CFL alternatives for this lamp and as the NOPR observes the LED alternative is not entirely satisfactory at replicating the attributes of the halogen MR16. 81 FR 14528, 14551 (March 17, 2016).

The NOPR would impose a 45 lumen per watt standard on the halogen MR lamp, which is not technologically feasible and would therefore eliminate this lamp. For the reasons previously explained, the Secretary does not have authority to adopt a new or amended standard that is not technologically feasible or economically justified for the product to meet. See Part One, Section III.F, *supra*.

NEMA proposes that the Secretary adopt the following energy conservation standard for the general service halogen MR lamp, which is technologically feasible and economically justified:

> MR incandescent lamps (designated MR11, MR14, MR16, and MR20) shall not exceed 50 rated watts.

IV. The market transformation in general service lamps and the market-driven energy savings that is naturally occurring without energy conservation standards for general service lamps

NEMA understands that the Department is aware that a very significant lighting market transformation is underway in the lighting market as a result of the lighting industry's research and development investments in new LED lighting technology.[59] It is not an understatement to state and acknowledge that this market transformation has occurred much more rapidly than anyone would have predicted nine years ago, in 2007 when Congress passed EISA-2007, and even just two years ago when this rulemaking began. At the DOE Public Meeting in this rulemaking on April 20, 2016, there was widespread acknowledgement of this rapid development.

The last time a lamp more efficient than the general service incandescent lamp was brought to market --- the compact fluorescent lamp, in the 1980s --- it took nearly twenty years to reach the market penetration and acceptance that the LED lamp has reached in less than three years. The LED's rapid market achievement should not be ignored. Overlooking the absence of a market parallel between these two lighting technologies --- CFL and LED --- can lead to mistakenly putting a heavier foot on the regulatory pedal that the market does not require and that consumers and distributors of lighting products do not need or want.[60]

The difficulties that the CFL had in penetrating retail store shelves and sockets are reasonably documented. See generally, PNNL CFL Report, note 2 *supra*. What is not well-documented are the different trajectories that the CFL and the LED general service lamp technologies experienced and are experiencing in the market and the reasons for this. The table below highlights key differences

	CFL	**LED**
Early broad manufacturer support for product	No	Yes
Early broad retail/distributor support for product	No	Yes
High early initial acquisition price	Yes	Yes
Rapid fall in high early initial acquisition price	No	Yes
Early Utility Rebate Program support for products	No	Yes
Significant product attribute dissatisfiers with consumers	Yes	No
Consumer dissatisfiers quickly addressed by manufacturers	No	Yes
Early consumer understanding of total owning cost/efficiency	No	Yes
Early governmental energy efficiency initiatives support for product	No	Yes

Some of the differences are attributable to differences in the technologies themselves. For example, fluorescent lamps necessarily use small amounts of mercury, a toxic substance at some level of exposure, and LED lamps do not. The fluorescent technology, at least in the early

[59] It is acknowledged that DOE's research mission has supported this investment. See DOE, *Solid-State Lighting: Manufacturing R&D Initiative Lowers Costs and Boosts Quality* (June 2015). http://energy.gov/sites/prod/files/2015/07/f24/mfg-initiative_factsheet_jun2015.pdf

[60] For one example of what NEMA is referring to, please see NEMA's comments in the California Energy Commission's recent Title 20 proceeding. http://www.nema.org/Policy/Documents/15AAER6%20NEMA%20comments%20on%20Title%2020%2015-day%20Revised%20Language%20LED%20and%20Small%20Dia%20Lamps%2022Jan16%20final.pdf

years, found difficulty mimicking the size of the general service incandescent lamp (early CFLs were large, and it was decades before a mini CFL was made); LEDs did not experience this problem. Fluorescent technology experiences a "warming up" period before full light output is realized after a switch activates the light; LEDs enjoy an "instant-on" experience like the incandescent lamp. Fluorescent technology experienced difficulty in dimming; LEDs are dimmable (or not) by design. Fluorescent technology also experiences what consumers recognize as "flicker" and "hum." These differences contribute significantly to differences in consumer satisfaction between the two products.[61] Some of the CFL technology issues were ultimately overcome, in part due to the ENERGY STAR program but also manufacturer investment and innovation, but clearly LED lamps are not suffering from the significant consumer detractors that plagued the CFL.

Manufacturers and retailers did not broadly adopt the CFL in their product catalogs or store shelves in early years. The CFL was initially promoted by new producers and importers who did not have historical relationships with traditional lighting distribution partners and found outlets for the CFL challenging. Thus, the CFL was not broadly marketed until the early 2000s.[62]

One attribute that both the compact fluorescent and LED technologies share is that when first introduced to the market they had a very high purchase price. This is not uncommon for new technology products, particularly when economies of scale have yet to be realized and competition is not fully formed. What is more important is how quickly manufacturing cost and price declines following initial introduction in the market. The price of the CFL saw retail prices of $25-$35 per lamp when first introduced to the market in the 1980s. It took a decade for the price to fall to an average of $19 in 1996 and $11 in 1999.[63] State agency and utility rebate programs brought the point-of-sale purchase price down to $2.00 and less by 2005 in some parts of the country.[64] Marketing programs of manufacturers and government programs such as the ENERGY STAR programs evolved to overcome retailer/distributor hesitation in stocking and displaying the CFL and this helped to drive volume production, innovation, competition and lower costs that was slow to develop.

In contrast, innovation and competition have driven the costs and prices of LED lamp products down much more rapidly than expected, so that the general service LED lamp is becoming competitively positioned with halogen incandescent lamps and is gaining substantial

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[61] See Pacific Gas & Electric Company, *Next Generation Light Bulb Optimization* at 33-40 (February 10, 2012)(eliminating mercury, flicker and hum and better medium white color would improve consumer's valuation of CFL).

[62] PNNL CFL Report at 2.4-2.6, *supra* note 2.

[63] PNNL CFL Report at 2.2, *supra* note 2.

[64] See e.g., L. Bonn, A Tale of Two CFL Markets: An Untapped Channel and the Revitalization of an Existing One (ACEEE Summer Study, 2012)(sharing Efficiency Vermont's story focusing on a subsidized $0.99 per bulb price campaign in 2010-11). http://aceee.org/files/proceedings/2012/data/papers/0193-000197.pdf

market share very quickly. When Philips Lighting first introduced the 800 lumen LED general service lamp into the market in 2012, the lamp sold for $60 per lamp at Home Depot.[65] Three years later in 2015, LED general service lamps were available for the first time at under $5.00[66] and prices continue to fall bringing increased consumer demand for this lamp product.

Several years after the CFL was introduced to the market, the CFL's share of retail lamp sales is reportedly 0.2% in 1990, slowly doubling to over 0.4% in 1998 and jumping to 2.1% in 2001.[67] National CFL socket penetration in 2002, more than 15 years after the CFL is introduced to the market, was reportedly 1.6%.[68] In contrast, LED socket penetration two years after the LED is introduced to the retail market are estimated to have gone from less than 1% of installations in 2012 to 2% in 2014.[69]

Shipments of CFLs did not surge until 2006-2007, the latter being the peak year for CFLs.[70] While falling in 2009 because of the recession and substantial decline in new construction, CFL shipments rose again numbering over 300 million units from 2010 – 2014. CFL shipments experienced a significant decline in 2015, a non-recession period --- down 130 million units off the 2007 peak and 100 million units lower than just two years earlier in 2013. CFL shipments represented approximately 22-28% of general service lamp shipments at their peak and, because of their longer operating life, a higher percentage of installed sockets. According to the July 2015 DOE report, *Adoption of Light-emitting Diodes in Common Lighting Applications*, CFL socket penetration is estimated to have increased from 34% to 46% from 2012 – 2014.[71]

Imports of CFLs for domestic consumption from 1996-2015 corroborate this narrative.[72]

[65] http://phys.org/news/2012-04-rebates-bulb.html

[66] http://www.pcmag.com/article2/0,2817,2482320,00.asp

[67] PNNL CFL Report at 5.1-5.2, *supra* note 2.

[68] *Id.*

[69] DOE, Adoption of Light-Emitting Diodes in Common Lighting Applications at 16 (July 2015).

[70] Accord, DOE, NOPR Technical Support Document: General Service Lamps, ch. 3 at 3-45 (Feb. 2016).

[71] *Id.*

[72] NEMA displays import data here as a surrogate for the magnitude of all domestic CFL shipments in a given year, because it incorporates, *inter alia*, retailer branded and other products that may not be captured in producer data.

U.S. Imports for Consumption, Annual Data in 1,000's

HTS Number	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
First Unit of Quantity where quantities are collected in number																				
8539310060 (Screw-in base)	3,018	3,466	5,752	17,871	20,677	69,055	51,608	65,760	93,476	101,729	184,690	397,129	337,490	271,676	357,078	302,121	315,744	369,078	327,280	265,233

Sources: Data have been compiled from tariff and trade data from the U.S. Department of Commerce and the U.S. International Trade Commission.

The decline of CFL shipments after 2013 coincides with the end of the phase out of traditional incandescent lamps attributable to EISA-2007 as consumers shifted from less efficient incandescent lamps to longer-life more efficient lamps.[73] And that peak and subsequent 2015 decline of CFL shipments also coincides with the decline of LED lamp prices from $60 per lamp in 2012 to under $10 per lamp in 2014 to $5.00 per lamp and less in 2015.[74]

As the very recent downward trend for the CFL has developed, another trend --- disinvestment in compact fluorescent lamps --- is already beginning as sales of CFLs plummet. One major US manufacturer of CFLs recently announced that it will cease producing and selling the CFL by the end of this year.[75] This coincides with a steep decline in CFL shipments from 2014 through 2015. As a percentage of NEMA's lamp index,[76] the percentage of CFLs peaked in the 4th Quarter of 2014 at 47% and dramatically fell by half to 23.4% in the 4th Quarter of 2015. For the most recent 1st Quarter of 2016, CFL shipments fell further to 19.2%. This also coincides with the expectation expressed to NEMA by several lighting companies just two years ago that consumers buying CFLs would be the first to purchase LEDs in substantial quantities once a certain price point for the LED light bulb was achieved and the LED product was shown to overcome consumer dissatisfaction with negative attributes of the CFL.[77] This coincides with

[73] A significant consumer survey corroborates that "following the phase out of incandescent bulbs, 78% of Americans most often switched bulbs, rather than stocking up on traditional bulbs to continue using (22%). CFLs were the most common to switch to, but LED light bulbs were the most common switch." KRC Research, *OSRAM SYLVANIA Socket Survey 7.0 Research Results* at 21 (March 2015). https://www.sylvania.com/en-us/tools-and-resources/surveys/Pages/socket-survey.aspx

[74] See text accompanying notes 64-65 *supra*.

[75] http://www.nytimes.com/2016/02/02/business/energy-environment/ge-to-phase-out-cfl-light-bulbs.html?_r=0

[76] The NEMA lamp index includes shipments of A-line LED lamps, A-line halogen incandescent lamps, A-line incandescent lamps, and CFLs. The A-line incandescent lamp data includes low wattage, low lumen incandescent --- 15W and 25W incandescent lamps that were not regulated under EISA-2007, and these low lumen lamps make up most of the "incandescent" lamp index today. The corresponding data for CFL, halogen and LED data does not include these low lumen equivalents. http://www.nema.org/Intelligence/Pages/Lamp-Indices.aspx

[77] The prediction included the prognostication that CFL reflector lamps would be impacted first because they are inherently a poor directional lamp product, while LED reflector lamps are inherently a superior directional lamp product. The decline in omnidirectional CFL shipments was predicted as well.

current, visible observations at retail stores demonstrating increasing shelf space being devoted to LED lamps at the expense of both the CFL and halogen incandescent.[78]

Demand and supply of CFLs in 2017 can be reasonably projected to fall further because, beginning January 1, 2017, the CFL will no longer meet the ENERGY STAR Lamps 2.0 specification established by the EPA. This means that CFLs will no longer qualify for utility or state agency point of sale rebate programs and their net price will rise. Retailers who are ENERGY STAR "partners" and stock ENERGY STAR products to meet their "partner" obligations will have another reason not to stock CFLs on their shelves, at least not in any significant quantity.

The average rated life of a CFL is approximately 8 years. Thus for 2016 – 2020, it is not unreasonable to expect that nearly 1.7 billion CFLs (the cumulative amount imported between 2008 and 2012) will be removed from domestic sockets and a very high percentage of those CFLs will be replaced by LED lamps. And it is not unreasonable to expect that LEDs will substitute for halogen incandescent lamps in that same period as well. Manufacturers already report this occurring as LED prices have fallen. The August 2014 DOE Report, *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications* forecasts that by 2020 the A-line LED will represent 55% of residential, commercial, and industrial socket installations.[79] This is not an unreasonable projection, and likely conservative.

A tipping point occurred in 2015 when the LED lamp displaced the CFL as the lamp to displace the incandescent bulb in American general service lighting sockets. That tipping point is reflected in the NEMA Lamp Index[80] through the First Quarter of 2016 shown on the next few pages. The index demonstrates that the market transformation is not limited to the substitution of LED technology for CFL technology. It is now occurring with halogen technology as well. Incandescent lamp shipments (including halogen incandescent and traditional incandescent lamps) in the First Quarter of 2011 represented 70% of general service lamp shipments with CFLs constituting the remaining 30% at that time. By the Fourth Quarter of 2015, the market is significantly different. Traditional incandescent A-line lamp shipments representing 8% of the market are comprised of low wattage, low lumen 15 watt and 25 watt incandescent lamps, which are not regulated, and for which there are no comparable CFL and LED lamp technologies. Halogen incandescent lamps --- the regulated general service incandescent lamp never achieve a 50% share of the medium base A-line lamp shipments, and are falling. CFL shipments are shrinking fast and LED shipments are soaring.

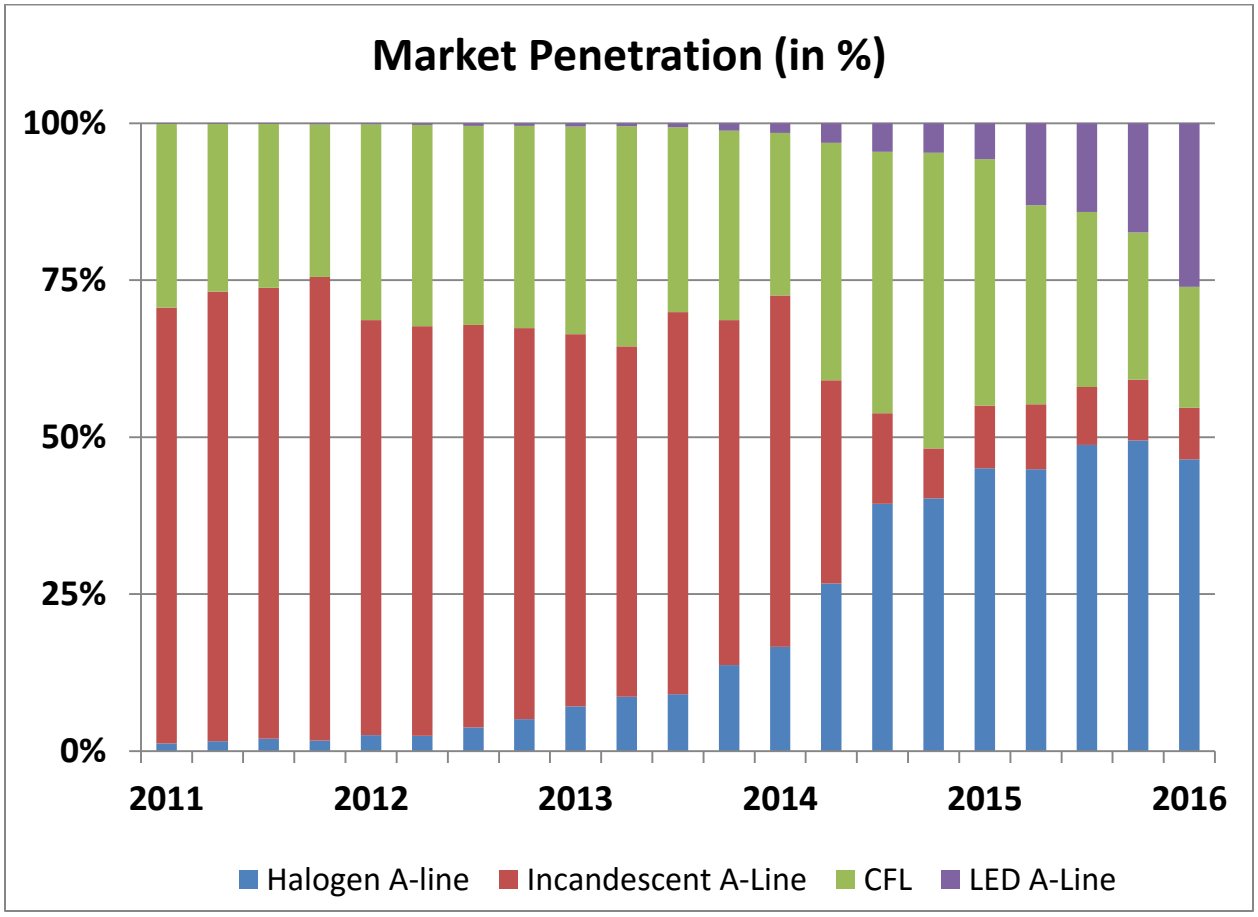
[78] Retailer IKEA ceased selling the CFL in 2015. http://www.theguardian.com/environment/2015/aug/10/ikea-ditches-conventional-lightbulbs-for-energy-saving-led-lighting See also, Christina Nunez, An Unloved Light Bulb Shows Signs of Burning Out (National Geographic February 16, 2016) http://news.nationalgeographic.com/energy/2016/02/1602016-cfl-phase-out-light-bulb-leds/ (reporting that Walmart and Sam's Club are also withdrawing retail support for CFLs).

[79] DOE, Energy Savings Forecast of Solid-State Lighting in General Illumination Applications at 15 (August 2014).

[80] http://www.nema.org/Intelligence/Pages/Lamp-Indices.aspx

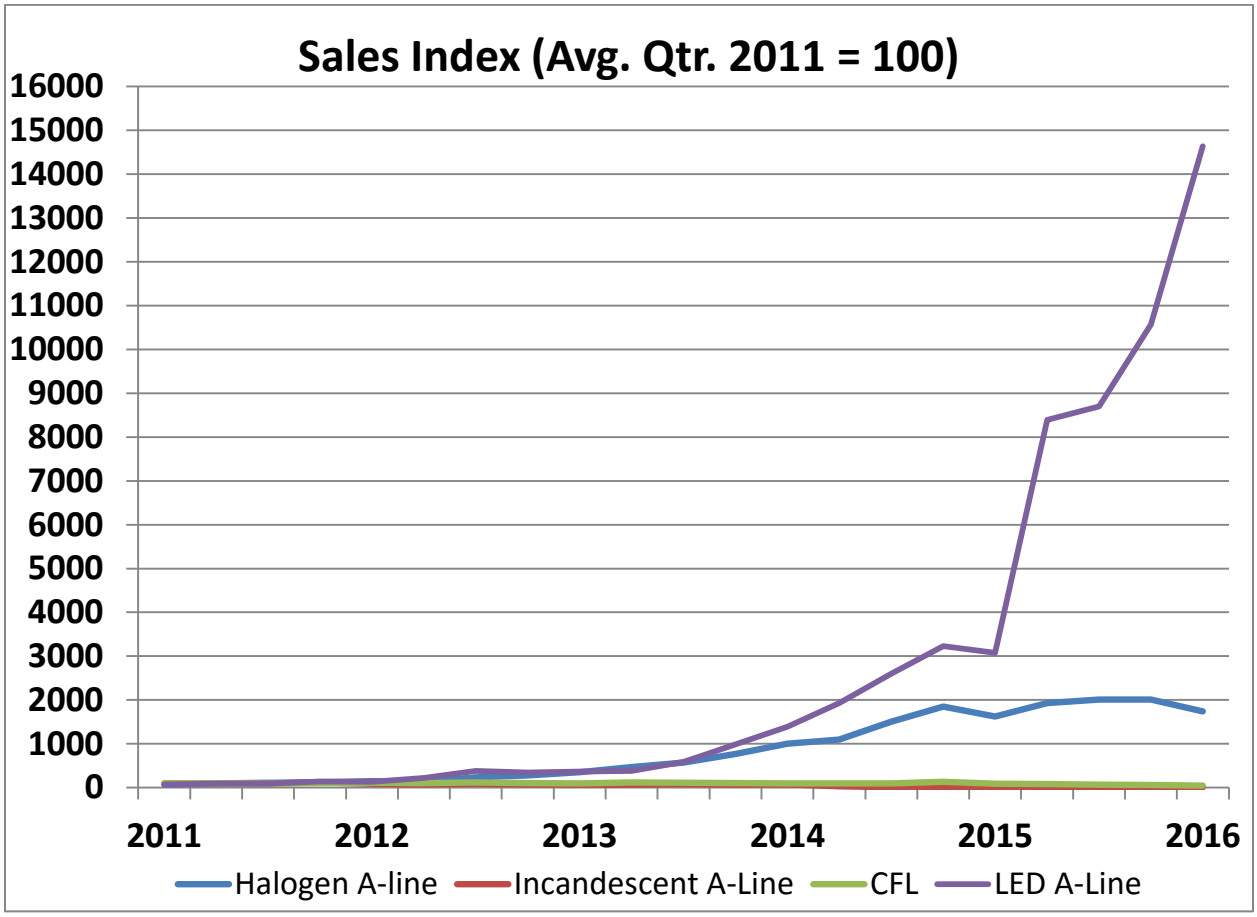
For the most recent First Quarter 2016, LED lamp shipments exceed CFL shipments for the first time. LED shipments now represent over 26% of A-line lamp shipments. CFL shipments continue to fall and halogen incandescent lamp shipments decline.

A-Line Lamp Shipments by Quarter



The Third and Fourth Quarter 2015 and First Quarter 2016 A-line incandescent lamp shipments consist of unregulated low lumen, low wattage (15 watt and 25 watt) A-line incandescent lamps for which there is no comparable lamp in halogen, CFL or LED technologies.

NEMA LAMP SHIPMENT INDEX BY QUARTER



Between now and 2020 it is probable and entirely foreseeable that, without any DOE regulation, general service halogen incandescent lamps will likely represent less than 40% of lamps in general service lamp sockets. The other 60% or more of lamp sockets will largely be comprised of general service LED lamps and a smaller percentage of CFLs as consumer and manufacturer interest in the CFL wanes almost entirely. With that mix of general service lamp products in general service lamp sockets, the energy *consumption* of general service lamps in sockets is less than if a 45 lumen per watt lamp was in every general service lamp socket. At that point, the energy "savings" that Congress said would avoid the Backstop provision in 42 U.S.C. §6295(i)(6)(A)(v) is achieved. As long as the Department arbitrarily and capriciously misinterprets the Appropriations Rider and contends that it cannot analyze incandescent lamps in this rulemaking --- including do nothing to implement 10 CFR 430.32(x) after a good faith analysis demonstrates that no amendment of the current standard for general service incandescent lamp is warranted, the law enacted by Congress in 2007 will never be fulfilled.

Not only is the "greater than or equal to [energy] savings from a minimum efficacy standard of 45 lumens per watt" envisioned by Congress achieved by the market without DOE regulation, but DOE's proposed rule that would impose a minimum 45 lumen per watt standard on a variety of general service lamps and specialty lamps will result in significant lamp product shortages in 2020. This is transparently obvious in Chapter 9 ("Shipments Analysis") of DOE's Technical Support Document (TSD) accompanying the NOPR where the DOE unreasonably and magically projects that the lighting industry will increase the supply of general service LED lamps in one year --- and for one year only --- by nearly 400 million units from 220 million units in 2019 to nearly 620 units in 2020.[81] As innovative as the global lighting industry has been in recent years, the global lighting industry is not capable of this wholly speculative miracle, and since CFL production will be declining (and consumers will have limited interest in the CFL product), it is inevitable that general service lamp shortages will emerge in the United States as a result of the DOE rule that eliminates the halogen incandescent lamp.

The flip side of this magical miracle envisioned by the DOE's Shipment Analysis is that industry will ramp up this output for one year and one year only. As the Department's own graphs show, this one year spike in shipments will never be duplicated again, and shipments will rapidly fall off after that. One and done as they say. No market ever operates in this manner, and no rational investment in global production capacity will ever flow from this this imaginary "one and done" circumstance. In the NOPR, the Department acknowledges that

> DOE is proposing standards that require the use of LED lamps to meet the Integrated Low-Lumen product class and acknowledges that manufacturers would have to face a difficult decision of whether to invest in the required production equipment necessary to supply the market with LED lamps in the compliance year and the years immediately following that, given that they may not be able to recover all of those investments due to the long-term drop in LED lamp shipments. DOE also acknowledges that as other nations and regions implement their own general service lighting regulations that require

[81] Department of Energy, NOTICE OF PROPOSED RULEMAKING TECHNICAL SUPPORT DOCUMENT: ENERGY EFFICIENCY PROGRAM FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT: GENERAL SERVICE LAMPS, Technical Support Document, Chapter 9 at 9-40 – 9-41 (Figures 9.4.1-9.4.3)(February 2016)(hereinafter "TSD").

the use of LED lamps there could be a potential global supply chain shortage of LEDs around the effective date of this rulemaking.

81 FR 14528, 14610 (March 17, 2016). It is irrational, if not poor public policy, for the Department knowingly to pursue a rule that even contemplates this outcome. But DOE appears to casually dismiss the serious consequences of this projected one-year spike by concluding, without any meaningful explanation, that "DOE believes that GSL manufacturers are capable of meeting the U.S. demand for LED lamps at proposed standard, TSL 3, given the three year time frame between the announcement of a final rule and the implementation of that final rule." *Id.* DOE cannot possibly "believe" in the imaginary. This represents entirely conclusory, wishful thinking. NEMA hopes the constructive conversation at the DOE Public Meeting on April 20, 2016 in this rulemaking informs that this consequence cannot be casually dismissed. There will not be enough LED production capacity to meet that projected one-year spike and shortages will ensue.

The projected spike in demand is the outcome of DOE's interpretation of the Appropriations Rider and the backstop, which, as our comments explain, is legally avoidable in this rulemaking. Commenters at the DOE Public Meeting suggested that the one year spike in demand for LED general service lamps may not be as severe as DOE projects for 2020. For reasons already explained, NEMA believes that pre-2020 growth in demand for general service LED lamps will be stronger than DOE's charts predict through 2019 and that CFL demand and supply will fall faster than DOE has modeled prior to 2020 in these graphs.[82] LEDs are substituting for both CFLs and halogen incandescent lamps in sockets. This pre-2020 market phenomenon will moderate the 2020 spike graphed by DOE in the TSD somewhat and DOE should re-examine its analysis and this graph. It is doubtful, however, that a spike will be eliminated if DOE continues its current interpretation on the Appropriations Rider and the backstop that prohibits the sale of halogen incandescent lamps in 2020. Capacity constraints can still be foreseen. In contrast, a market supplied by a variety of lamp technologies will ensure an orderly market transition to more energy efficient installed base of lamps that Congress intended in EISA -2007.

The only way to avoid this significant risk for shortages in the marketplace is for the Secretary to undertake the actions that Congress prescribed: (1) determine that further improvements in standards for general service incandescent lamps cannot be amended because they are not economically justified; (2) consider whether any exemptions for specialty lamps are economically justified and technologically feasible; (3) without limiting this rulemaking to incandescent technologies to determine whether standards for compact fluorescent lamps

[82] Some commenters at the DOE Public Meeting suggested that consumers will have stockpiles of incandescent or CFLs in basements that will defer demand for LEDs beyond 2020. NEMA acknowledges a "pantry effect" where lamp consumers have small quantities of replacement lamps on hand because the lamps are purchased in packages of two, four, six or eight lamps. But this is built into current demand for lamps and DOE's model would capture this. To the question of hoarding on the eve of a product disappearing from the market by government fiat, there could be some hoarding behavior but in terms of total demand it will not be material. See note 71, *supra*. NEMA does not envision that the pantry effect or hoarding will materially "soften" the spike in 2020 demand for LEDs caused by DOE's interpretation of the Appropriations Rider and the backstop.

and general service LED lamps are economically justified and technologically feasible, including whether exemptions for specialty versions of these lamps are justified; and (4) consider whether phased-in effective dates make sense; and (5) complete the rulemaking by the end of 2016.

It is consistent with DOE's long-established policy to consider non-regulatory strategies in lieu of regulatory actions. The Department's 1996 Process Rule, 10 CFR Pt. 430, Subpt. C, App. A, states in Section 12(b):

> (b) DOE believes that non-regulatory approaches are valuable complements to the standards program. In particular, DOE will consider pursuing voluntary programs where it appears that highly efficient products can obtain a significant market share but less efficient products cannot be eliminated altogether because, for instance, of unacceptable adverse impacts on a significant subgroup of consumers. In making this assessment, the Department will consider the success more efficient designs have had in the market, their acceptance to date, and their potential market penetration.

This rulemaking provides the Secretary with an opportunity to constructively apply this policy here because it "appears that highly efficient products can obtain a significant market share but less efficient products cannot be eliminated altogether because, for instance, of unacceptable adverse impacts on a significant subgroup of consumers," along with significant adverse impacts on domestic manufacturers and domestic employees. The information presented in Part Two, Sections III and IV represent a "demonstration of the strong commitment of manufacturers, distribution channels, utilities or others to such voluntary efficiency improvements" which the Process Rule states "will be used in assessing the likely incremental impacts of establishing or revising standards, in assessing appropriate effective dates for new or revised standards and in considering DOE support of non-regulatory initiatives." *Id.* at Section 12(a).

V. PROPOSED STANDARDS FOR GENERAL SERVICE COMPACT FLUORESCENT AND LED LAMPS

NEMA proposes that the lumens per watt equation that the NOPR would propose to establish as an energy conservation evaluation for general service compact fluorescent and LED lamps be modified slightly to address problems that the LED lamps will experience at lower wattages. During the recent DOE public meeting, NEMA members spoke with DOE's consultants about this issue and learned that when they studied the LED lamps over two years ago, they were investigating lamps at higher wattages for a given lumen output than are on the market today. The equation that DOE is proposing to apply to the now lower wattage LED was based on the study of the higher wattage LED lamps two years ago, but it does not work well with the lower wattage LED lamps now on the market.

Second, referring back to our comments in Part One, Section III.F, NEMA urges DOE to abandon amending standards for medium base compact fluorescent lamps. The proposed standard is not technologically feasible for the medium base compact fluorescent lamp, and it is

a waste of public and private resources. NEMA urges the DOE to maintain the current standard and watch the marketplace sunset this product.

With respect to the lumens per watt equation as applied to general service LED lamps, we provide the following comments and insight. According to available information, the proposed efficiency curve for integrated Low Lumen products was developed by studying LED products that ranged from 7 watts (40 watt replacement) to over 20 watts (100 watt replacement), which was typical of the efficiency of LED lamps a few years ago when this analysis was performed. The slope of the proposed curve was then developed based on this "above-7W" wattage range. However, with the development of higher efficiency lamps, the wattage needed to produce the same lumen output decreased. At the lower end of the efficacy curve, the wattage of lamps producing 310 lumens to 500 lumens is now approximately 3 watts to 6 watts. DOE analysis has not kept pace with industry's product development, and DOE has not analyzed LED products at these very low wattage levels. At these lower levels, drivers account for a larger percentage of electrical losses, and the efficacy curve must bend more steeply to accommodate lower efficiency due to these higher fixed losses. The curve proposed in the NOPR, developed for higher wattage products (i.e. > 7W) does not drop quickly enough at low power levels making the efficiency regulations difficult to meet for very low lumen, low wattage products.

At the public meeting on April 20, 2016, NEMA members reminded the DOE that this same issued occurred with electronic fluorescent ballasts during their last fluorescent ballast rulemaking and a new relationship curve was developed to address this during that proceeding.

In view of the above, the DOE must re-examine the "electronics power curve" equation used to set efficiency levels for electronic ballasts and use a similar approach for LED lamps. We recommend using an equation that increases slope at lower power levels.

NEMA proposes the following equation/curve for the 310 lumen to 2000 lumen integrated low lumen non-connected product class, to accommodate increased driver power losses as a percentage of total power at the lower power levels.

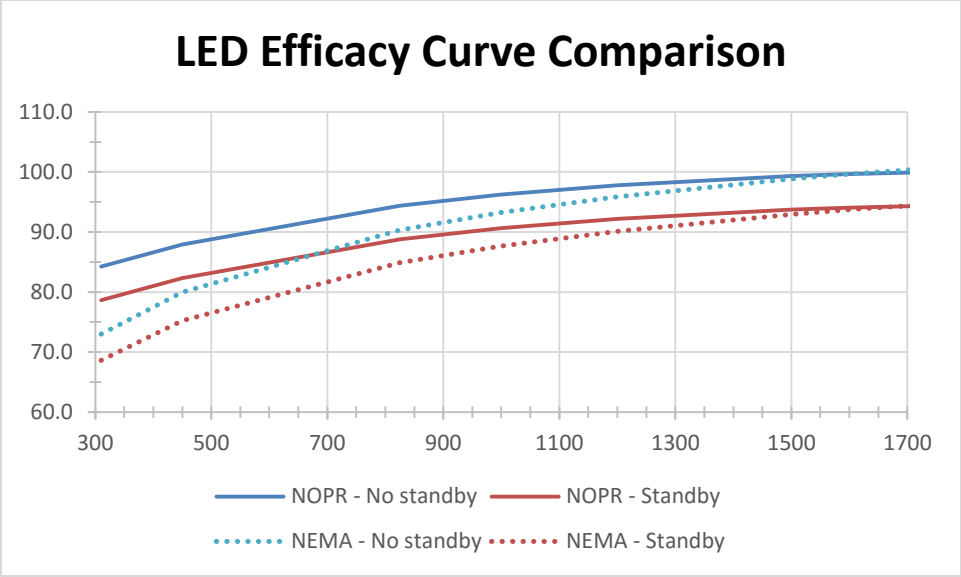
Minimum Lumens per Watt = 124 / (1+0.33 *(Lumens/1000) ^ -0.64)

NEMA proposes the following equation/curve for the 310 lumen to 2000 lumen integrated low lumen product class with connected capability.

Minimum Lumens Per Watt = 116.6 / (1+0.33*(Lumens/1000)^-0.64)

The relationship between the proposed non-connected and connected product equations we propose is similar to the NOPR proposed levels, but as noted accommodates the respect for fixed driver losses at low lumen levels.

At the upper power levels (and higher lumen output levels), the results of the NEMA equation result in similar efficacy levels as in the proposed rule; however, the efficiency levels decrease slightly for lamps using low amounts of power to accommodate the aforementioned fixed driver losses.



NEMA also proposes a separate energy conservation standard for the MR light emitting diode lamps that are general service lamps. While a general service lamp, the LED MR lamp is not yet a true replacement for the halogen MR lamp, a point that DOE acknowledges in the NOPR. 81 FR 14528, 14551-52 (March 17, 2016). For example, while there are currently LED lamp "replacements" for the MR16 20W, 35W and 50W halogen MR16 lamps they do not truly replace halogen MR16 lamps. Halogen MR lamps deliver focused illumination have desirable color quality, are easy to use with controls, and are available with a range of different options (e.g., beam angle and intensity) and accessories (e.g., spread lenses). Given this combination of features, the conventional halogen MR lamp is one of the most difficult lamps for LED technology to successfully replicate. This is especially true for 12 V, 50 W halogen lamp.

As of January 2014, a DOE CALiPER Snapshot Report based on data from LED Lighting Facts found that few MR16 lamps listed by LED Lighting Facts were comparable to a 50 W (12 V) halogen MR16 lamp. Of the small subset of MR16s that provided data for beam angle and center beam intensity, only one would meet the minimum ENERGY STAR CBCP criterion for equivalence to a 50 W halogen MR16 at the same beam angle (40°). Further, those data show that both lumen output and input power have been increasing steadily in recent years, with the net result being little change in luminous efficacy.

The CALiPER 22 report indicates the following: "Consistent with the analysis of lumen output, none of the CALiPER-tested lamps can match the ENERGY STAR-predicted CBCP of 50 W halogen MR16s at any beam angle. Furthermore, only one product exceeded the CBCP predicted for a 35 W halogen lamp using the ENERGY STAR tool at its measured beam angle. Notably, this product also claimed equivalency to a 75 W halogen MR16, which produces vastly higher CBCP (and lumen output). This greatly overstated equivalency claim is not unique, however. Not a single product achieved the ENERGY STAR-predicted CBCP at its measured beam angle—and all but six products made such a claim."

The NOPR would propose to adopt a 45 lumen per watt standard for the MR LED lamp. Current LED MR product is not available at a higher lumen output. Industry research and development on the MR LED lamp is expected to be directed toward higher lumen output MR LED lamps. An efficacy standard can be constraining for the development and improvement of the technology. To provide the flexibility for manufacturers to innovate and develop these products, NEMA proposes a maximum energy use standard that MR LED lamps not exceed 15 watts.

VI. FEDERAL PREEMPTION

EPCA provides for express federal preemption of State regulation for the disclosure of information relating to energy use and efficiency, test procedures to measure energy use or an energy descriptor, and energy conservation standards concerning the energy use or energy efficiency of a covered product. 42 U.S.C. §6297. Once Congress has designated a product for regulation under EPCA by either enacting energy conservation standards for a product or requiring DOE to undertake a rulemaking to determine if standards are justified, or, if Congress has not so designated, the Secretary designates a new covered product under 42 U.S.C. §6292(b), States are preempted from requiring a different manner of testing products or requiring information disclosure other than what the DOE or the FTC requires under EPCA, and no State regulation concerning energy use or energy efficiency of the covered product shall be effective. *Id.* Preemption applies both before a federal energy conservation standard becomes effective, 42 U.S.C. §6297(b),[83] and after a federal energy conservation standard becomes effective. 42 U.S.C. §6297(c).[84]

In EISA-2007, Congress designated general service lamps for regulation as of December 19, 2007 and, with a couple of exceptions noted in EISA-2007, all State regulation concerning energy use or energy efficiency for general service lamps was subsequently and is now not effective. If energy conservation standards for any specialty lamps, currently exempt from regulation, are established by the Secretary in this rulemaking, then they will become covered products and federal preemption will apply to them.

In EISA-2007, Congress specified three exceptions to preemption allowing the States of California or Nevada to adopt, effective on or after January 1, 2018:

> ‘‘(I) a final rule adopted by the Secretary in accordance with clauses (i) through (iv);
>
> ‘‘(II) if a final rule described in subclause (I) has not been adopted, the backstop requirement under clause (v); or
>
> ‘‘(III) in the case of California, if a final rule described in subclause (I) has not been adopted, any California regulations relating to these covered products adopted pursuant

[83] Section 327(b) preemption applies after March 17, 1987. This is not an issue for this rulemaking.

[84] Both Section 327(b) and Section 327(c) of EPCA contain exceptions, none of which are relevant to this discussion. There are some differences in the exceptions between the two paragraphs of Section 327.

to State statute in effect as of the date of enactment of the Energy Independence and Security Act of 2007."

As DOE explained during the Public Meeting, Clause (III) is not applicable because there was no California regulation in effect as of December 19, 2007. As explained in these comments, the Secretary can complete a rulemaking in accordance with clauses (i) through (iv) consistent with the Appropriations Rider leaving California and Nevada only with the option of adopting the final rule adopted by the Secretary. If DOE does not adopt a final rule in accordance with clauses (i)-(iv), California and Nevada can adopt a 45 lumen per watt standard for general service lamps.

The definition of "covered product" serves a purpose of making clearer what products are preempted under EPCA. Consistent with DOE precedent, see 71 FR 42178, 42195, 42203 (July 25, 2006), DOE should amend the definition of "covered product" at 10 CFR 430.2. The NOPR proposes to define a number of new terms for the first time, some of which describe what is intended to be a "covered product." Some of these specialty lamps would be subject to energy conservation standards. There are other covered specialty incandescent lamp products subject to energy conservation standards as a result of EISA-2007 that DOE has not included in this definition, which should be added as shown below, as well as specialty lamps that we propose energy conservation standards for in this rulemaking:

Covered product means a consumer product:

(1) Of a type specified in section 322 of the Act, or

(2) That is a ceiling fan, ceiling fan light kit, *pin base or* medium base compact fluorescent lamp, *candelabra base incandescent lamp, candelabra base light emitting diode (LED) lamp, general service light emitting diode (LED) lamp, general service organic light-emitting diode (OLED) lamp, intermediate base incandescent lamp, intermediate base light emitting diode (LED) lamp, rough service incandescent lamp, vibration service incandescent lamp, multifaceted reflector (MR) lamp, B-Shape incandescent lamp, BA-shape incandescent lamp, CA-shape incandescent lamp, F-shape incandescent lamp, M14-shape incandescent lamp, S-shape incandescent lamp, T-shape incandescent lamps, three-way light emitting diode (LED) lamp* dehumidifier, battery charger, or external power supply.

PART THREE: ISSUES ON WHICH DOE SEEKS PUBLIC COMMENT

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. DOE requests comment on its consideration to exclude from the scope of the GSL rulemaking lamps that are addressed in other rulemakings. See section IV.B.2.

   NEMA Comment: NEMA agrees that products regulated separately in EPCA are excluded from the scope of this rulemaking and this is consistent with the intent of Congress. In Parts One and Two of NEMA's comments, NEMA identified a number of specialty incandescent lamp products for which Congress has applied energy conservation standards in one form or another. These specialty lamps are not "exempt" from regulation and should *not* be considered in this rulemaking since Congress only invited the Secretary to determine whether "exemptions" should be maintained or discontinued. As these are not general service lamps, and there is no "exemption" from regulation, the non-exempt specialty lamps are plainly outside the scope of this rulemaking.

2. DOE requests comment on the energy savings potential of standards for GSLs greater than 2,600 lumens. See section IV.B.3.

   NEMA Comment: NEMA agrees with DOE's decision to not regulate lamps with greater than 2600 lumens. Sales have continuously and substantially declined for years and again from 2014 to 2015. Sales of these lamps are expected to continue to decline in volume. Sales of high lumen products are a very small percentage of the overall market and these lamps do not use a significant amount of energy in the aggregate. There are limited CFL replacement options and no LED replacement options at this time.

3. DOE requests comment on the revised definitions proposed for general service LED lamp, OLED lamp, and light fixture. See sections IV.C.1, IV.C.2, and IV.C.6.

   NEMA Comment: NEMA has thoroughly explained the extent to which the NOPR has altered Congress' definition of "general service" lighting by borrowing terminology from a very different part of the statute where the term "general service" is not used and improperly grafting it on to the definition of "general service" lamps. The "general service" lamp --- whether incandescent, fluorescent, or LED technology --- is not defined in terms of the lamp's capacity to provide "overall illumination" to an area, because that capability is equally capable of applying to specialty lamps that Congress has long excluded from the definition of "general service" lamps of all technologies. Consequently, there is no room in the definition of "general service lamp" or "general service incandescent lamp" for the term "general lighting applications" as DOE proposes in these two definitions. The phrase "general lighting applications" must be stricken from the definitions The DOE must conform its definitions to the clear intent of Congress in this case: "general service" lamps refer to those lamps that are used in a majority of lighting applications and exclude those that are used in a minority of lighting applications.

NEMA sees a couple of paths in which the Department may conform to the long-established definition assigned by Congress:

> "General service light-emitting diode (LED) lamp means an integrated or nonintegrated LED lamp designed for use in a majority of lighting applications and that uses light-emitting diodes as the primary source of light."

Alternatively, DOE could define this term as follows:

> "General service light-emitting diode (LED) lamp means an integrated or nonintegrated LED lamp designed for use in general service applications and that uses light-emitting diodes as the primary source of light."

and, consistent with the meaning of "general service" long assigned by Congress, add a new definition:

> "General service applications" means the majority of lighting installations and does not include specialty lamps designed for special purposes or special applications that represent a minority of lighting applications.

Either way, these definitions clearly conform to the text used by Congress EPCA in giving meaning to term "general service" in EPCA. Similarly, the following definition should be used for OLED lamps:

> "Organic light-emitting diode or OLED lamp means an integrated or nonintegrated lamp designed for use in a majority of lighting applications that uses OLEDs as the primary source of light."

or, alternatively, DOE could define this term as follows:

> "Organic light-emitting diode or OLED lamp means an integrated or nonintegrated lamp designed for use in general service applications that use OLEDs as the primary source of light."

and consistent with the meaning of "general service" long assigned by Congress, add the definition of "general service applications" provided above.

4. DOE requests comment on the definition proposed for LED downlight retrofit kit. See section IV.C.7.

   NEMA Comment: We agree with the definition of LED downlight retrofit kit as written, and we agree with excluding this product from the scope of the proposed regulation.

5. DOE requests comment on if there are any other lamp types that do not serve in general lighting applications and should be exempted from general service lamp standards. See section IV.D.

NEMA Comment: This question has been fully addressed in Part One and Part Two of NEMA's comments. The question is poorly phrased and reflects the Department's departure from the definition of "general service" lamps long established by Congress and reinforced in EISA-2007. Congress' scope of "general service" lamps is narrower than the scope proposed by DOE in the NOPR. When DOE aligns its definitions with Congress' definitions and intended meaning, as NEMA has described in Part One and Part Two of these comments, those are the lamps to which DOE may apply "general service" lamp standards. EISA-2007 authorized DOE to further consider energy conservation standards in this rulemaking procedure for various specialty lamps to which no standard applied --- that were "exempt" from regulation. NEMA has provided ample reasons why those exemptions should be either maintained or discontinued in specific cases. Most of these specialty lamps do not meet the congressional profile for regulation because, since they are used in niche applications that do not represent a majority of the lighting applications, they consume too little electricity; others do not fit the scope of this rulemaking because the lamps are undeniably *not* consumer products; other lamps are outside the scope of this rulemaking because they are not exempt from regulation.

The Secretary's ability to incrementally add "other lamps" to the scope of the general service lamp standards is controlled by Congress' limiting proposition that the "other lamps" must be "used to satisfy lighting applications traditionally served by general service incandescent lamps." 42 U.S.C. §6291(30)(BB)(i)(IV). This is not a congressional invitation to expand the scope of "general service" lamps to include the lamps specifically excluded from the definition of "general service lamps" or regulated elsewhere; Congress put a well-understood boundary around the Secretary's ability to incorporate new technologies into this rulemaking. The Department must respect that boundary. The only "other lamp" that can be regulated as a "general service" lamp in this rulemaking is the MR reflector lamp (with a pin-base or medium screw base), designed to meet performance specification when operated between 115 and 130 volts, or operated at 12 volts on a 120 volt transformer). This lamp is commonly used in a large number of general service applications, is currently an exempted incandescent lamp, is not currently included in the definition of reflector lamp, and is not covered by another rulemaking. All other lamps are specialty lamps that are either (i) already regulated and not exempt from energy conservation standards, or (ii) are currently exempt from energy conservation standards and the Secretary may consider for regulation if they are consumer lamp products that satisfy the regulatory threshold in 42 U.S.C. §6292(b).

In Table C below, NEMA summarizes the specialty lamps, whether exemptions should be maintained or discontinued and the reasons for that conclusion. See also Part Two, Table A and Table B, *supra*.

TABLE C
SPECIALTY LAMPS and EXEMPTIONS FROM ENERGY CONSERVATION STANDARDS

Specialty Lamp	Technology	Maintain or Discontinue Exemption	Reason	Proposed Standard
Screw terminal base (G54) reflector lamps	Incandescent	Maintain	EPCA Part B commercial lamp only	none
	CFL	Product does not exist	N/A	none
	LED	Maintain	EPCA Part B commercial lamp only	none
Medium side prong base (G12.7) reflector lamps	Incandescent	Maintain	EPCA Part B commercial lamp only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Mogul prong base reflector lamp	Incandescent	Maintain	EPCA Part B commercial lamp only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Intermediate base lamps	Incandescent	Not exempt	40 watt max. energy use std.	Do not amend
	CFL	Maintain	Product will decline in the market without regulation; unnecessary to encumber with regulatory burden.	none
	LED	Discontinue		10 watt max. energy use
Candelabra base lamps	Incandescent	Not exempt	60 watt max. energy use std.	Do not amend
	CFL	Maintain	Product will decline in the market without regulation; unnecessary to encumber with regulatory burden	none
	LED	Discontinue		10 watt max. energy

				use
Bayonet base lamps	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Product does not exist	N/A	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Double ended base lamps	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Recessed Single Contact base lamps	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Mogul Screw and mogul bi-post base lamps	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
G53 base lamps	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Double Contact Prefocus base lamps	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Product does not exist	N/A	none
	LED	Product does not	N/A	none

		exist		
2-pin bases lamps	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
Appliance	Incandescent	Not exempt	40 watt max. energy use std.	none
	CFL	Product does not exist	N/A	none
	LED	Maintain	LED not available for warm applications	none
Black light	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Bug	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Colored	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Infrared	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Product does not exist	N/A	none

	LED	Product does not exist	N/A	none
Left hand thread	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Marine	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Maintain	EPCA Part B commercial product only	none
	LED	Maintain	EPCA Part B commercial product only	none
Marine signal	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Maintain	EPCA Part B commercial product only	none
	LED	Maintain	EPCA Part B commercial product only	none
Mine service	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Maintain	EPCA Part B commercial product only	none
	LED	Maintain	EPCA Part B commercial product only	none
Plant light	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Rough service	Incandescent	Discontinue	Sales will likely exceed threshold	40 watt max. energy use std./single pckg.
	CFL	Product does not exist	N/A	none
	LED	Product	N/A	none

		does not exist		
Shatter resistant	Incandescent	Maintain	Sales declining; Average annual per-household energy use less than 100 kWh; primarily commercial	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh; primarily commercial	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh; primarily commercial	none
Showcase	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Sign service	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Maintain	EPCA Part B commercial product only	none
	LED	Maintain	EPCA Part B commercial product only	none
Silver bowl	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh; primarily commercial	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh; primarily commercial	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh; primarily commercial	none
Three-way	Incandescent	Maintain	Sales declining;	none
	CFL	Maintain	Product will decline in the market without regulation; unnecessary to encumber with regulatory burden.	none
	LED	Discontinue	Explained *supra*.	The LPW equation for GSL measured

				at highest power level.
Traffic signal	Incandescent	Maintain	EPCA Part B commercial product only	none
	CFL	Maintain	EPCA Part B commercial product only	none
	LED	Maintain	EPCA Part B commercial product only	none
Vibration service	Incandescent	Not exempt	Sales threshold exceeded	40 watt max. energy use std./single pckg
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
B-shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
BA-shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
CA (candle) shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
F (flame) shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend

	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
G16-1/2 shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
G25 shape	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
G30 shape	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
G-shape (G40) with diameter greater than 5”	Incandescent	Maintain	Average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
M14 shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
	CFL	Product does not exist	N/A	none
	LED	Product does not exist	N/A	none
S shape	Incandescent	Not exempt	40 watt maximum energy use std.	Do not amend
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none
Lamps greater than 2600 lumens	Incandescent	Maintain	Sales declining; average annual per-household energy use less than 100 kWh	none
	CFL	Maintain	Average annual per-household energy use less than 100 kWh	none
	LED	Maintain	Average annual per-household energy use less than 100 kWh	none

6. DOE welcomes comment on the exemptions proposed for non-incandescent lamps of certain shapes, in particular on the proposal to exempt B-shape lamps (including blunt shape), C- and CA-shape lamps (including candle shape), F-shape lamps (including flame or flame tip shape), S-shape lamps, and torpedo or torpedo tip shape lamps with diameters of 1.875 inches or less, G-shape lamps with diameters of 2.0625 or less, and A15 lamps with diameter of 2.185 or less. See section I.A.1.a.

   NEMA Comment: NEMA's position on the exemptions for both incandescent and non-incandescent specialty lamps is shown in Table C in response to the previous question. This Table builds on our comments about the correct scope of this rulemaking in Part One and Part Two of these comments. With respect to the particular lamp shapes cited, the B, BA, C, CA, F, S and G16-1/2, G25, G30 and M14 shape incandescent lamps are not currently exempt from regulation. They are regulated by a 40 watt maximum energy use standard that Congress included in 42 U.S.C. §6292(30)(D)(ii)(XXII). In Table C and elsewhere, NEMA has further explained the reasons, consistent with EPCA, why the exemptions for non-incandescent versions of these lamps should be maintained or discontinued.

7. DOE welcomes comment on including non-IRLs in the definition of GSLs. See section IV.D.2.a.

   NEMA Comment: This question is neither clear nor logical as phrased. Congress defined a "general service lamp" in a way the clearly includes lamps that are not incandescent reflector lamps ("non IRLs"), such as the general service incandescent lamp and the medium screw base CFL. If, on the other hand, DOE's question is focused on including the MR (multifaceted reflector) lamp in the definition of "general service lamp" (because multifaceted reflector lamps are not part of the definition of incandescent reflector lamp), NEMA has indicated that it agrees with that proposition. DOE has indicated that it believes general service lamp standards are not yet appropriate for LED MR lamps (there are no CFL MR lamps and none will be made for technical and commercial reasons). Yet DOE proposes to establish a 45 lumen per watt standard for the MR16, so DOE is not being consistent in its statements. There is an energy standard for MR16 LEDs that can be economically justified. NEMA proposes a maximum energy use standard of 15 watts for MR 11, 14, 16 and 20 LEDs. See Part Two, Section V.

   In the case of halogen incandescent MR 11, 14, 16 and 20 lamps, NEMA believes and proposes that a maximum energy use standard of 50 watts is the better standard and that an efficacy standard is not appropriate. See Part Two, Section III.B, *supra*.

8. DOE requests comment on the various definitions based on GSIL exemptions proposed to better delineate the GSL definition, especially in regards to determining the possible GSLs that use technologies other than incandescent and operate in applications equivalent to those of the lamps exempted from the GSIL definition. See section IV.D.

   NEMA Comment: Consistent with our comments in Part One and Part Two, the exempt lamps that the Department is referring to in this question are "excluded" from the

definition of “general service lamp” just like they are excluded from the definition of “general service incandescent lamp.” These specialty lamps don’t become “general service lamps” until they cease becoming designed for and used in special applications that represent a minority of lighting applications. The terms “exclusion” and “exemption” are not synonymous. See Part I, Section III.A, *supra*.

In the interest of clarity, NEMA provides in Appendix B a definition of “specialty lamp” and “specialty base lamp” so that the dichotomy between “general service” and “specialty” lamps that resides throughout EPCA for all lighting technologies is clearly recognized. See also Part One, Section III.B and Part Two, Section I. In conformity with EPCA, specialty lamps are excluded from the definition of “general service lamp” and to the extent that an energy conservation standard has not been applied by Congress to a specialty lamp, those specialty lamps are “exempt.”

9. DOE requests comments on its assessments of GSLs for which standards should be proposed. See section IV.E.4.

NEMA Comment:
To the extent that DOE has included specialty lamps and specialty base lamps in with its analysis of general service lamps, NEMA disagrees with the assessments.

NEMA agrees with DOE’s decision not to establish standards for non-reflector candelabra and intermediate base integrated lamps. As these are specialty lamps, DOE’s authority to adopt standards for these lamps is independent of standards for general service lamps. A standard applicable to general service lamps is not applicable to these specialty lamps.

NEMA disagrees with the DOE’s perceived need to establish standards for Pin-Based compact fluorescent lamps. This is a relatively small product area used almost exclusively in commercial lighting applications. As such, this is not a growing product area. It is a declining product area.

With regard to MR16 lamps, DOE says it “is not setting standards for MR16 lamps in this rulemaking because more-efficient replacements maintaining the same utility are not available.” In fact, however, DOE is establishing a 45 lumen per watt standard that would apply to MR16 LED lamps as well as MR 16 halogen incandescent lamps. For the reasons explained in Part Two, Section V, NEMA urges DOE to adopt a maximum energy use standard of 15 watts for the MR11, 14, 16and 20 LED lamp instead of the proposed 45 LPW standard.

NEMA objects to a 45 LPW standard applied to the MR16 halogen incandescent lamp for which it is not technologically feasible to meet that standard. NEMA recommends that a 50 watt maximum energy use standard be applied to the MR 11, 14, 16 and 20 halogen incandescent lamp. See Part Two, Section III.B.

NEMA agrees with DOE's decision not to establish energy conservation standards for general service OLED lamps at this time.

As DOE is proposing a 45 lumen per watt standard for a number of specialty lamps, NEMA objects and disagrees with this proposal. It is not necessary or obligatory to establish energy conservation standards for specialty lamps used in niche applications and do not consume significant energy. NEMA's analysis of one of the more prominent exempt specialty lamps --- the globe shape incandescent lamp --- earlier in these comments recognizes that specialty lamps fail to meet the threshold for regulation established by Congress in EPCA. See Part Two, Section II.A, *supra*.

10. DOE requests information on start times available on the CFL market. See section IV.F.2.c.

    NEMA Comment: NEMA agrees with DOE that start time has no effect on energy efficiency.

11. DOE requests comment on its proposal to require integrated LED lamps to meet a power factor of 0.7 or some other value. See section IV.F.3.

    NEMA Comment: Power factor (PF) is not a parameter that is being focused on by industry for research and development resources, and a higher power factor requirement will raise lamp price with no perceived consumer benefit. Additional PF correction components may also affect physical size challenges in smaller lamp shapes and base types. We note that the EPA ENERGY STAR Lamps program settled on 0.6 for what is viewed as a high-performance specification. As the DOE notes, there is no proven negative impact for 0.5 PF for CFLs, and therefore no justification to raise PF for LED lamps above 0.5. To alleviate the aforementioned provable concerns regarding technology and physical space constraints, versus a virtual concern (unproven power quality complaints from other stakeholders) we propose 0.5 as the Federal minimum Power Factor for all integrated lamps.

12. DOE requests any comments regarding proposed metrics for GSLs in this NOPR analysis. See section IV.F.4.

    NEMA Comment: NEMA agrees that energy efficiency and power factor metrics for LED lamps are the primary factors effecting energy use. However, as most CFL lamps will be eliminated by the proposed efficacy standards, adding new metrics to CFL products seems unnecessary. In particular, a metric like start time has no effect on energy efficiency. If DOE adds these metrics, the metric levels being proposed are achievable, but the DOE has not examined the added burden associated with adding new test procedures and parameters to report, impacted by the fact that these products will disappear from the market shortly after implementing these new test procedure and reporting requirements. NEMA's recommendation is to maintain the current standard for medium base compact fluorescent lamps along with the current metrics unless EL-2 can be economically justified for the medium base compact fluorescent lamp. We have explained the reasons for this recommendation previously.

13. DOE requests comments on the proposed product classes. See section V.A.1.

    NEMA Comment: Placing CFL and LED lamps in the same product class will eliminate low lumen integrated CFL lamps from the market under the proposed energy conservation standard. NEMA recommends treating the CFL and LED lamps as separate lamp types and applying different energy conservation standards to them as we urge earlier in these comments.

    NEMA agrees with the DOE analysis and conclusion to create a separate product class for high lumen lamps. NEMA also agrees with DOE conclusion to create a separate product class that connected LED lamps having standby power.

14. DOE requests comment on its proposed renaming of "device level optics" to "improved primary optics" and refined description of this technology option. See section V.A.2.b.

    NEMA Comment: We agree with the DOE's proposed changes.

15. DOE requests comment on its proposal to replace the term "increased light utilization" with "improved secondary optics" and the refined definition of this technology option. See section V.A.2.b.

    NEMA Comment: We agree with the DOE's proposed changes.

16. DOE requests comments on the proposed technology options. See section V.A.2.c.

    NEMA Comment: While the lighting industry is working on improving the efficiency of LED technologies, the lighting industry has already improved screw-based and pin-based compact fluorescent lamps technology over the past 20 years and is near the limits of the highest practical efficiency available from this technology. No further advancements in efficiency are expected in the CFL product area.

17. DOE requests comment on the proposed design options in this NOPR analysis. See section V.B.3.

    NEMA Comment: With regard to the eight CFL technology options that the DOE mentions to increase the efficacy of the lamps, CFLs are a mature technology which is not experiencing further breakthroughs. Essentially, CFLs are at the top of their practical performance and they cannot be improved further. At most, they can have marginal efficacy improvements at a cost that will not be practical to be absorbed by the end user. Moreover, given the natural sales decline of CFLs, no manufacturer will be willing to spend R&D resources to achieve marginal efficacy improvement of the products.

    We have the following comments for the specific CFL technology options proposed by the DOE, which are not viable to increase the efficacy of the lamps:

    Highly emissive electrode coatings
    As far as we know, there are some differences among the existing emissive material types. The difference is that the solid material content in some types is a little higher

than in others. The advantage is to prolong lifetime or improve performance on rapid cycle stress test. The lamp power and efficacy remains the same. So far, there is NO evidence of the existence of emitters that reduce lamp power and increase overall efficacy.

Higher efficiency lamp fill gas composition

Higher efficiency lamp fill gas compositions are not available. CFL discharge tubes are already at their highest efficacy level. Based on decades of experience, there is no additional room to significantly improve the lamp efficacy with a different fill gas.

Higher efficiency phosphors

Normal CFLs lamps are using the YOX/CAT/BAM phosphor mix, it is the so called CAT system. This phosphor mix can support a higher wall-load and keep lumen maintenance in required level. There is also another phosphor mix combination with YOX/LAP/BAM, it is so called LAP system. This phosphor mix yields a bit higher efficacy.
However, the problems for using LAP system are the following:

- Price of LAP is 100% higher than CAT, i.e., significant cost uplift

Glass Coatings

Some CFL manufacturers already use a coating on the inside of the bulb, which is applied before the phosphor coating. This bulb coating or precoat reflects UV energy from the glass wall into phosphors, so that more visible light is emitted. The lamp gets an efficacy gain of 1 – 1.5 lm/W with this pre-coat. However, the main reason for applying the pre-coat is to improve lumen maintenance.

These technology options CANNOT improve further the efficacy beyond what is currently commercially available.

Also please see our comment on question 16.

18. In its collection of lamp performance data, DOE did not consider high and low end outliers in the engineering analysis where DOE was unable to verify values using test data or manufacturer confirmation. DOE welcomes comment on the data approach. See section V.C.1.

    NEMA Comment: NEMA agrees that outliers should be excluded from the analysis and we thank the DOE for recognizing this concern, often mentioned in other proceedings.

19. DOE requests comment on the baseline lamps analyzed in the NOPR analysis, in particular the spiral CFL baseline in the Integrated Low-Lumen product class. See section V.C.3.a.

    NEMA Comment: NEMA has no comment on this item.

20. DOE requests comment on the 3-way lamp used as a basis for the modeled LED lamp and information on whether such a lamp would meet DOE's screening criteria and should be maintained for the final rule analysis. See section V.C.4.

NEMA Comment: The middle setting of a 3-way lamp is an odd choice when evaluating single light level lamp designs. A more reliable and straight-forward approach would be to only consider the efficiency of single light level lamp designs. The technology that led to the higher efficiency of a more expensive 3-way lamp design may not be typically used in lower cost single light level designs.

21. DOE requests comment on the ELs under consideration for both of the integrated lamp product classes, including the max-tech levels. See section V.C.5.a.

    NEMA Comment: DOE should assume that there will be no further efficiency improvements or development in integrated compact fluorescent lamp technology. If DOE intends to keep high lumen CFL lamps on the market, they should not place efficiency levels slightly above the current efficiency levels available from the majority of manufacturers. Placing the efficiency level at the highest known reported value from one manufacturer is likely to eliminate almost all products from the market with no further development of new products expected given the small market size.

    We support the DOE's decision to NOT create any new requirements for non-integrated Compact Fluorescent lamps).

22. DOE requests comment on the assumption that the efficacy of non-integrated CFLs can be improved for those lamps with base types that potentially cannot meet EL 1. See section V.C.5.b.

    NEMA Comment: DOE should assume that industry will not place any further research or development into increasing the efficiency of non-integrated CFL lamps. The products available today represent mature product development for this product area. Any further development would be extremely costly for industry and would produce very small efficiency gains that are exceeded by improvements in LED technology.

    DOE appears to assume that very large CFLs designed to replace 150W incandescent lamps can pass the proposed standards. NEMA disagrees, and does not know of any lamps that pass the proposed levels. Also, it seems unlikely that this small market share product will continue to be made after the market leaders (i.e. 800-1200 lumen CFLs) are eliminated from production.

23. DOE requests comment on the EL under consideration for the Non-Integrated product class, including the max-tech level. See section V.C.5.b.

    NEMA Comment: Efficiency standards should not be placed on non-integrated products

24. DOE requests comment on the scaling factors determined. See section V.C.6.

    NEMA Comment: Scaling to lamps that can operate in standby mode is acceptable.

25. DOE requests comment on its assumption that the EISA 2007 backstop will be triggered. See section V.E.1.a.

NEMA Comment: As we discussed in detail in Part One and Part Two of our comments, the DOE is purportedly triggering the backstop by choice by deciding not to analyze certain incandescent lamps as directed by Congress. This action is not dictated by Congress because EISA-2007 and the Appropriations Rider are reconcilable, and Congress' interest that a certain level of energy savings be realized is occurring. See Appendix A. The backstop should not be triggered.

26. DOE requests comment on the data and methodology used to estimate operating hours for GSLs in the residential sector, as well as on the assumption that GSL operating hours do not vary between CFLs and LED GSLs. See section V.E.1.a.

    NEMA Comment: NEMA would not expect operating hours to vary between CFL lamps and LED lamps. However, we would expect operating hours to be less for shorter life halogen lamps. Available data supports that proposition.

27. DOE invites comments and data on its approach to account for variability in HOU in the commercial sector. See section V.E.1.b.

    NEMA Comment: There is very limited use of general service incandescent lamps in the commercial sector. Where they are used, the weighted average of 10.7 hours per day is reasonable. However individual use, depending on building type, can vary greatly. The overall impact will be small as most commercial locations will have already switched to energy efficiency alternatives or are operating GSIL lamps in a significantly dimmed mode which reduces energy use and increases lamp life. Use of standard life GSIL lamps would be unacceptable in most commercial applications due to the need for constant replacement due to short lamp life.

28. DOE requests comment on the energy reduction estimate of 30 percent, as well as data and information on the energy use implications of using dimmers in the residential sector. See section V.E.3.

    NEMA Comment: Use of dimming will vary greatly on a room by room basis, but 30 percent as an average is reasonable.

29. DOE requests comment on the assumption that, although in the NOPR analyses DOE continues to assume that 5 percent of CFLs are dimmable, the fraction of CFLs and LEDs that are used with controls external to the lamp is assumed to be the same (14 percent in the reference case) in the residential sector. See section V.E.3.

    NEMA Comment: We agree that there are a very low percentage of CFLs sold that are dimmable. The fraction of external controls used for CFL or LED lamps is the same today. However, in the future there may be greater use of controls associated with LED lighting due to enabling technology and a greater ability to dim.

30. DOE requests comment on the overall methodology and results of the LCC and PBP analyses. See section V.F.

    NEMA Comment: The LCC and PBP analyses appear to be adequate.

31. DOE requests comment on the installation cost assumptions used in its analyses. See section V.F.2.

    NEMA Comment: The installation cost assumptions appear to be adequate.

32. DOE requests comment on the methodology and assumptions used to determine the market share of the lumen range distributions. See section V.F.3.

    NEMA Comment: NEMA agrees that a very low percentage of GSL lamps are sold into high lumen applications.

33. DOE invites comment on the three GSL service life scenarios in its analyses. DOE also invites comment on the lifetime scenario accounting for GSL failure in the first year of use. See section V.F.6.

    NEMA Comment: The life scenarios and failure scenarios appear to be adequate.

34. DOE requests comment and relevant data on the disposal cost assumptions used in its analyses. See section V.F.8.

    NEMA Comment: Disposal costs assumptions are acceptable. However, the DOE must factor in increasingly shorter lifetimes of LED lamps as the market explores a balance between slightly shorter lifetimes versus lower purchase prices in order to expand LEDs in sockets. Lifetime is an active topic for value-engineering.

35. DOE requests relevant data on GSL shipments as they become available in order to improve the accuracy of the shipments analysis. See section V.G.1.a

    NEMA Comment: We have nothing additional to submit at this time beyond our previous comments.

36. DOE requests comment on the assumption that the shift to CFL and LED GSLs during the shipments analysis period will take place over several years. See section V.G.1.a.

    NEMA Comment: NEMA's views on the current trends and projected trends in the market are recited in Part Two, Section IV, *supra*. The market data recited therein demonstrates that the question posed by DOE assumes facts that are contrary to what is happening and will likely happen in the market. There is no shift to CFLs; there is a shift away from CFLs as shipments likely move toward zero by 2020. DOE should not project an increase in CFL shipments for the year 2020.

    As we noted earlier in Part Two, Section IV, more general service lamp sockets are occupied by longer-life CFL and LED lamps and fewer sockets are occupied by shorter life halogen incandescent lamps. This trend is occurring and will continue. This results in slower sales turnover and lower annual shipments for CFL and LED that is smaller than the CFL and LED lamp socket penetration represents. While socket penetration for halogen incandescent lamps is shrinking, the shorter-life of the halogen incandescent product results in a faster sales turnover and higher annual shipments than their socket penetration represents. Thus, demand for these lamps is impacted by the greater

penetration of longer-life LED lamps in sockets. At some point, changes in demand for LEDs will flatten or decline after the CFL disappears from the market.

Lamp supply cannot be ignored either. DOE should be mindful of the prospect of lamp shortages in 2020 as a result of its limited analysis of the impact of its proposed rule if the proposed rule is not modified by the time of the final rule.

37. DOE requests comment on whether there are data, in the lighting sector, showing that consumers might purchase, in quantity, existing products on the market prior to compliance of a new, more efficient standard.

NEMA Comment: The data presented in NEMA's comments demonstrates that consumers are purchasing halogen incandescent and, CFLs in smaller numbers and NEMA expects that trend to continue; in contrast, the data demonstrates that consumers are purchasing LEDs in significantly greater numbers and NEMA expects that trend to continue.

The DOE's proposed standards for halogen incandescent, CFL, and LED lamps will eliminate virtually all of the current versions of these products from the market on or before January 1, 2020. This will have no impact on the decline in purchases of CFLs. We expect consumers to purchase growing numbers of LEDs with or without new energy conservation standards.

If the proposed 45 lumen per watt standard is adopted and is determined to be applicable to each general service lamp, the products for which it is not technologically feasible to meet that standard --- such as certain incandescent lamps including the halogen incandescent lamp --- will disappear earlier from the market because the proposed energy conservation standard bans the "sale" of these lamps by January 1, 2020. That means manufacture will have to cease well before that time to reduce the inventory in the supply channel. Consumers may not even realize that the halogen incandescent lamps are disappearing from store shelves until they are gone or in short supply.

38. DOE invites comments on its approach to price learning for LED GSLs. See section V.G.1.b.

NEMA Comment: LEDs will experience price learning as technology advancements are implemented and production volumes increase. The public can expect to see an increase in the net price of the CFL for the reasons explained in Part Two, Section IV, *supra*. Beginning January 1, 2017, the CFL will no longer be supported by the ENERGY STAR Lamps program and will no longer qualify for incentive pricing. As demand and supply for the CFL shrink, manufacturers of CFLs may experience declining economies of scale that could impact prices as well.

39. DOE requests comment on the assumption that brighter lumen bins have a fixed fractional price increment relative to lamps in dimmer lumen bins. See section V.G.1.b.

NEMA Comment: NEMA agrees that as LED lamps increase in brightness to the next lumen bin, their price will increase as more LED chips will be required. The increase in price between lumens bins will increase more significantly if the next lumen bin has a much lower market share and production volume.

40. DOE has assumed zero rebound effect in the reference scenario for consumers switching from CFLs to LED lamps in both the commercial and residential sectors. In an alternative scenario, *DOE has assumed 15 percent rebound in the residential sector for consumers switching from CFLs to LED lamps*, and zero rebound in the commercial sector. DOE requests comment on these assumptions and any data that can be used to further refine the rebound effect assumptions used in the shipments and NIA analyses. See section V.H.1.

    NEMA Comment: The rebound effect from switching from CFLs to LEDs will be very small, if not zero. Due to the high efficiency levels being proposed, integrated CFL technology will not even be available for rebound.

    As consumers switch from halogen incandescent lamps to LEDs, it is more likely that there would be at 17% rebound in the hours of use, consistent with what data has shown in the past for incandescent and CFL.

41. DOE estimated a reduction in product costs at the proposed standard level because (1) more efficacious lamps have longer average lifetimes than less efficacious lamps, resulting in fewer replacement purchases, (2) the purchase price of more efficacious LED lamps is lower than the price of less efficacious LED lamps, and (3) the purchase price of LED lamps declines faster than the price of CFLs during the analysis period, resulting in LED lamps becoming less expensive than CFLs. DOE requests comment on the cost reduction estimate. See section VI.C.2.

    NEMA Comment: There is no fundamental technology reason why more efficacious LED lamps would have longer average lifetimes than less efficacious LED lamps, or that the price of more efficacious LED lamps would be lower than lower efficiency LED lamps. This DOE observation of the market is more likely the result of a one-time snap shot of the market in an odd transitional stage that will not be maintained for long. The purchase price of newly developing LED technology will decline faster than price of CFL lamps will are not likely to decline at all and may increase as their sales decrease. Once the LED market is mature, LED lamps will mostly likely reach similar price points as the mature CFL lamps sold today. LED lamps may be become less expensive than CFL lamps as the net price of CFL lamps increase with the elimination of state and utility incentives and rebates and/or declining economies of scale in manufacture.

42. DOE considered three lighting-controls scenarios including a smaller range of penetration for smart lamps: 0 percent smart-lamp penetration in the residential sector by 2049, 50 percent penetration (the reference scenario), and a high residential-controls scenario which assumed that externally controlled sockets increase to 50 percent of all sockets in 2049 in addition to a 50 percent penetration of smart lamps in 2049. DOE invites comment on these scenarios. See section V.H.1.a.

NEMA Comment: The most likely scenario is moderate penetration of smart lamps, it will not be zero, and it is unlikely to reach as high as 50% simply because of the increased cost of the smart lamp and the functional utilitarian nature of many sockets in the home.

43. DOE requests data and information on the assumption of 30 percent energy savings for smart lamps. See section V.H.1.a.

NEMA Comment: NEMA agrees that Smart lamps will save energy. Smart lamps are designed to be easy to control, without even leaving your couch, so it is conceivable that such lamps will be controlled even more often than standard lamps operated with typical lighting controls. Increased control may lead to increased savings, but the technology is too new for assessment data. An assumption of 30 percent is not unreasonable at this time.

44. DOE invites comment on the low and high benefits scenarios considered in its analysis. See section V.H.2.

NEMA Comment: NEMA agrees that initial purchase price is a critical aspect of consumers adopting LED technology. NEMA agrees that lower product prices will lead to greater consumer adoption in the absence of standards.

45. In addition to the high and low benefits scenarios, DOE considered several other scenarios in its shipments and NIA analyses. DOE invites comments on whether there are other scenarios that should be considered. See section V.H.2.

NEMA Comment: NEMA has no other scenarios to suggest at this time. We have commented on the shipment forecast elsewhere in our comments.

46. DOE requests comment on the consumer subgroups selected for analysis in this NOPR. See section V.I.

NEMA Comment: NEMA agrees that low income consumers and small commercial would be the most negatively affected if forced to purchase GSL with higher initial purchase prices.

47. DOE requests comment on its approach to conducting the emissions analysis for GSLs. See section V.K.

NEMA Comment: We have no additional comment at this time. See our response to Question 52.

48. DOE requests comment on the use of 1.52 as an average distribution chain markup and 1.55 as the manufacturer markup for all GSLs. See section V.J.2.b.

NEMA Comment: The markups are reasonable.

49. DOE seeks comment on the assumption that there is only one GSL manufacturer with domestic production of CFLs or LED lamps. Additionally, DOE seeks comment on any

potential domestic employment impacts as a result of the proposed new and amended energy conservation standards for GSLs in this NOPR. See section VI.B.2.b.

NEMA Comment: We are concerned the DOE may not have adequately investigated/identified small businesses with respect to U.S.-based manufacturing, but we have none specific to suggest. With respect to employment impact analyses we refer to our comments in Part Two, Section IV, *supra* and also urge the DOE to consider individual NEMA-member comments on this important matter, including their comments at the public meeting on April 20, 2016.

50. DOE seeks comment on any other potential manufacturer subgroups that could be disproportionally impacted by new and amended energy conservation standards for GSLs. See section VI.B.2.d.

NEMA Comment: We mention one of our small manufacturer members, The Finally Light Bulb Company, who manufactures an induction lamp. NEMA understands they have met with DOE staff to discuss their product and recent entry. We have nothing additional to add to the existing manufacturer subgroup analysis.

51. DOE seeks comment on the compliance costs of any other regulations GSL manufacturers must make, especially if compliance with those regulations is required three years before or after the estimated compliance date of these proposed standards (2020). See section VI.B.2.e.

NEMA Comment: Other standards, adopted and implemented prior to the implementation date of the DOE GSL Final Rule will have some potentially negative impacts on national energy savings analysis, manufacturer impact analysis and related analyses. The best example of this is California Title 20. For example, Title 20 currently prescribes testing for integrated LED lamps to IES LM-84/TM-28. This represents a significant additional cost as manufacturers currently use LM-80/TM-21. LM-84 tests the end product and manufacturers will have to make capital investments to expand their testing facilities to perform the testing. Ironically, the CEC has stated that they will ultimately follow the DOE test procedure once finalized. So if the DOE uses LM-80/TM-21 and asserts its preemptive authority this unnecessary burden of CEC standards can be avoided.

52. DOE invites input on its approach to estimating monetary benefits associated with emissions reductions. See section V.L.

NEMA Comment: As we have previously noted in appliance efficiency proceedings under the Energy Policy and Conservation Act:

> Given the enormous uncertainty in the IAMs models, these models --- even "averaged" as the Interagency Working Group has done --- are poor tools for agency decision-making, particularly with respect to products regulated by EPCA that are not themselves a source of emissions. Reliance on the SCC to justify a standard could be socially counterproductive: An agency could very well end up justifying the imposition of enormous costs upon a non-polluting, energy-saving product that it wants to see penetrate the market in greater

> numbers that could not otherwise be justified without the uncertain benefits attributed to the SCC. NEMA believes that DOE should base its net benefit determination for justifying a particular energy conservation on the traditional criteria relied upon by DOE --- impacts on manufacturers, consumers, employment, energy savings, and competition. If there are estimated benefits from reduced carbon emissions, they should be noted --- subject to the inherent uncertainty and difficulty in monetizing those benefits --- as benefits over and above the net benefits from DOE's traditional analysis under EPCA.

We incorporate by reference our entire comment on this subject in the recently completed incandescent reflector lamp and general service fluorescent lamp rulemaking,[85] which the DOE acknowledged in the Final Rule published in that rulemaking. 80 FR 4042, 4099 (January 26, 2015).

In our previous comments, NEMA highlighted an important point made Professor William Nordhaus in his book, *The Climate Casino*:

> The results of detailed energy models suggest an important troubling conclusion. The favorite policies of most countries today are energy efficiency regulations such as those for automobiles and appliances like refrigerators. However, such regulations will not touch the area where [carbon emission] reductions are most economical . . .
>
> This leads to one further point. The costs involved in reducing CO_2 emissions are potentially very large. *** Yet we need to ensure that societies rely on the least expensive approach. Returning to our examples of refrigerators versus electricity generation, we saw a cost difference of a factor of almost ten. When we are talking about reducing emissions by billions of tons, the economic stakes are enormous.[86]
>
> "Let's take two specific examples," Nordhaus explains:
>
> Example 1: new refrigerator. I have an old refrigerator and am thinking of buying a new energy-efficient model that costs $1,000. Each refrigerator will last 10 years and has identical size and cooling. The new one uses less electricity, and I calculate the cost savings to be $50 per year, so (ignoring discounting) the new refrigerator will have a net cost of $500. A little research shows that the new fridge emits about 0.3 tons of CO_2 per year less than the old one. So over the 10 years I can reduce my CO_2 emissions by 3 tons for a cost of $500. This comes to $167 per ton of CO_2 reduced [=$500/0.3 X 10]. This cost is a little higher if we discount the costs as we should for investments.
>
> Example 2: Natural gas electricity generation. The cost of reducing emissions by replacing my old refrigerator turns out to be high. Let's turn to another example, which is motivated by my discussion in Chapter 14 of the advantage

[85] Energy Conservation Program: Energy Conservation Standards for General Service Fluorescent Lamps and Incandescent Reflector Lamps, Docket No. EERE-2011-BT-STD-0006. NEMA Comments dated June 30, 2014, pages 38-44.

[86] W. Nordhaus, *The Climate Casino* at 172-73 (2013).

> of substituting natural gas for coal in electricity generation. Suppose the old coal plan is inefficient and has variable cost about 1 cent per kWh more than the new gas plant. The difference in CO_2 emissions is about half a ton of CO_2 per 1,000 kWh. Dividing these, we get a cost of $20 per ton of CO_2 removed. The arithmetic is ($10/1000kWh/(0.5 tons of CO2/1000kWh) = $20/ton of CO_2. So this is much less costly than replacing the refrigerator.[87]

Other economists likewise recognize that regulating efficiency standards is a less efficient, second-best means for reducing pollution:

> Krupnick, Parry, Walls, Knowles, and Hayes (2010) come to a similar qualitative conclusion. They compare the cap-and-trade provisions of the proposed Waxman–Markey climate change legislation to the legislation's energy efficiency provisions, which include standards for buildings, lighting, and appliances. The cap-and-trade, or an equivalent carbon tax, abates carbon dioxide at a welfare cost of $12 per ton. If there are no investment inefficiencies, the energy efficiency standards are five times more costly, or $60 per ton. This significantly exceeds the United States government's estimated social cost of carbon dioxide emissions, which is about $21.[88]

NEMA's point here is simple: if energy conservation is a goal worth pursuing, that goal should be pursued primarily for other reasons besides carbon emission reduction while recognizing that one of the incidental benefits of energy conservation standards could be a reduction in carbon emissions. Carbon policy should not be a principal driver in the conversation about sound energy efficiency policy and any carbon reduction benefit should not justify an otherwise marginal, unjustifiable energy efficiency regulation.

During the recent Public Meeting, DOE was asked if it was going to update its emissions model to account for the implementation of EPA's Clean Power Plan. The nature of power generation is expected to change materially in the coming 30 years --- with or without the Clean Power Plan --- and this change will likely be accompanied by a significant reduction in carbon emissions associated with power generation. Any guess based on today's power generation platform will vastly overestimate the monetary benefits associated with emissions reductions due to this rulemaking and cannot be used to justify higher efficiency limits on regulated products.

53. DOE seeks comment on its approach to conducting the utility impact analysis. See section V.M.

    NEMA Comment: The proposed approach appears to be adequate.

54. DOE welcomes input on its approach to assessing national employment impacts. See section V.N.

[87] Id. at 170.

[88] Alcott and Greenstone, *Is There An Efficiency Gap?,* 26 J. Economic Perspectives 3, 22-23 (2012).

NEMA Comment: As discussed in Part Two, Section IV, *supra*, there will be job losses and plant closures associated with DOE's adoption of a 45 lumens per watt standard that will eliminate domestic incandescent lamp manufacturing. DOE has not attempted to analyze these impacts.

55. DOE requests comment on its assumption that there will be no lessening of utility or performance such that the performance characteristics, including physical constraints, diameter, lumen package, color quality, lifetime, and ability to dim, would be adversely affected for the GSL efficacy levels. See sections VI.B.4, V.A, V.B, and V.C.

    NEMA Comment: There will be a lessening of utility as many general service LED lamps are not rated/approved for use in totally enclosed fixtures, while many more integrated CFLs are. The proposed efficiency standards will eliminate integrated CFLs less than 2000 lumens and therefore reduce the available utility of these lamp types.

56. DOE welcomes comments on how to more fully assess the potential impact of energy conservation standards on consumer choice and how to quantify this impact in its regulatory analysis in future rulemakings. See section VI.C.

    NEMA Comment: The proposed rule in this rulemaking would significantly reduce consumer choice for lamps impacted by the rule, by eliminating some features and capacities for certain lamps that are appropriate for certain lighting applications and cannot be replaced by the more efficient lamps. NEMA's comments in Part Two address this.

57. DOE requests any available data or reports that would contribute to the analysis of alternatives to standards for GSLs. In particular, DOE seeks information on the effectiveness of existing or past efficiency improvement programs for these products. See section VII.B.4.

    NEMA Comment: NEMA's comments in Part Two, Part IV address this. DOE's analysis in this rulemaking is not capturing what the market is accomplishing, with ENERGY STAR and manufacturer innovation without DOE regulation, and strongly points to a regulatory program that can be less aggressive with less adverse to manufacturers and workers and consumers than the NOPR proposes.

APPENDIX A

Congress was interested in whether energy savings produced by the final rule in this rulemaking would be greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt. That scenario necessarily contemplates that the final rule will permit some general service lamps to have an efficacy less than 45 lumens per watt while others will have an efficacy greater than 45 lumens per watt. If all general service lamps were required to meet an efficacy standard above 45 lumens per watt, there would be no reason for Congress to have inserted this provision in EISA-2007 and the provision would be superfluous. The scenario therefore requires that the DOE analyze the "fleet" of general service lamps installed in the United States.

To determine the energy saving scenario that would likely have to emerge, at a minimum, as a result of the final rule in this proceeding, a number of factors have to be included in the analysis. We present this as a preliminary analysis, as the proceeding in which this undertaking would have to occur must necessarily follow this rulemaking. Our conclusion is that it is very reasonable and plausible to conclude that Congress' interest in the final rule producing a certain level of energy savings will be satisfied and the Backstop provision will not be triggered.

The factors that play a role in this analysis are these:

1. For each general service lamp technology (incandescent, halogen incandescent, compact fluorescent, light-emitting diode (LED)) a representative lumen level, rated wattage, lumens per watt for each lamp technology must be identified in order to make energy consumption measurements. These can be derived from products observed to be representative of the most commonly available in the market. The lumen and wattage measurements for LED will be derived from the final rule (or the NOPR in this preliminary case).

2. The number of general service lamp sockets that represent the installed base must be estimated. Actually, for purposes of this analysis it is irrelevant what this number actually is: the outcome of the analysis does not vary by the number of sockets. All that is important is to have some number, and NEMA has used the number 3.3 billion A-line sockets, which number was taken from DOE Report titled *Adoption of Light Emitting Diodes in Common Applications,* Figure 2.1 (Navigant, May 2013).

3. For each general service lamp technology and for each representative lumen and wattage level within each technology, the percentage of each. To derive these figures, NEMA surveyed its members for their shipments for the years 2009 – 2013. Part of this period is influenced by the impact of the EISA-2007 shift in product from incandescent to halogen incandescent lamps, and it was concluded that the percentage of each lumen/wattage level category between the two would remain consistent between them based on pre-EISA implementation. With respect to CFL and LED lamps, the shipment data show a higher percentage of shipments for the

"13 watt" CFL compared to the "60 watt" incandescent, consistent with manufacturer experience because of the focus of utility or state incentive programs that favored this CFL lamp's lumen and wattage level. In both the incandescent and CFL categories, these two lamps' wattage/lumen levels had the greatest share of total shipments, but it was comparatively larger for the CFL because of incentives and rebates. As general service LED lamps were only just coming to market in this period, with manufacturers distributing almost exclusively the two lower wattage and lumen level LED lamps, a reasonable assumption was made that the allocation of LED lamps in sockets would correspond to the CFL experience.[89]

4. Shipments of lamps, one relevant marker to evaluate the percentage of specific types of lamps used in sockets, will not perfectly match socket penetration for a couple of reasons: certain lamps (CFL and LED) have a longer life than others and are likely to remain in sockets longer than others (incandescent); some lamps are sold in multi-unit packages and may not be installed immediately in sockets and stored in a "pantry." Longer-life lamps (CFL and LED) can be expected to have a larger socket penetration than their shipments suggest; shorter life lamps (incandescent) can be expected to have a smaller socket penetration than their shipments suggest.

5. The baseline for determining the energy savings impact of the final rule in this case is a general service lamp with an efficacy of 45 lumens per watt in every socket. This is a hypothetical lamp, but the measurements can easily be calculated. We assumed that the lumen levels of this hypothetical lamp would correspond to the CFL and computed the wattage to equal 45 lumens per watt.

6. The next step is to calculate annual energy consumption of general service lamps installed in sockets by measuring the energy consumption per hour of each lumen/wattage category within each type of lamp technology. The kilowatt hour of energy consumed by each lamp can be computed by multiplying the wattage of the lamp by its estimated daily hours of use, annualizing that number (x 365), and dividing by 1000. This is a known measurement. This preliminary analysis uses 1.9 hours for the two types of incandescent lamps and 2.3 hours for CFL and LED lamps. The incandescent figures come from the DOE Report *2010 DOE Lighting Market Characterization Report* Table 4.7 (Navigant 2012); the hours of use for CFL and LED --- 2.3 hours --- are derived from the hours used by DOE in this rulemaking. That converts to 693.5 hours of use per year for incandescent and 839.5 hours of use per year for CFL and LED. For the benchmark 45 LPW lamp, we used the CFL hours of use as well. The estimated annual kilowatt hours (kWh) of energy used for

[89] This is a more refined approach than that taken in the Cadeo Group report cited by DOE in its Framework Document. The Cadeo Group lumped all lamped technologies together in its allocation of lumen bins. Compare *Historical General Service Lamp Shipments Estimates* at 3 (Cadeo Group 2014).

a 100 watt incandescent lamp is 69.35 kWh; the estimated annual kilowatt hours of energy used for a 13 watt CFL is 10.9 kWh.

7. The aggregate annual kWh of each lamp is determined by multiplying the annual kilowatt hours of energy use for each lamp by the number of lamps in each lumen/watt category for each lamp technology type. Since the purpose of this preliminary analysis is merely to model this question: what does the allocation of the "fleet" of installed general service lamps have to look like in order for the energy consumption of the fleet to be less than the energy consumption of the baseline 45LPW lamps in every socket? Percentages for each lamp technology can be adjusted to determine how many incandescent lamps, how many halogen incandescent lamps, how many CFLs and how many LEDs would have to be in each socket to satisfy this requirement. There are a myriad of combinations of percentages of each technology that will satisfy this requirement; however, we are only interested in what combination produces some minimum amount of savings or is energy neutral.

8. The first spreadsheet at the end of Appendix A models the following "fleet' percentages that will produce a small amount of energy savings over the consumption of energy from a baseline 45 LPW lamp in every socket.

Lamp type	Percentage
Incandescent	0.1%
Halogen incandescent	38.9%
Compact fluorescent	14.0%
LED	47.0%

As long as the number in the lower right hand corner of the spreadsheet is positive, indicating that the energy consumption from the "fleet" of lamps in sockets is less than the baseline lamp in every socket, then "savings" is produced by the final rule.

The weighted average of lumens per watt for this "fleet" of installed A-line lamps is just about 61 lumens per watt, well above 45 lumens per watt.

9. Are these "fleet" percentages plausible and reasonably likely? We believe so, and the estimates are likely conservative.

    a. The 47% LED percentage is well below the projection of 55% for 2020 LED socket penetration in DOE's 2014 report, *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications* at 15 (Navigant, August 2014). General service lamp sockets are present in both residential and commercial/industrial settings. The larger percentage of sockets exists in the residential environment; however, LED adoption replacement is occurring faster in the commercial/industrial setting. The DOE report projections

indicate that 85% of commercial/industrial general service lamp sockets will be occupied by LED lighting in 2020. NEMA members believe this is reasonable and consistent with current marketplace dynamics. This drives the overall general service LED socket penetration up even if residential penetration is not at 47%.

b. The calculation that 1.5 billion of the 3.3 billion sockets will be occupied by LED lamps is conservatively consistent with the fact that an estimated nearly 1.7 billion CFLs will reach end of life between now and 2020 and a very high percentage of these "spent" CFLs will be replaced by consumer preference for LED over CFL, and a number of halogen incandescent lamps will be replaced by LED as well as is revealed by the shrinking market share of halogen incandescent lamp shipments.

c. We have included a small percentage (0.1%) of sockets still occupied by traditional incandescent lamps that cannot presently be manufactured as a result of EISA 2007. To the extent that there was inventory of these incandescent lamps in the distribution channels or in household pantries after January 1, 2014, it is reasonable to expect that by 2020 it will be a very small number left due to their shorter life (compared to CFL and LED) and the fact that they could not be manufactured between 2012 - 2014. The remaining incandescent lamps in sockets will be occupied by the 28% more efficient halogen incandescent lamp in 2020.

d. The 2015 DOE Report *Adoption of Light-emitting Diodes in Common Lighting Applications* (Navigant, July 2015) indicating that 46% of sockets were occupied by CFLs in 2014 computes to 1.51 billion of the estimated 3.3 billion sockets. As just mentioned, it is estimated that approximately 1.7 billion CFLs could be removed from sockets between 2016 and 2020 based on the nearly 1.7 billion in CFL shipments occurring 8 years earlier that reach their end-of-life in this period. Based on current market trends and the replacement of CFLs by LED due to market forces relative to the CFL described *infra*, the reduction in CFLs in sockets to 14% by 2020 is very reasonable.

e. NEMA members have advised NEMA of their belief that the foregoing estimates for LED and CFL socket penetration, including the Navigant estimate, are conservative. Based on product sales trends for the previous six years (2010-2015), NEMA members estimate that two billion of the 3.3 billion general service A-line lamp sockets are already occupied by CFL and LED A-line lamps. That is over 60% of the sockets. Just in the past six years, nearly two billion CFLs were imported and sold, and while some portion of these CFLs are purchased in packages of more than one and stored by the consumer, the combination of CFLs still in sockets from

previous purchases and the nearly 200 million A-line LED lamps sold domestically during the last three years lend credence to the two billion socket estimate for CFLs and A-line LED. Without question, nearly all the LED lamps sold are reasonably believed to have been installed promptly in sockets. If 60% of general service sockets are occupied by CFL and LED lamps today, it is reasonably likely that more than that same percentage of sockets (weighted more heavily to LED installations) will be occupied by LED and CFL in 2020.

f. Nor does the adoption of NEMA's proposed LED efficacy equation disturb the conclusion either. Wattages at lower lumen output levels are slightly higher under the NEMA proposed equation than the NOPR equation, but positive energy savings from the "fleet" of general service lamps in sockets is met when the LED share is increased slightly to 50% and CFL share is reduced slightly to 11%. The LED share is still below the projection of a 55% share of sockets in DOE's 2014 report, *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications* at 15 (Navigant, August 2014). The remaining CFL share is still consistent with the substantial removal of CFLs from general service sockets by 2020.

The weighted average of lumens per watt for the fleet of installed general service lamps is above 60 LPW, still well above 45 LPW.

The second spreadsheet at the end of Appendix A models the following "fleet' percentages that will produce a small amount of energy savings over the consumption of energy from a baseline 45 LPW lamp in every socket based on the revised efficacy equation proposed by NEMA:

Lamp type	Percentage
Incandescent	0.1%
Halogen incandescent	38.9%
Compact fluorescent	11%
LED	50%

Lamp Type	Representative Lumens	Watts	L/W	Installed Units (billions)	Percent	Percent	Hours/Day	Hours/Yr	kWh/year per lamp	Aggregate kWh
					All	Lamp Type				Billions
Incandescent				0.0033	0.10%					
	1490	100	14.9	0.000825	0.03%	25.0%	1.9	693.5	69.35	0.05721375
	1050	75	14	0.000726	0.02%	22.0%	1.9	693.5	52.0125	0.037761075
	750	60	12.5	0.001386	0.04%	42.0%	1.9	693.5	41.61	0.05767146
	310	40	7.75	0.000363	0.01%	11.0%	1.9	693.5	27.74	0.01006962
Halogen Incandescent				1.284	38.90%					
	1490	72	20.7	0.320925	9.73%	25.0%	1.9	693.5	49.932	16.0244271
	1050	53	19.8	0.282414	8.56%	22.0%	1.9	693.5	36.7555	10.38026778
	750	43	17.4	0.539154	16.34%	42.0%	1.9	693.5	29.8205	16.07784186
	310	29	10.7	0.141207	4.28%	11.0%	1.9	693.5	20.1115	2.839884581
CFL				0.462	14.00%					
	1600	23	69.6	0.101595403	3.08%	22.0%	2.3	839.5	19.3085	1.961654846
	1250	18	69.4	0.057080192	1.73%	12.4%	2.3	839.5	15.111	0.862538786
	825	13	63.5	0.270375993	8.19%	58.5%	2.3	839.5	10.9135	2.950748398
	520	9	57.8	0.032948411	1.00%	7.1%	2.3	839.5	7.5555	0.248941723
LED				1.55100	47.00%					
	1600	16.05	99.7	0.341070283	10.34%	22.0%	2.3	839.5	13.47241725	4.595041162
	1200	12.27	97.8	0.19162636	5.81%	12.4%	2.3	839.5	10.3006135	1.97386907
	825	8.74	94.4	0.907690833	27.51%	58.5%	2.3	839.5	7.336731992	6.659484373
	450	5.12	87.9	0.110612524	3.35%	7.1%	2.3	839.5	4.29778157	0.475388468
Total All				3.3	100.00%					65.21280405
Weighted average LPW			61.03574		100.00%					
Hypothetical 45LPW lamp	Lumen level	Wattage	LPW	Installed Units (billions)	Percent	Percent	Hours/Day	Hours/Yr	kWh/year per lamp	Aggregate kWh
	1600	35.6	45	0.825		25.0%	2.3	839.5	29.84888889	24.62533333
	1200	26.7	45	0.726		22.0%	2.3	839.5	22.38666667	16.25272
	825	18.3	45	1.386		42.0%	2.3	839.5	15.39083333	21.331695
	450	10.0	45	0.363		11.0%	2.3	839.5	8.395	3.047385
Total All				3.3		100%				65.25713333
Notes:										
Operating hours from 2014 Adoption of Light-Emitting Diodes in Common Lighting Applications (July 2015)										
As with DOE, assumes LED and CFL hours of use are the same.									**Energy Savings**	**0.044329288**
1.7 billion CFLs estimated to come out of service 2016-2020 based on USITC/Customs import data for 2008-2012 (assuming 8 yr average CFL life)										
The August 2014 DOE Report, Energy Savings Forecast of Solid-State Lighting in General Illumination Applications forecasts that by 2020 the A-line LED will represent 55% of residential, commercial, and industrial socket installations.										
LED lumen per watt figures from NOPR. All other lumen per watt figures computed after identifying common wattages.										
Representative lumens based on Internet survey of manufacturer and retail websites identifying common products										
Total installed units from DOE May 2013 Report, *Adoption of Light Emitting Diodes in Common Applications (Navigant)*										

Lamp Type	Representative Lumens	Watts	L/W	Installed Units (billions)	Percent	Percent	Hours/Day	Hours/Yr	kWh/year per lamp	Aggregate kWh
					All	Lamp Type				Billions
Incandescent				0.0033	0.10%					
	1490	100	14.9	0.000825	0.03%	25.0%	1.9	693.5	69.35	0.05721375
	1050	75	14	0.000726	0.02%	22.0%	1.9	693.5	52.0125	0.037761075
	750	60	12.5	0.001386	0.04%	42.0%	1.9	693.5	41.61	0.05767146
	310	40	7.75	0.000363	0.01%	11.0%	1.9	693.5	27.74	0.01006962
Halogen Incandescent				1.284	38.90%					
	1490	72	20.7	0.320925	9.73%	25.0%	1.9	693.5	49.932	16.0244271
	1050	53	19.8	0.282414	8.56%	22.0%	1.9	693.5	36.7555	10.38026778
	750	43	17.4	0.539154	16.34%	42.0%	1.9	693.5	29.8205	16.07784186
	310	29	10.7	0.141207	4.28%	11.0%	1.9	693.5	20.1115	2.839884581
CFL				0.363	11.00%					
	1600	23	69.6	0.07982496	2.42%	22.0%	2.3	839.5	19.3085	1.541300236
	1250	18	69.4	0.044848723	1.36%	12.4%	2.3	839.5	15.111	0.677709046
	825	13	63.5	0.21243828	6.44%	58.5%	2.3	839.5	10.9135	2.31844517
	520	9	57.8	0.025888038	0.78%	7.1%	2.3	839.5	7.5555	0.195597068
LED				1.65000	50.00%					
	1600	16.05	99.7	0.362840726	11.00%	22.0%	2.3	839.5	13.47241725	4.888341662
	1200	12.51	95.9	0.20385783	6.18%	12.4%	2.3	839.5	10.50469239	2.141463792
	825	9.14	90.3	0.965628546	29.26%	58.5%	2.3	839.5	7.669850498	7.406226583
	450	5.63	80.0	0.117672898	3.57%	7.1%	2.3	839.5	4.7221875	0.555673488
Total All				3.3	100.00%					65.20989427
Weighted average LPW			60.34847		100.00%					
Hypothetical 45LPW lamp	Lumen level	Wattage	LPW	Installed Units (billions)	Percent	Percent	Hours/Day	Hours/Yr	kWh/year per lamp	Aggregate kWh
	1600	35.6	45	0.825		25.0%	2.3	839.5	29.84888889	24.62533333
	1200	26.7	45	0.726		22.0%	2.3	839.5	22.38666667	16.25272
	825	18.3	45	1.386		42.0%	2.3	839.5	15.39083333	21.331695
	450	10.0	45	0.363		11.0%	2.3	839.5	8.395	3.047385
Total All				3.3		100%				65.25713333
Notes:										
Operating hours from 2014 Adoption of Light-Emitting Diodes in Common Lighting Applications (July 2015)										
As with DOE, assumes LED and CFL hours of use are the same.									**Energy Savings**	**0.047239068**
1.7 billion CFLs estimated to come out of service 2016-2020 based on USITC/Customs import data for 2008-2012 (assuming 8 yr average CFL life)										
The August 2014 DOE Report, Energy Savings Forecast of Solid-State Lighting in General Illumination Applications forecasts that by 2020 the A-line LED will represent 55% of residential, commercial, and industrial socket installations.										
LED lumen per watt figures from NEMA proposed equation. All other lumen per watt figures computed after identifying common wattages.										
Representative lumens based on Internet survey of manufacturer and retail websites identifying common products										
Total installed units from DOE May 2013 Report, *Adoption of Light Emitting Diodes in Common Applications (Navigant)*										

4. Section 430.2 is amended by:

a. Adding in alphabetical order the definitions of "Black light lamp," "Bug lamp," "Colored lamp," "General service light-emitting diode LED lamp," "GU24 base," "Infrared lamp," "Integrated lamp," "LED Downlight Retrofit Kit," "Light fixture," "Marine signal service lamp," "Mercury vapor lamp," "Mine service lamp," "MR lamp," "Non-integrated lamp," "Non-reflector lamp," "OLED lamp," "Pin base lamp," "Plant light lamp," "Reflector lamp," "Showcase Lamp," "Sign service lamp," "Silver bowl lamp," "Specialty lamp," "Specialty base lamp," and "Traffic signal lamp;" and

b. Revising the definitions of "covered product," "designed and marketed," and "general service lamp," and general service light-emitting diode (LED) lamp."

The additions and revisions read as follows:

§ 430.2 Definitions.

* * * * *

Black light lamp means a lamp that is designed and marketed as a black light lamp and is an ultraviolet lamp with the highest radiant power peaks in the UV-A band (315 to 400 nm) of the electromagnetic spectrum.

* * * * *

Bug lamp means a lamp that is designed and marketed as a bug lamp, has radiant power peaks above 550 nm on the electromagnetic spectrum, and has a visible yellow coating.

* * * * *

Colored lamp means a colored fluorescent lamp, a colored incandescent lamp, or a lamp designed and marketed as a colored lamp and not designed and marketed for general lighting applications with either of the following characteristics (if multiple modes of operation are possible [such as variable CCT], either of the below characteristics must be maintained throughout all modes of operation):

(1) A CRI less than 40, as determined according to the method set forth in CIE Publication 13.3 (incorporated by reference; see § 430.3); or

(2) A correlated color temperature less than 2,500 K or greater than 7,000 K as determined according to the method set forth in IES LM-66 or IES LM-79 as appropriate (incorporated by reference; see § 430.3).

* * * * *

Covered product means a consumer product:

(1) Of a type specified in section 322 of the Act, or

(2) That is a ceiling fan, ceiling fan light kit, pin-base or medium base compact fluorescent lamp, candelabra base incandescent lamp, candelabra base light emitting diode (LED) lamp, general service light emitting diode (LED) lamp, general service organic light-emitting diode (OLED) lamp, intermediate base incandescent lamp, intermediate base light emitting diode (LED) lamp, rough service incandescent lamp, vibration service incandescent lamp, multifaceted reflector lamp, B-Shape incandescent lamp, BA-shape incandescent lamp,

CA-shape incandescent lamp, F-shape incandescent lamp, M14-shape incandescent lamp, S-shape incandescent lamp, T-shape incandescent lamps, three-way light emitting diode (LED) lamp dehumidifier, battery charger, or external power supply.

Designed and marketed means that the product is specifically designed to fulfill the indicated application and, when distributed in commerce, is designated and marketed for the intended application, with the designation on the packaging and all publicly available documents (*e.g.*, product literature, catalogs, and packaging labels) indicating the intended application. This definition is applicable to terms related to the following covered lighting products: Fluorescent lamp ballasts; fluorescent lamps; general service fluorescent lamps; general service incandescent lamps; general service lamps; incandescent lamps; incandescent reflector lamps; medium base compact fluorescent lamps; and specialty application mercury vapor lamp ballasts.

* * * * *

General service lamp means a lamp that has an ANSI base, but is not a specialty base lamp, ~~operates at any voltage~~ has a rated voltage from 110 to 130 volts or has a rated voltage from 11 to 13 volts, has an initial lumen output of 310 lumens or greater (or 232 lumens or greater for modified spectrum general service incandescent lamps) and an initial lumen output of 2600 lumens or less, is not a light fixture, is not a specialty lamp, is not an incandescent reflector lamp or a general service fluorescent lamp, and is used ~~in general~~ to satisfy a majority of lighting applications. General service lamps include, but are not limited to, general service incandescent lamps, compact fluorescent lamps, general service light-emitting diode lamps, general service organic light emitting diode lamps, and reflector lamps (that are not a specialty base lamp, specialty lamp, or incandescent reflector lamp). ~~, but do not include general service fluorescent lamps; incandescent reflector lamps; mercury vapor lamps; appliance lamps; black light lamps; bug lamps; colored lamps; infrared lamps; traffic signal lamps; and medium screw base incandescent lamps that are left-hand thread lamps, marine lamps, reflector lamps, rough service lamps, shatter-resistant lamps (including a shatter-proof lamp and a shatter-protected lamp), silver bowl lamps, showcase lamps, 3-way incandescent lamps, vibration service lamps, G-shape lamps as defined in ANSI C78.20 (incorporated by reference; see §430.3) and ANSI C79.1-2002 (incorporated by reference; see §430.3) with a diameter of 5 inches or more; T-shape lamps as defined in ANSI C78.20 (incorporated by reference; see §430.3) and ANSI C79.1-2002 (incorporated by reference; see §430.3) and that use not more than 40 watts or have a length of more than 10 inches; and B, BA, CA, F, G16-1/2, G-25, G30, S, or M-14 lamps as defined in ANSI C79.1-2002 (incorporated by reference; see §430.3) and ANSI C78.20 (incorporated by reference; see §430.3) of 40 watts or less.~~

General service light-emitting diode (LED) lamp means an integrated or non-integrated LED lamp designed for use in ~~general~~ a majority of lighting applications and is not a specialty lamp or a specialty base lamp (as defined in § 430.2) and that uses light-emitting diodes as the primary source of light. It includes lamps marketed as vibration service, vibration resistant, or rough service lamp.

* * * * *

GU24 base means the GU24 base standardized in ANSI C81.61 (incorporated by reference; see §430.3).

* * * * *

Infrared lamp means a lamp that is designed and marketed as an infrared lamp, has its highest radiant power peaks in the infrared region of the electromagnetic spectrum (770 nm to 1 mm), and which has a primary purpose of providing heat.

Integrated lamp means a lamp that contains all components necessary for the starting and stable operation of the lamp, does not include any replaceable or interchangeable parts, and is connected directly to a branch circuit through an ANSI base and corresponding ANSI standard lamp-holder (socket).

* * * * *

LED Downlight Retrofit Kit means a product intended to install into an existing downlight, replacing the existing light source and related electrical components, typically employing an ANSI standard lamp base, either integrated or connected to the downlight retrofit by wire leads, and is a retrofit kit classified or certified to UL 1598C (incorporated by reference; see § 430.3). LED downlight retrofit kit does not include integrated lamps or non-integrated lamps.

* * * * *

Light fixture means a complete lighting unit consisting of light source(s) and ballast(s) (when applicable) together with the parts designed to distribute the light, to position and protect the light source, and to connect the light source(s) to the power supply.

* * * * *

Marine signal service lamp means a lamp that is designed and marketed for marine signal service applications.

* * * * *

Mercury vapor lamp means a high intensity discharge lamp, including clear, phosphor-coated, and self-ballasted screw base lamps, in which the major portion of the light is produced by radiation from mercury typically operating at a partial vapor pressure in excess of 100,000 pascal (approximately 1 atmosphere).

* * * * *

Mine service lamp means a lamp that is designed and marketed for mine service applications.

* * * * *

MR lamp means a curved focusing reflectorized bulb which may have a multifaceted inner surface that is generally dichroic coated and referred to as a multifaceted reflector lamp with a GU10, GU11, GU5.3, GUX5.3, GU8, GU4, or E26 base. It is commonly used with a tungsten halogen light source or an LED light source and may be either open faced or sealed together with a glass lens. The lens, if any, may be either plain or configured. For LED or other technology: A curved focusing bulb following the same general outline shape as the halogen MR. MR lamp designations are based on the diameter of the lamp measured in eights of an inch: general service MR lamps designated as MR20 (20/8” diameter), MR16 (16/8” diameter), MR14 (14/8” diameter) and MR11 (11/8” diameter) and specialty MR lamps designated as MR8 (8/8” diameter).

Non-integrated lamp means a lamp that is not an integrated lamp.

Non-reflector lamp means a lamp that is not a reflector lamp.

* * * * *

OLED lamp means an integrated or non-integrated lamp designed for use in general lighting applications that uses OLEDs as the primary source of light.

* * * * *

Pin base lamp means a base type designated as a single pin base or multiple pin base system in Table 1 of ANSI C81.61, Specifications for Electrics Bases (incorporated by reference; see § 430.3).

* * * * *

Plant light lamp means a lamp that is designed to promote plant growth by emitting its highest radiant power peaks in the regions of the electromagnetic spectrum that promote photosynthesis: Blue (440 nm to 490 nm) and/or red (620 to 740 nm). Plant light lamps must be designed and marketed for plant growing applications.

* * * * *

Reflector lamp means a lamp that has an R, PAR, BPAR, BR, ER, MR, or similar bulb shape as defined in ANSI C78.20 (incorporated by reference; see § 430.3) and ANSI C79.1-2002 (incorporated by reference; see § 430.3) and is used to direct light.

* * * * *

Showcase lamp means a lamp that has a T-shape as specified in ANSI C78.20 (incorporated by reference; see § 430.3) and ANSI C79.1-2002 (incorporated by reference; see § 430.3), is designed and marketed as a showcase lamp, and has a maximum rated wattage of 75 watts.

* * * * *

Sign service lamp means a vacuum type or gas-filled lamp that has sufficiently low bulb temperature to permit exposed outdoor use on high-speed flashing circuits, is designed and marketed as a sign service lamp, and has a maximum rated wattage 15 watts.

Silver bowl lamp means a lamp that has a reflective coating applied directly to part of the bulb surface that reflects light toward the lamp base and that is designed and marketed as a silver bowl lamp.

* * * * *

Specialty lamp means a lamp that is designed for and used in special applications and is an appliance lamp, black light lamp, bug lamp, colored lamp, infrared lamp, left-hand thread lamp, marine lamp, marine signal lamp, mine service lamp, plant light lamp, rough service incandescent lamp, shatter-resistant lamp (including a shatter-proof lamp and a shatter-protected lamp), showcase lamp, sign service lamp, silver bowl lamp, 3-way incandescent lamps, traffic signal lamp, vibration service incandescent lamp, G shape lamp as defined in ANSI C78.20 (incorporated by reference, see §430.3) and ANSI C79.1-2002 (incorporated by reference, see §430.3) with a diameter of 5 inches or more, T shape lamp as defined in ANSI C78.20 (incorporated by reference, see §430.3) and ANSI C79.1-2002 (incorporated by reference, see §430.3) and that use not more than 40 watts or have a length of more than 10 inches, or B, BA, CA, F, G16-1/2, G-25, G30, S, or M-14 shape lamps as defined in ANSI C79.1-2002 (incorporated by reference, see §430.3) and ANSI C78.20 (incorporated by reference, see §430.3) of 40 watts or less, or MR lamp designated MR8.

Specialty base lamp means a lamp with an intermediate base, candelabra base (E12), mini-candelabra base (E11), bayonet base, double ended base, screw terminal base, medium side prong base; or mogul prong base, recessed single contact, mogul screw, mogul bi-post, G53, Double Contact Prefocus, 2-Pin GY6.35, 2-Pin G8, 2-Pin G9 and 2-pin G4 when used on non-reflector lamps.

Traffic signal lamp means a lamp that is designed and marketed for traffic signal applications.

* * * * *

Vibration service lamp means a lamp that --

(1) Has filament configurations that are C-5, C-7A, or C-9, as listed in Figure 6-12 of the IESNA Lighting Handbook (incorporated by reference; see § 430.3) or similar configurations;

~~(2) Has a maximum wattage of 60 watts;~~

~~(3) Is sold at retail in packages of 2 lamps or less;~~ and

(42) Is designated and marketed specifically for vibration service or vibration-resistant applications, with --

(i) The designation appearing on the lamp packaging; and

(ii) Marketing materials that identify the lamp as being vibration service only.

5. Section 430.3 is amended by adding paragraph (u)(4) to read as follows:

§ 430.3 Materials incorporated by reference.
* * * * *
(u) * * *

(4) UL 1598C-2014 ("UL 1598C"), Standard for Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits, First Edition, dated January 16, 2014, IBR approved for § 430.2.

6. Section 430.32 is amended by ~~removing and reserving paragraphs (u) and (x), and~~ adding paragraph (z) to read as follows:

§ 430.32 Energy and water conservation standards and their compliance dates.

* * * * *

(z) ~~General service~~ Lamps.

(1) Energy conservation standards for ~~general service~~ incandescent lamps:

(A) General service incandescent lamps shall have a rated wattage within the rated lumen ranges no greater than the values shown in 10 CFR 430.32(x)(1).

(B) Incandescent reflector lamps shall meet or exceed the efficacy standards shown in 10 CFR 430.32(n)(5)-(6).

(C) MR incandescent lamps (designated MR11, MR14, MR16, and MR20) shall not exceed 50 rated watts.

(D) Specialty incandescent lamps

(i) Each candelabra base incandescent lamp shall not have a wattage greater than that wattage specified in 10 CFR 430.32(x)(2).

(ii) Each intermediate base incandescent lamp shall not have a wattage greater than that wattage specified in 10 CFR 430.32(x)(3).

(iii) Each vibration service incandescent lamp manufactured on or after April 7, 2017 shall

(I) have a maximum wattage of 40 watts; and
(II) shall be sold at retail only in a package containing one lamp.]

(iv) Each rough service incandescent lamp manufactured on or after January 1, 2018 shall

(III) have a shatter-proof coating or equivalent technology that is compliant with NSF/ANSI 51 and is designed to contain the glass if the glass envelope of the lamp is broken and to provide effective containment over the life of the lamp;

(IV) have a maximum wattage of 40-watts; and
(V) be sold at retail only in a package containing one lamp.

(v) Each B, BA, CA, F, G16-1/2, G-25, G30, S, M-14 shape incandescent lamp, as defined in ANSI C79.1-2002, or T shape incandescent lamp, as defined in ANSI C78.20, shall not exceed 40 rated watts.

(2) Compact fluorescent lamps

(A) A bare or covered (no reflector) medium base compact fluorescent lamp must meet or exceed the requirements of 10 CFR 430.32(u).

(B) A non-integrated (no-reflector) compact fluorescent lamp must have a minimum efficacy of 45 lumens per watt.

(3) Light-emitting diode lamps

(A) General service light-emitting diode lamps. Each general service light-emitting diode lamp manufactured on or after [DATE 3 YEARS AFTER Federal Register OF FINAL RULE] that:

(1) Is an integrated, non-reflector lamp with a medium screw base and an initial lumen output between 310 and 2,600 lumens; or

(2) Is an integrated or non-integrated non-reflector lamp with a GU24 base and an initial lumen output between 310 and 2,600 lumens; shall have:

(i) A power factor greater than or equal to 0.7 for integrated LED lamps (as defined in §430.2) and 0.5 for integrated compact fluorescent lamps (as defined in appendix W of subpart B); and

(ii) A lamp efficacy greater than or equal to the values shown in the table in this paragraph:

Lumen package (lumens)	Standby mode operation	Minimum lamp efficacy (lm/w)
310 </= Initial Lumen Output < 2,000	No standby mode	124 / (1+0.33 *(Lumens/1000) ^ -0.64)
310 </= Initial Lumen Output < 2,000	Capable of operating in standby mode	116.6 / (1+0.33*(Lumens/1000)^-0.64)
2,000 </= Initial Lumen Output </= 2600	No standby mode	73.4 – 29.42*0.9983^Initial Lumen Output
2,000 </= Initial Lumen Output </= 2600	Capable of operating in standby mode	70.5 – 29.42*0.9983^Initial Lumen Output

or

(3) Is an MR lamp shall have a maximum wattage of 15 watts.

(B) Light-emitting diode specialty lamps. Effective beginning January 1, 2020, each of the following light-emitting diode specialty lamp shall meet or exceed the following energy conservation standards:

(1) Three-way light-emitting diode lamp shall have a lamp efficacy greater than or equal to the values shown in paragraph (A)(2)(ii).

(2) Candelabra-base light-emitting diode lamps shall not exceed 10 rated watts.

(3) Intermediate-base light-emitting diode lamps shall not exceed 10 rated watts.

~~(2) Other standards for general service lamps:~~

~~(3) ***~~