



**Testimony of Steven Nadel,  
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**Before the Senate Energy Committee**

**Hearing on:  
Energy Efficient Lighting for a Brighter Tomorrow Act (S. 2017)**

**September 12, 2007**

## Summary

This testimony is presented on behalf of a coalition of energy efficiency advocacy organizations. We believe that S. 2017 is a huge step in the right direction for improving the efficient use of energy in the United States. The version of the bill as introduced is a substantial improvement over earlier drafts, particularly in how it sets a floor for the DOE rulemaking that will set a revised standard that takes effect in 2020. We think it is vitally important to set such a floor so that large savings are ensured (nearly half the savings are from the second stage standard) and so that manufacturers have ample time to prepare for the product changes that will be needed to meet this new standard.

While there are many provisions we like in the bill, we also think it can and should be improved in order to:

1. Expand coverage of the bill to additional lamp types and take other steps that are needed to plug loopholes that would allow low-efficiency exempted products to be sold in place of the higher efficiency products called for by the bill. If these loopholes are not addressed, much of the savings projected for the bill could evaporate.
2. Include lumen per Watt requirements and/or adjust lumen output bins in order to reduce the likelihood that lamps with low light output will be sold that consumers think are too dim. If consumers find that lamps are too dim, some of them will switch to higher wattage lamps, eliminating significant energy savings.
3. Modify the preemption of state standard provisions in order to protect states that have adopted or are in the process of adopting state standards on general service incandescent lamps.
4. Make a variety of technical changes so that intent is not misunderstood and implementation can proceed in a logical fashion.
5. Consider a new section on fluorescent tube efficiency standards based on discussions between ACEEE and lamp manufacturers. This new provision would update standards set by Congress in the Energy Policy Act of 1992.

With our recommended changes we estimate that this bill will, by 2030, reduce annual electricity use by nearly 200 billion kWh, reduce peak demand by 31,000 MW (equivalent to capacity of more than 100 power plants of 300 MW each) and reduce consumer and business energy bills by about \$18 billion per year. These are very large savings. In addition, these provisions will reduce greenhouse gas emissions by nearly 40 million metric tonnes, adding to the substantial savings in the Senate-passed energy bill and making a useful downpayment in efforts to address global warming. We urge you to include these improved provisions in an energy bill reported out of this Committee and the upcoming House-Senate energy bill conference.

## Introduction

My name is Steven Nadel and I am the Executive Director of the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit organization dedicated to increasing energy efficiency as a means of promoting both economic prosperity and environmental protection. I am here today representing a coalition of energy efficiency organizations that has been working together on lamp standard issues for many months. In addition to ACEEE, other members of this coalition are the Alliance to Save Energy, Appliance Standards Awareness Project, Earth Day Network, Natural Resources Defense Council, and Southwest Energy Efficiency Project. Our coalition thanks you for the opportunity to testify today.

S. 2017 is an important step forward in efforts to secure large energy savings and greenhouse gas reductions by reducing the energy now used by general service incandescent lamps and also metal halide lighting fixtures. The provisions on consumer education will also be very useful as are the sections on research and development and mercury use. We thank Senators Bingaman and Stevens for introducing this bill and moving the discussion forward on how best to regulate lighting products to produce energy savings in a way that provides consumers with the light and amenities they need and that is workable for manufacturers.

In my testimony here today I will discuss each of the bill's sections in turn—what we like about this bill and how it can be improved. I will also recommend that a new section be added to adopt updated standards on fluorescent tubes, based on discussions between ACEEE and the National Electrical Manufacturers Association (NEMA).

## General Service Incandescent Lamps

General service incandescent lamps are a very important target for energy savings. According to a recent study commissioned by the U.S. Department of Energy (DOE), there are approximately 4 billion general incandescent lamps in use in the U.S. that consume approximately 286 billion kWh of electricity annually. At the current national average electricity price of about 9 cents per kWh, this means consumers and businesses are paying more than \$25 billion per year to operate general service incandescent lamps. Of this energy use, 58% is in the residential sector, making these standards particularly important to individual consumers.<sup>1</sup>

S. 2017 will save energy from general service incandescent lamps in several stages. In the first stage, effective 2012-2014, it will phase out the most common types of incandescent lamps in favor of products that use about 25-30% less energy (e.g., a 60 Watt bulb will be replaced with a bulb using 43 Watts or less). In addition, because these 43 Watt bulbs likely will cost somewhat more than today's 60 Watt bulbs, many consumers will choose to purchase a compact fluorescent lamp (CFL), saving additional energy (e.g., one using about 15 Watts instead of 43 Watts) at little additional cost. In the second stage, the bill requires the DOE to set a new standard, but provides an important backstop by requiring that the new standard save at least as much energy as a standard that would require 45 lumens of light output per Watt of energy input. Using the

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<sup>1</sup> Navigant Consulting, 2002, *U.S. Lighting Market Characterization, Volume 1: National Lighting Inventory and Energy Consumption Estimate*. Washington, DC: Office of Energy Efficiency and Renewable Energy, USDOE.

same example of a current 60 Watt bulb, this means that in stage 2, energy use will be reduced to about 20 Watts, more than doubling the energy savings from the first stage. The bill also calls for a third stage, with the standard to be set by DOE.

Our coalition believes this bill is a huge step in the right direction for improving the efficient use of energy in the United States. However, we also think it can and should be improved, primarily by plugging potential loopholes in the bill that would allow low-efficiency exempted products to be sold in place of the higher efficiency products called for by the bill. In addition, we think that refinements are needed to reduce the likelihood that lamps with low light output will be sold that consumers think are too dim and to protect states that have adopted or are in the process of adopting state standards on general service lamps. Later in my testimony I elaborate on these points, as well as several recommended technical corrections.

As most of you probably know, the energy bill recently adopted by the House of Representatives includes a section on general service incandescent lamp standards authored by Representatives Jane Harman and Fred Upton. This provision is broadly similar to S. 2017 in that it requires efficiency improvements to these lamps in two stages with effects similar to the first two stages in S. 2017. However, there are quite a few differences in the details of these bills, some of which are important.

For example, S. 2017 was drafted to fit into existing appliance and equipment standards law while the House bill is a stand-alone section. We support the S. 2017 approach since it takes advantage of the many important implementation details now in current law. We also like the fact that S. 2017 includes phase 1 standards based on maximum power (watts) for each range of light output (lumens) that is comparable to today's incandescent lamps. By contrast, the House bill used a lumens-per-watt approach that, unless Watt caps are also added, could allow improved efficiency to be translated into more light (i.e., higher-output lamps) rather than lamps that use less electricity while providing about the same amount of light. On the other hand, there are several provisions in the House bill that are superior and should be incorporated in S. 2017 as I discuss later in my testimony.

ACEEE, with help from the Alliance to Save Energy, has estimated that the House general service incandescent lamp standard provision will reduce U.S. electricity use by about 81 billion kWh in 2020, peak electric demand by nearly 10,000 MW (the capacity of 33 power plants of 300 MW each), and greenhouse gas emissions by 16 million metric tonnes of carbon. By 2030, due to the stage two standards in the bill, these annual savings increase to 143 billion kWh, 17,500 MW of peak power (the capacity of 58 power plants), and 28.5 million metric tonnes of carbon. At 9 cents per kWh, annual energy bill savings from these standards will be about \$7 billion from stage 1 and \$13 billion from stage 2.

By comparison, our estimate is that S. 2017 will save a little more energy in 2020 and a little less in 2030 than the House bill. Savings in 2020 are higher since S. 2017 includes watt limits on intermediate and candelabra base lamps and also includes wattage caps on all lamps (these items are not in the House bill). Savings are lower in 2030 since the guaranteed second stage standard is stronger in the House bill. Specifically, our estimates of savings from S. 2017 are as follows:

- In 2020, annual energy savings of 85 billion kWh (reducing bills by \$7.7 billion) and peak demand reductions of 10,500 MW (the capacity of 35 power plants of 300 MW each). Greenhouse gas reductions of 17 million metric tonnes of carbon.
- In 2030, annual energy savings of 139 billion kWh (reducing bills by \$12.6 billion) and peak demand reductions of 11,600 MW (the capacity of 38½ power plants of 300 MW each). Greenhouse gas reductions of 27.8 million metric tonnes of carbon.

Our estimates of savings from both bills are highly approximate as they depend on judgments on the second stage standard to be set by DOE (our estimate assumes the minimum) and how widely manufacturers and importers exploit loopholes that differ between the bills.

*To assure these savings, it is absolutely critical that final legislation close the easy-to-exploit loopholes that would allow circumvention of the intended standards.*

Turning now to some of the details of S. 2017, our comments fall into five categories:

1. The second stage standard (which takes effect 2020)
2. Closing potential loopholes
3. Discouraging dim lamps
4. Preemption of state standards
5. Additional technical issues

## **Second Stage Standard**

Our coalition strongly supports having a guaranteed second stage standard in the bill. S. 2017 takes a smart approach by calling for a DOE rulemaking but providing a backstop standard in case DOE either does not complete the rule in time or the DOE standard fails to achieve the same energy savings as a 45 lumen per Watt standard. Effectively, this provision puts a floor on the DOE rulemaking, based on current known products (e.g., CFLs) and products that are expected to achieve these efficiency levels well before 2020 (e.g., light emitting diodes, or LEDs).<sup>2</sup>

As this committee knows, DOE has missed all of its Congressionally-set deadlines for new efficiency standards since 1990, so it is important to have a clear and achievable minimum standard in place if DOE does not act in time. Most of the new standards set by Congress in the Energy Policy Act of 2005 and in energy bills passed by the House and Senate in 2007 either contain such a backstop provision or allow states to set standards if DOE misses its deadlines. Also, in the case of new lamp standards, in order to achieve the large energy savings that can clearly be achieved with stage two, major product changes will be needed. The provision to create a floor for the stage 2 standard provides a clear direction to manufacturers to work on

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<sup>2</sup> Other promising technologies are also in development such as ceramic filaments, selective emitters, and photonic lattices. See Calwell, Chris, Jan. 25, 2005, "Technical Basis for General Service Incandescent Lamp Standards in California." Power Point presentation available from Ecos Consulting, Durango, CO. Additional options are provided by more efficient fill gases (used today but use could expand) and low voltage input (planned for some European products).

developing a full array of products that can meet this floor by 2020. In other words, manufacturers have 13 years to prepare for the new standard.

Without such clear direction, manufacturers could argue during a 2014-2017 rulemaking that they are not ready for a strong standard and either the standard needs to be weakened or they need many more years to prepare, delaying the effective date of the new standard. These savings are substantial—*ACEEE estimates that nearly half of the annual energy and carbon reductions in 2030 from the general service incandescent lamp standard in S. 2017 are due to the stage 2 standard.*

*The costs of any delay in stage 2 implementation would be enormous. Unlike many other products, lamps last a few months to a few years. As a result, the total effect in reduced electricity demand and emissions reductions from a new standard is attained soon after implementation.*

Our coalition also notes that while we support the approach in S. 2017, we are also comfortable with the approach in the House bill that sets a similar stage 2 standard, but without the DOE rulemaking. (Some of our coalition prefer the House approach.)

While we strongly support the stage 2 lamp standard provision in S. 2017, we also think it should be refined in a few ways:

1. The wording on p. 18 (lines 10-16) is ambiguous and should be clarified in order to make clear that the backstop standard goes into effect if DOE either misses the deadline or sets a standard that results in less energy savings than a 45 lumen per Watt standard. We suggest specific rewording in the appendix to my testimony.
2. The backup standard of 300% of the efficacy of a 100 Watt lamp (p. 18, line 19-23) is imprecise, because there are many types of 100 Watt lamps. The most common 100 Watt lamps on the market today are about 17 lumens per Watt. To eliminate ambiguity, we recommend that 50 lumens per Watt (rounding 300% of 17 lumens per watt) be the backstop standard. This would save a lot of work to interpret this provision and help avoid the prospect of controversy, potential delays, and litigation.
3. The bill calls for the Secretary to formally set the backstop standard (p. 18, lines 17-23), even if the backstop goes into effect because of DOE inaction. If a specific backstop standard is set as we recommend above, then Congress can and should just set the backstop standard instead of requiring DOE action.
4. The bill makes clear that DOE, in the stage 2 rulemaking, should not limit consideration of new standards to just those achievable by incandescent technology (p. 17, lines 9-10). We think it would be useful to further clarify that if other provisions of the law are met (including the provision to not reduce consumer utility), it is possible that the new standard will be met only by technologies that are not incandescent. We are not saying such an event is likely, but instead saying that the legislation should be clear about

permitting such an event if justified. We suggest specific legislative language in the appendix to this testimony.

5. In discussing the DOE stages 2 and 3 rulemakings, the bill uses the term "more stringent maximum wattage than the standards specified [for stage one]" (p. 17, lines 1-4) and page 19, lines 5-10). We think DOE should have more flexibility to consider other metrics such as lumens per Watt, especially since the default standard is specified in lumens per Watt. More agency flexibility could enable DOE to better meet the underlying legal criteria of economic justification and technical feasibility and may be useful for harmonizing with international standards. To allow such consideration, the words "maximum wattage than the" should be deleted. Alternatively, a period could be added after "amended" in line 1 on page 17 and the rest of the paragraph through the end of line 4 struck.

### **Closing Potential Loopholes**

Past history shows that when Congress sets lamp standards, creative manufacturers (not necessarily large companies or even companies in the market today) can often find ways to legally evade the law by exploiting loopholes. Typically a small manufacturer takes the first step to exploit a loophole and evade Congressional intent, and then larger manufacturers produce similar "loophole products" in order to be competitive.

For example, in the Energy Policy Act of 1992, a small niche product known as "BR" lamps (BR for "bulged reflector") were exempted because they were an obscure niche product. However, after enactment, the inefficient BR lamp became the dominant reflector lamp for the residential market, increasing from niche status to more than 50% of sales. This loophole is finally being narrowed in the incandescent reflector lamp provision of the 2007 House and Senate energy bills.

Likewise, the Energy Policy Act of 2005 required ceiling fan light kits to use CFLs, but provided an exception for lamps that do not use medium-screw bases (the common ~1 inch diameter screw base). Since this legislation, intermediate base incandescent lamps (~1/2 inch in diameter) have become prevalent in ceiling fan light kits and use of candelabra bases (~1/4 in diameter) has also increased, defeating the intent of the law, which was to ensure use of more efficient CFLs rather than inefficient incandescent lamps in ceiling fans.

Given this history, this new legislation should be especially vigilant for potential loopholes. S. 2017 takes important steps in this regard, including identifying likely loopholes such as vibration service, rough service, and shatter-proof lamps and calling for monitoring of sales of these lamps and a procedure to close these loopholes if sales of these exempt products double from baseline levels. However, much more is needed to prevent loopholes. Below we identify a number of potential loopholes and suggest ways to fix these.

**New lamp shapes and bases:** The bill lists specific lamp shapes that are regulated or their "equivalent" (p. 4, lines 14-18). "Equivalent" can be a very specific term and this appears to us to allow manufacturers to develop new shapes that are similar to but not equivalent to current shapes in order to get around the law. We strongly recommend changing the bill language to

cover all screw base lamps, and then adding to the list of exemptions as needed—for example, exempting T and G40 lamps as well as exempting B, BA, CA, F, G16½, and S lamps less than or equal to 40 Watts. Significantly, if all bases are covered, there is no incentive for some manufacturer to develop a new base.

At a minimum, the phrase "equivalent" should be changed to "similar" and this section moved to after the reference to the ANSI standard, since our understanding is that ANSI does not define either "equivalent" or "similar."

We should note that the House bill also has the same loophole problems. Representative Harman's staff have told us they are supportive of efforts to address this problem.

**Petitions for extended coverage:** If the Senate elects to stick with the narrowly defined approach to coverage in the current bill, we recommend that the provision allowing for extension of coverage on page 14 be clarified. Currently, the language allows for petitions seeking extension of coverage to those products "excluded" from the definition. The bill explicitly defines nineteen "exclusions." However, the bill also implicitly excludes dozens of other lamp types, shapes and bases (some of which are not yet even invented) but which could become common for general service lighting. The law should make crystal clear that petitions to close loopholes may apply to both explicitly and implicitly exempted products. We suggest language in the appendix to the testimony.

Also, the procedure for interested parties to expand coverage to new lamp classes (p. 15, lines 1-10) provides too high a burden on petitioners. We recommend that line 5 be amended to insert "availability and/or" in front of "sales." It is hard for petitioners outside of lamp companies to have sales data; data on lamp availability can be more readily collected. Likewise, on line 9, insert "likely" in front of "being." Without doing an expensive field survey, it cannot be determined if a specific type of lamp is widely being used. Addition of the word "likely" or "probably" allows for reasonable judgments to be made without definitive evidence. This provision only initiates a longer process during which additional data can be collected before decisions are made.

**G (globe) and P lamps:** G lamps are round lamps, which are becoming more popular. While large lamps of this type (such as G40 lamps, which are 5 inches in diameter) cannot be used in the most common lighting fixtures, smaller lamps such as G25 and G30 (between 3 and 4 inches in diameter) often can. Likewise, P lamps (pear?) can also be used in many general lighting fixtures. The change suggested in the paragraph above will address these problems. But if the Senate elects not to make this change, these lamps should be added to the coverage of this standard so they don't become loopholes. At an absolute minimum, these lamps should be added to the sales monitoring section of the legislation and if sales double relative to the baseline, then these lamps should be subject to the same standards as their A-shaped cousins.

**B, BA, CA, F, G16½, and S lamps over 40 Watts:** These are different types of decorative lamps that are generally 40 Watts or less, but for most of these products, 60 W lamps are also sold. But 60 Watts is the most common incandescent lamp size and if 60 Watt lamps of these types are allowed, we would expect sales of these lamps to grow dramatically, thus undercutting



a significant fraction of the energy savings expected from phase 1 standards. To address this problem, we strongly recommend that these lamps be limited to no more than 40 Watts, the same as for intermediate base lamps.

**Candelabra bases:** As noted above, candelabra bases are becoming more common in ceiling fan light kits in order to get around the new standard set in the Energy Policy Act of 2005. If new standards go into effect for many of the more common lamps, we expect candelabra bases to become even more common. S. 2017 attempts to address this problem by imposing a 60 W cap on candelabra bases (p. 13, line 12). But, as discussed above, 60 Watts is the most common incandescent lamp size and if 60 Watt candelabra bases are allowed, we would expect sales of these lamps to increase substantially, undercutting the standard. To address this problem, we recommend that these lamps be limited to no more than 40 Watts, the same as for intermediate bases. Candelabra lamps are historically designed for decorative purposes, usually in multi-socket fixtures, and often with dimming controls, where the extra light output of a 60 Watt lamp is not needed.

**Rough, vibration, etc. service:** As discussed above, S. 2017 requires DOE to monitor the sales of rough and vibration service, and shatter-resistant lamps. These lamps are virtually the same shape as conventional lamps and can be used in virtually all conventional lamp sockets. To help keep sales of these lamps from exploding, we recommend that the bill direct that these lamps be exempted from the standards only if sold at retail in single-lamp packages. Wholesale sales can still be in bulk, but retail sales should be restricted. We have already seen 10-packs of low-cost vibration service lamps for sale in California in order to get around California's incandescent lamp standards. Single-lamp packaging (or at most, two-lamp packaging) will keep that from happening nationally. The House bill includes a requirement for single-lamp packaging of these lamps. The Senate bill should adopt this same provision. S. 2017 includes single-lamp packaging as part of the backstop standard for these lamps, but by the time the backstop standard is imposed, significant energy savings will be lost. It is better to close this door before the horse leaves the barn.

As noted above, S. 2017 calls for an accelerated DOE rulemaking if the sales of any of these lamps double relative to the baseline and provides a backup standard if DOE does not complete the rulemaking within one year. The House bill automatically imposes the backup standard without a rulemaking, thereby imposing the backstop standard sooner and also saving rulemaking resources for more important matters. We recommend that the Senate adopt the House approach and drop the rulemaking requirement.

### **Discouraging Dim Lamps**

S. 2017 sets minimum lamp wattages for different lumen bins. The bins are meant to be equivalent to conventional 40, 60, 75 and 100 Watt lamps, but some of the bins are broad enough that lamps 14% dimmer than today's most common lamps can be sold. The approach in S. 2017 encourages production of dimmer lamps by implicitly reducing the efficacy (lumens per watt) requirement as light output declines with each lumen bin. As lamps get dimmer, some consumers may be dissatisfied and move up to a higher lumen class, eroding much of the savings achieved. To address this potential problem, the bill would include both wattage caps and lumen per Watt

floors in order to keep lamps from being too dim or too bright. We recommend adding the following lumen per watt (LPW) minimums within the various lumen bins of the tier one incandescent lamp standards in the table on p. 11 of the bill: 1490-2600 lumens: 22.5 LPW, 1050-1489 lumens: 22 LPW, 730-1049 lumens: 20 LPW, 310-729 lumens: 17 LPW.

But if this step is not taken, at a minimum, we recommend revising several of the lumen classes in order to limit the bottom of the class to only 10% dimmer than today's most common bulbs. Specifically, we recommend that the 60 Watt equivalent class be 750-1049 lumens (not the 730-1009 lumens now in the bill) and that the adjoining classes be adjusted so that the next lower class ends at 749 lumens and the next higher one starts at 1050 lumens (this change should be made in the table on p. 11).<sup>3</sup> A similar change should be made to the lumen ranges for modified spectrum lamps (for the table on top of p. 12).

Also, regarding the standards for modified spectrum lamps (on top of p. 12), these modified spectrum lamps will be considerably dimmer than the conventional lamps they replace. The lumen ranges in S. 2017 for modified spectrum lamps are 25% lower than for standard lamps. Given recent technical developments announced by the major manufacturer of modified spectrum lamps,<sup>4</sup> we believe that lower lumen levels are not needed, but if lumen levels are relaxed for modified spectrum lamps, they should be dropped no more than 15%.

### **Preemption of State Standards**

S. 2017 preempts state lamp standards with one limited exception—states with standards that precede the legislation (currently California and Nevada) are allowed to enforce their standards until the federal legislation takes effect (p. 34, lines 16-24). We support the ability of states to enforce their existing standards, but believe that the preemption language overall is an unacceptable infringement on states' rights. What is most troubling is that a strong Nevada standard now part of state law will be replaced by a weaker federal standard when the initial federal standards in S. 2017 take effect. To our knowledge, in the 20 years of federal standards legislation, Congress has never done this before. In the past, stronger state standards have been grandfathered and preemption does not apply to them. We recommend that this approach be taken here and the Nevada standard (and any other state standards on general service incandescent lamps adopted prior to the enactment of federal standards) be grandfathered.

In addition, California has begun a proceeding to revise its incandescent lamps efficiency standards and would like to continue this rulemaking without preemption so that they may meet the requirements of existing and pending state laws. California is submitting detailed comments to the Committee on this issue. We support California's ability to complete their current rulemaking and move up the effective dates of the different federal standards, if such action is taken by appropriate authorities in the state.

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<sup>3</sup> A soft white 60 W lamp is typically 840 lumens; 10% lower is 756 lumens. A soft white 75 W lamp is typically 1180 lumens; 10% lower is 1062 lumens. We have rounded to the nearest 50 lumens.

<sup>4</sup> "GE Announces Advancement in Incandescent Technology; New High-Efficiency Lamps Targeted for Market by 2010." Press release issued Feb. 23, 2007.

<http://www.genewscenter.com/Content/Detail.asp?ReleaseID=1260&NewsAreaID=2&MenuSearchCategoryID=7>.

## **Additional Technical Issues**

We have a few other technical corrections to suggest as follows.

1. General service lamps are defined (p. 4, lines 9-10) to be 200-3000 lumens, but the standard in the legislation only covers lamps of 310-2600 lumens. The coverage should be modified to be the same as the specific standards so as not to leave 200-310 and 2600-3000 lumen lamps in a state of limbo.
2. The definition (p. 4, lines 11-13) includes lamps with "a voltage range at least partially within 110 to 130 volts." It is unclear whether lamps that may be advertised as "rated for 140 volts," but that will operate at 110-130 volts, are covered by the standards. They should be covered, to avoid yet another potentially serious loophole. We recommend this sentence be changed to read "is capable of operating at a voltage at least partially within the range of 110-130 volts." We believe this is the intent of the provision. The same change should be made in Section 105 on page 35, lines 22-23. Our understanding is that the major lamp manufacturers agree with this recommendation.
3. The provision on 150 Watt lamps (p. 27, line 4 through p. 28, line 15) should be specified in terms of a lumen range (e.g., 2601-3300 lumens) and not as a specific wattage. As currently written, sales of 149 or 151 Watt lamps, for example, would not be tracked and could become a loophole. Specifically, the words "150-Watt" should be replaced with "2,601–3,300 lumens" each place it appears in this section (p. 27, line 4, p. 27, line 9, and p. 27, line 25).
4. On page 8, we recommend clarifying the language by deleting "similar to but not limited to" in lines 7 and 8 and adding before the comma at the end of line 9, "or similar configurations." We recommend parallel clarifications to lines 1 through 4 on page 10.
5. In the heading to the table at the bottom of page 11, "INSIDE FROST" should be changed to "FROSTED" to be consistent with the definition on page 4 and usage throughout the rest of the bill.

## **Metal Halide Lighting Fixtures**

Metal halide lamps also provide a substantial savings opportunity, although not as large as for incandescent lamps. Metal halide lamps are commonly used in gymnasiums, big box retail stores, and other high-ceiling applications. A recent study for DOE estimates there are some 4 million metal halide fixtures in the U.S. that consume about 54 billion kWh per year.<sup>5</sup> At 9 cents per kWh, these cost nearly \$5 billion per year to operate.

Multiple states have adopted standards requiring that new metal halide fixtures use "pulse start" ballasts instead of the older and less efficient "probe start" ballasts. Use of pulse start ballasts typically reduces energy use by about 15%. States that have enacted these standards are Arizona,

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<sup>5</sup> See footnote 1 for reference.

California, Connecticut, Massachusetts, Maryland, New York, Rhode Island, Vermont, and Washington.

In July, 2007, ACEEE and NEMA completed negotiations on a consensus federal standard that would achieve the same purpose but provide a little more flexibility to manufacturers. ACEEE estimates that this provision will save 14 billion kWh annually by 2030, reducing peak power demand by about 3900 MW (the capacity of 13 power plants of 300 MW each) and greenhouse gas emissions by nearly 3 million metric tonnes of carbon. At 9 cents per kWh, this provision will reduce energy bills by about \$1.4 billion per year after stock turnover gradually replaces the existing fixture base. This provision is included in the House-passed energy bill. We thank you for including this identical provision in S. 2017 and support its enactment into law.

## **Consumer Education**

For incandescent lamp standards to work, consumers need to be educated that they are purchasing lamps for their light output, not their watt input. Section 102 directs that the FTC review and revise current lamp labeling rules to help consumers better understand new high-efficiency products. We see this as an essential complement to the standards set in the bill.

## **Fluorescent Tubes**

Fluorescent lamps account for about the same amount of energy use in the U.S. as incandescent lamps—313 billion kWh per year according to a recent study for DOE. At 9 cents per kWh, consumers and businesses spend \$28 billion annually to operate fluorescent lamps.<sup>6</sup>

Congress passed efficiency standards for these lamps in the Energy Policy Act of 1992. Revisions to these standards are overdue. ACEEE and NEMA have been discussing a set of recommendations that would set new standards for fluorescent tubes. The primary effect of these new standards will be to encourage consumers and businesses now using T12 tubes (1.5 inches in diameter) to use the more efficient T8 tubes (1 inch in diameter). T8 lighting systems are highly cost-effective to consumers and businesses, but many (roughly half) have yet to convert to T8. Our recommended standard would encourage the change by limiting T12 tubes to the very highest efficiency levels on the market. As a result, T8 lamps will not only be more efficient than T12, they will also be less expensive.

As this point, ACEEE and NEMA have not reached agreement. The primary differences are in the stringency of the new T12 standard. ACEEE wants only the most-efficient T12 lamps to meet the standard, thereby encouraging further conversions to even more efficient T8 systems. NEMA is suggesting that only the least-efficient T12 systems fail the standard. There is also a difference regarding the effective date.

ACEEE estimates that its version of this provision will reduce U.S. energy use by 23.5 billion kWh in 2030, reducing peak demand by 7550 MW (the capacity of 25 power plants of 300 MW

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<sup>6</sup> See footnote 1 for reference.

each). At 9 cents per kWh, more than \$2 billion in annual energy bill savings will result. Greenhouse gas emissions reductions will total nearly 5 million metric tonnes of carbon in 2030.

A copy of our recommended changes to existing law is attached to my testimony. If remaining issues can be resolved with manufacturers, we urge you to incorporate this language into federal legislation.

## Other Provisions

S. 2017 also includes provisions on research and development, market research on ways to increase use of products that exceed the new standards, and research on ways to limit the release of mercury from lamps. We support all of these provisions.

## Conclusion

S. 2017 contains important provisions to improve the efficiency of general service incandescent lamps and metal halide lighting fixtures. In my testimony our coalition recommends crucial ways to improve this legislation by minimizing opportunities for loopholes and misinterpretation, and addressing technical concerns and protecting states' rights for continuing to enforce state efficiency standards. We also recommend adding new fluorescent tube standards to the legislation. A table summarizing our estimate of savings from S. 2017, and savings from our recommended modifications to the bill, is provided below.

Item	Annual Savings in 2030				
	Billion kWh	Peak MW	Power Plants (300 MW ea.)	Energy Bills (@ \$.09/kWh)	Million Metric Tonnes Carbon
<i>S. 2017</i>					
Incandescent	139	17,100	57	\$12.6	27.8
Metal halide	<u>14</u>	<u>3,900</u>	<u>13</u>	<u>1.4</u>	<u>2.9</u>
Subtotal	153	21,000	70	14.0	30.7
<i>Modifications</i>					
Incandescent	20	2,500	8	1.8	4.0
Fluorescent	<u>24</u>	<u>7,500</u>	<u>25</u>	<u>2.1</u>	<u>4.7</u>
Subtotal	44	10,000	33	3.9	8.7
TOTAL	197	31,000	103	\$17.9	39.4

With our recommended changes we estimate that this bill will, by 2030, reduce annual electricity use by nearly 200 billion kWh, reduce peak demand by 31,000 MW (the capacity of more than 100 power plants) and reduce consumer and business energy bills by about \$18 billion per year. These are very large savings. In addition, these provisions will reduce greenhouse gas emissions by nearly 40 million metric tonnes, adding to the substantial savings in the Senate-passed energy bill and making a useful downpayment in efforts to address global warming. We urge you to include these improved provisions in an energy bill reported out of this Committee and the upcoming House-Senate energy bill conference.

This concludes my testimony. Thank you for the opportunity to present these views.

## Appendix: Specific Legislative Changes

*Recommend change to p. 18, lines 10-23, as discussed on p. 4 of the testimony. Replace these lines with the following:*

"(v) BACKSTOP REQUIREMENT. - The standard shall be 51 lumens per watt, effective for products manufactured after January 1, 2020, unless both of the following occur:

- (I) The Secretary completes a rulemaking in accordance with clauses (i) through (iv); and (II)
- (II) The Secretary finds that the standard issued under clause (I) will produce savings that are greater than or equal to the savings from a minimum efficacy standard of 45 lumens per watt.

*Recommended change to p. 17, lines 9-10 and page 19, lines 14-16. Replace these lines with the following:*

"(I) shall consider both incandescent technologies and non-incandescent technologies such as LED and fluorescent and may result in a standard only met by non- incandescent technologies."

*Recommended change to page 14, lines 14 to 18.*

“(E) Extension of Coverage.–

- (i) Petition.–Any person may petition the Secretary to establish standards for lamp types, shapes or bases that are explicitly or implicitly excluded from the definition of general service lamps.

*Recommended language for fluorescent tubes:*

### Fluorescent Lamp Standard Amendments

Highlighted sections are areas where there is not yet a consensus between ACEEE and NEMA.

EPCA Sec. 321 is amended as follows:

Delete paragraph (30), subparagraphs (A) and (B) and replace with the following:

(30) (A) Except as provided in subparagraph (e), the term ‘fluorescent lamp’ means a low pressure mercury electric-discharge source in which a fluorescing coating transforms some of the ultraviolet energy generated by the mercury discharge into light, including only the following:

- (i) Any straight-shaped lamp (commonly referred to as 4-foot medium bi-pin lamps) with medium bi-pin bases of nominal length of 48 inches and nominal diameters of 1 inch through 1.5 inches, as defined in ANSI 78.81-2005.
- (ii) Any U-shaped lamp (commonly referred to as 2-foot U-shaped lamps) with medium bi-pin bases of nominal overall length between 22 and 25 inches and nominal diameters of 1 inch through 1.5 inches, as defined in ANSI 78.81-2005.

(iii) Any rapid start lamp (commonly referred to as 8-foot high output lamps) with recessed double contact bases of nominal overall length of 96 inches, nominal diameters of 1 inch through 1.5 inches, and 0.800 nominal amperes at 60 Hz or 0.400 nominal amperes at high frequency, as defined in ANSI 78.81-2005.

(iv) Any instant start lamp (commonly referred to as 8-foot slimline lamps) with single pin bases of nominal overall length of 96 inches, and nominal diameters of 1 inch through 1.5 inches, as defined in ANSI 78.81-2005.

(B) 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 non-general 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 90 or greater.
- (ix) Lamps with 3200K, 3700K and 5600K correlated color temperatures and color rendering index of greater than or equal to 85 that are labeled and marketed for photographic, studio, theater and cinema use.
- (x) Four-foot medium bi-pin lamps with a CRI of 70 or more, an efficacy of 80 lumens per watt or more, that are labeled and marketed for residential use only and that are sold at retail in packs of no more than two lamps.

EPCA Sec. 325, subsection (i) is amended to add the following:

Each of the following general service fluorescent lamps manufactured after Jan. 1, 2010 shall meet or exceed the following lamp efficacy and CRI standards:



Lamp Type	Lamp Diameter	Nominal Lamp Wattage	Minimum CRI	Minimum LPW
4-foot medium bi-pin	> T8	$\leq 45W$	70	83
4-foot medium bi-pin	T8	$\leq 38W$	75	84
2-foot U-shaped	> T8	$\leq 45W$	70	78
2-foot U-shaped	T8	$\leq 38W$	75	80
8-foot instant start single-pin	> T8	$\leq 60W$	70	90
8-foot instant start Single-pin	T8	$\leq 65W$	75	90
8-foot rapid start HO	> T8	$\leq 115W$	70	85
8-foot HO	T8	$\leq 90W$	75	90

(8) Notwithstanding any other requirement in this subsection, the Secretary shall conduct a rulemaking to determine if the standards for T8 lamps established under paragraph (1) should be amended. This rulemaking shall also consider appropriate standards for T8 lamps with correlated color temperatures of more than 4500 degrees Kelvin. The Secretary shall publish a final rule no later than June 30, 2009. The Secretary shall, based on the rulemaking record, determine a date by which new products shall meet the new standard. Such date shall be a minimum of 3 years and a maximum of 5 years from the date the final rule is issued.