Alliance to Save Energy
American Council for an Energy-Efficient Economy
Appliance Standards Awareness Project
Natural Resources Defense Council
Northeast Energy Efficiency Partnerships
Northwest Power and Conservation Council
Pacific Gas and Electric Company

June 29, 2006

Ms. Brenda Edwards-Jones
U.S. Department of Energy, Buildings Technology Program
Lamp Products Rulemaking
1000 Independence Ave. SW
Washington, DC 20585

RE: Docket number EE-2006-STD-0131

Dear Brenda,

We are writing to provide comments on DOE's May 31, 2006 Federal Register notice and Rulemaking Framework document on energy efficiency standards for general service fluorescent lamps, incandescent reflector lamps and general service incandescent lamps. In general, we are pleased to see DOE begin this rulemaking and think that DOE's proposed approach is generally acceptable. However, we do have some serious concerns and some suggestions on ways to improve the process and analyses. At the workshop, the Department expressed its intent to issue a final standard by the end of June 2009. The Department should take great care that, in working to complete the rulemaking within three years, it also complies with its obligations to conduct complete and unbiased analysis. We start with some general comments and then proceed to product-specific comments.

General Comments

1. *The analysis should cover the major types of general service lamp products and not be arbitrarily limited by narrow overly restrictive parsing of the legislative language.* We agree with NEMA that general service fluorescent lamps with CRI greater than 82 should be included as these lamps are now widely used and, if not regulated, could create a loophole in standards that DOE sets in this rulemaking. In addition, we recommend including incandescent reflector lamps 2.25 to 2.75 inches in diameter as these products are now regulated in several states and should be incorporated into national standards.

ACEEE led negotiations on the EPAct 1992 lighting standards and the intent of the provision was to allow DOE to add additional fluorescent and incandescent lamps to the standards if there were opportunities to achieve significant energy savings that are technically feasible and economically justified. This provision can be found in section 325(i)(5) of the Energy Policy and Conservation Act as amended. DOE has taken a much more narrow interpretation and proposes to limit the scope of this provision to those lamps that fit under the definitions in section 321. However, this narrow interpretation does not allow for technical developments, such as new widely used lamp types that fall outside these now-outdated definitions. In fact, for incandescent reflector lamp types, DOE's interpretation effectively argues that the section 325 provision is moot because there are no lamps fitting under the section 321 definition that are not already regulated. Only with a broader interpretation can section 325 have meaning for incandescent reflector lamps. Furthermore, both efficiency supporters and NEMA agree that lamps with CRI over 82 should be included. If DOE elects not to include them, states may need to start regulating this product subclass, leading to a balkanization of standards that EPAct 1992 was attempting to avoid.

Alternatively, DOE could elect to cover fluorescent lamps with CRI over 82 and incandescent reflector lamps 2.25-2.75 inches in diameter under section 322(b) in the law which allows DOE to add products that use at least 100 kWh/year per household on average. According to the *U.S. Lighting Market Characterization Report* published by DOE in September 2002, incandescent reflector lamps use an average of 214 kWh per home (1946 kWh/year all lighting of which 11% is incandescent reflector) and miscellaneous fluorescent use an average of 175 kWh per home (1946 kWh/year times 9%.) Thus, both these product types use more than 100 kWh/household, providing DOE an opportunity to regulate these products more fully than under the narrow definitions of fluorescent lamps and incandescent reflector lamps as contained in section 321. We urge the Department to use its authority under either section 325 or section 322 to address these important product categories in the current proceeding.

2. *Limiting the detailed analysis to just a few products of each type risks oversimplifying the analysis, obtaining results that cannot be extended to other products and unnecessarily sacrificing achievable and cost effective energy savings.* For example, DOE proposes to examine energy saving fluorescent lamps (e.g. <35 W four foot T12 lamps) and somehow expand this to full wattage T12 lamps (e.g. >35 W four foot tubes). The energy saving and full wattage products have some different characteristics and should be examined separately. Likewise, DOE proposes to examine only 75 W and 150 W incandescent reflector lamps and generalize to other classes. But appropriate substitutes for lamps in each class can vary so we think it would be better to examine each class. As discussed in item 3 below, this can be done in ways that are not especially burdensome.

3. *Rather than basing the analysis on detailed engineering data provided by manufacturers, a better approach may be to take bulk purchase price data available*

from major states and work backwards. Using this bulk purchase data, DOE can estimate manufacturer costs based on manufacturer and distributor markups (which will vary by volume), economies of scale (which will lower prices for current niche products) and answers to specific questions provided by manufacturers. Such an approach will be less time consuming than the approach discussed in the framework document and will be more transparent to outside parties. If DOE finds that state contract data do not provide adequate data for some key technologies or lamp types, DOE should supplement this data with manufacturer and/or distributor provided cost data verified by DOE.

4. *If DOE elects to collect manufacturer cost data, DOE should verify such estimates.* We recommend that DOE use state contract pricing and, if necessary, design options analysis to determine if costs estimates developed through manufacturer provided data are reasonable.

5. *DOE should make clear to manufacturers that cost estimates they provide should assume mass production, national distribution, and significant sales volume.* Efficiency standards will make today's niche products commodity products in the future. In addition, manufacturers often amortize the cost of design changes on an exponentially declining basis over time, such that first-year incremental costs do not meaningfully predict long-term incremental costs. Thus, for a standards scenario, manufacturer cost estimates need to reflect long-term, commodity-type market incremental costs. From our review of past manufacturer cost estimates, many manufacturers appear to understand this, but some do not.

6. *Allow for market forces in computing typical costs using manufacturer cost estimates.* If DOE collects cost estimates from manufacturers, based on past experience, these estimates will vary significantly from manufacturer to manufacturer. DOE proposes to take a market-share weighted average of these costs. But given competition in the market, manufacturers with below average costs will determine prices in the market, since in order to compete, higher-priced manufacturers will need to find ways to reduce costs, or risk losing market share. To address these market considerations, we recommend that DOE use the simple average of the lowest cost estimate and the weighted average DOE proposes to use in the Framework Document. In addition, DOE should explore methods of making detailed manufacturer cost data publicly available while balancing manufacturer needs for confidentiality.

7. *Plan on revising the economic analyses at the NOPR and final rule stages*. DOE indicates that it will be using EIA price forecasts in its analyses. EIA's current estimates of future electricity costs are very low and are likely to be revised upwards in the next few years, just as EIA has recently significantly increased its estimates of long-term oil prices. If we are correct, the revised analysis will generally show that higher efficiency levels are cost-effective than if the present forecasts are used. DOE should be ready for such a change and not be caught flat-footed.

8. *The number of trial standards examined should depend on the market for each product and not be designed to always have five trial standards for each product*. While DOE generally strives for five trial standard levels, for some product classes 4 or 6 trial standard levels may be appropriate. DOE should look at natural divisions in the market for each product in deciding how many trial standards to examine.

9. *Expand environmental impact analysis to include mercury and particulate (PM_{10}) emissions and consider monetizing pollution reductions.* Mercury and particulate emissions have a significant impact on public health; the impact of standards in reducing these emissions should be considered along with other environmental impacts. NEMS includes these pollutants so these calculations should be a relatively simple addition to the analysis. We also urge DOE to evaluate approaches for attaching economic valuations to avoided emissions based on externality values commonly used by state public utility commissions or agencies. Important advances in pollution reduction valuation approaches could help inform DOE decision making.

10. *Follow-through with Monte Carlo analysis.* We are pleased the Department has decided to use a Monte Carlo methodology for the life cycle cost analysis. This approach provides very useful information on the number of purchasers who are better or worse off economically under each scenario and the size of their gain or loss. Based on DOE contractor statements, we understand this analysis to add relatively little complexity to the overall DOE rulemaking process.

11. *DOE should include all major expected electricity tariff components and structures that will be in existence when the new standard will become effective.* The electric utility industry continues to experience significant uncertainty as it adjusts to changing regulatory requirements, environmental impact pressure and fuel price increases. In addition, applied metering technology has improved dramatically even as costs have dropped. In some states, metering requirements are changing. For example, California has committed to time-dependent pricing for all electricity market sectors. In addition, greater prevalence of increasing block rates instead of decreasing block rates will change utility tariff structures during the analysis period. We note that the evolution of rate structures may cause the Department to make significant modifications over the course of this rulemaking. Therefore, early sensitivity analysis will help the Department evaluate if pricing structure changes are likely to significantly influence the rulemaking analysis. If such sensitivity analysis shows reasonably expected changes to electricity price structures to be influential in the analysis, we urge the Department to include provisions for these basic electricity tariff evolutions in the structure of the lifecycle cost and national impacts analyses.

In addition, we have several comments related to specific types of equipment as follows:

<u>Fluorescent Lamps</u>

12. *Combine two product categories for fluorescent lamps.* For fluorescent lamps, there are few T8's above 35 Watts and thus the <35 and >35 Watt categories can be

combined and examined by looking at the standard 32 W T8 and lower wattage replacements for it.

13. *For fluorescent lamps, DOE should treat new construction/new fixture market separately from instances when just lamps are replaced*. This issue was discussed extensively at the workshop and we believe agreement reached to evaluate the two cases separately and combine them into a final analysis based on the proportion of lamp sales going to each market. First, in the new construction and remodeling market, new fixture installation enables many options including wider spacing of fixtures or use of ballasts with lower (or higher) ballast factors in order to adjust for differences in light output between lamps. Second, in the lamp replacement market, the main choices are between lamps, although in some cases replacing the ballast may be cost-effective.

Reflector Lamps

14. *Narrow definition of BR/ER lamps.* For incandescent reflector lamps, in order to narrow use of BR and ER lamps to applications where they are an appropriate energy-saving option, we recommend that DOE revise the current definition of BR and ER to include only those lamps exempted from state standards in California, Massachusetts, Washington, Rhode Island and Vermont. These exemptions from state standards were developed in coordination with and with the support of NEMA. We understand NEMA to be in agreement with us that the existing federal definitions should be narrowed in this manner. By narrowing this definition, DOE would limit instances where purchasers can circumvent the national lamp standards by purchasing a BR or ER product. With this change, BR/ER would only be available in fairly low wattages and would not be an alternative to higher wattage products.

15. *Design options and product categories for incandescent reflector lamps.*
    a. DOE should consider improved halogen capsules through coatings or change in type or quantity of fill gas as a design option.
    b. We believe the current categories (e.g. 40-50 W, etc.) remain appropriate.

General Service Incandescent Lamps

16. *DOE's analysis should extend beyond the most common lamp types and include a broad range of wattages.* We are concerned that DOE may choose to limit its analysis (and therefore, potentially, coverage) of general service incandescent lamps to A-line lamps in the 60, 75 and 100 W wattage ranges. Millions of bulbs are sold in wattages and shapes other than 60, 75 and 100 Watt A-lines. For example, G-line lamps have become increasingly popular. A-line lamps below 60 Watts and above 100 watts represent significant market share as well. Therefore, we recommend that DOE gather data on and evaluate other common bulb shapes which provide general illumination in addition to the most common A-line lamps. In defining exemptions from any standard, DOE must take great care to avoid creating loopholes whereby exempted products are permitted to gain market share at the expense of covered

products. If products are designed to meet a general service lighting application need, they should be covered products with an appropriate efficiency standard level.

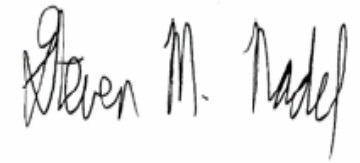
17. *DOE should strive for standards that both improve efficiency and save energy; standards should not be structured so as to foster dimmer or brighter lamps.* In the Framework document, DOE stated the intention to hold light output constant for its analysis of energy savings options. We agree. Therefore, we recommend that any resulting standard be designed to achieve constant or similar light output. Equivalent service (i.e., light output) achieved with reduced power consumption should be the goal for a national standard. On the other hand, DOE should be careful to avoid standard structures which could foster compliance by noticeably reducing light output. Nor should DOE set up structures that use efficiency gains to foster overlighting or longer bulb life instead of energy savings.

18. The DOE framework document describes the following technological improvements for achieving improved efficiency in general service incandescent lamps: higher temperature incandescent light sources; filament materials and coatings; and lamp-fill gas. We firmly believe that DOE should examine all feasible technology enhancements in its analysis and provide here a more specific list of design options which may not necessarily be mutually exclusive from the ones mentioned above:
    i. Substitution of fill gases to improve filament insulation (krypton, xenon, or halogens). This includes new halogen-filled incandescent lamps being introduced by Philips in 2006 in Europe under the brand name EcoBoost, which claim 50% energy savings compared to conventional incandescents.
    ii. Filament redesign for higher temperature operation
    iii. Coiled coil filaments and other changes to filament geometry to improve efficacy
    iv. Infrared reflective coatings and other spectrally selective coatings to maintain high filament temperatures with lower power requirements
    v. Hafnium carbide and other ceramic filament technologies
    vi. Nanotechnology-enabled filament materials
    vii. Reduction in filament support wires to improve filament insulation
    viii. 3D photonic lattices as a substitution for traditional incandescent filaments

20. *Product categories should be based on lumens of light output and coating.* DOE should consider three broad product categories based on product coating: soft white, frosted/clear, and modified/enhanced spectrum. Within each coating category, DOE should establish standards which permit a certain amount of power in watts for a given level of light output. DOE should structure standards to carefully avoid creating significant incentives to shift to less-efficacious product categories. (For example, if DOE were to leave a low-efficiency product type unregulated, but set improvements for a relatively efficient product type, such a scenario could increase market share for the less-efficacious, unregulated product category.)

If you have any questions about these comments, please contact Steven Nadel at ACEEE at 202-429-8873 or snadel@aceee.org. Steve will either answer your questions or put you in touch with other technical experts among our organizations. Thank you for considering our views.

Sincerely,



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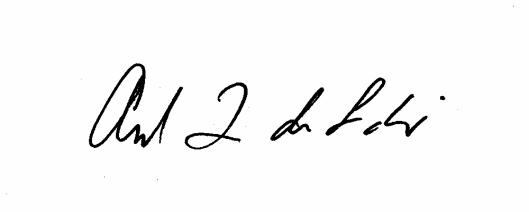

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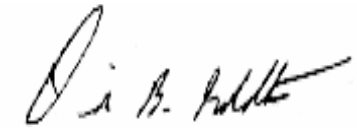

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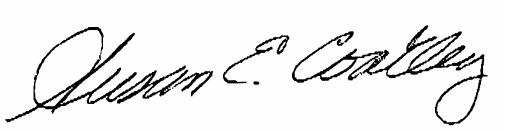

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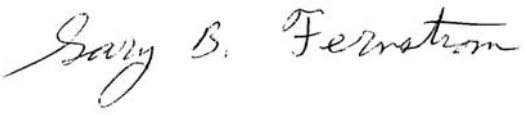

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