KYLE PITSOR

February 2, 2006

Commissioner Jackalyne Pfannenstiel
Commissioner Art Rosenfeld
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: Proposed Amendments to Appliance Efficiency Regulations: CEC Docket Number 05-AAER-2: General Service and Reflector Incandescent Lamps, and for Metal Halide Luminaires

Dear Commissioners Pfannenstiel and Rosenfeld:

The NEMA Lamp Product Group submits the enclosed comments and recommendations on the proposed 45-day language and staff report issued in January 2006 on the referenced matter. We look forward to discussing our recommendations at the February 14, 2006 public hearing of the Energy Subcommittee, and urge favorable consideration be given to our views.

Very truly yours,

Kyle Pitsor

Enclosure

National Electrical
Manufacturers Association
www.nema.org

1300 North 17th Street Suite 1752
Rosslyn VA 22209
703 841 3200
FAX 703 841 5900

NEMA Lamp Product Group Comments on Proposed 45-Day Language, February 2, 2006

The NEMA Lamp Product Group ("NEMA") appreciates the opportunity to offer comments and recommendations on the 45-day language for general service incandescent lamps, incandescent reflector lamps, and metal halide luminaire proposed regulations.

General Service Incandescent Lamps

1. During the discussions and proposals with the CEC, NEMA has approached the proposed regulation of general service incandescent lamps from the perspective of lower wattage options for certain lamps coupled with an educational and promotional campaign aimed at the purchasers of these lamps. We would like to emphasize the importance of the second component since the energy savings that serves as an underpinning of the regulation will only be achieved if purchasers select the lower wattage product offerings over their previous buying habit of selecting today's common wattages. NEMA believes that a California educational effort is key to inform purchasers as they are faced with new lower lamp wattages contemplated by the rulemaking approach.

It is this uncharted area of how the purchaser will respond to new wattage products that brings into question whether any additional regulation beyond a Tier Two regulation is appropriate at this time. NEMA believes any further regulation beyond Tier Two should be based on an evaluation of how purchasers respond to the new lower wattage products in Tier Two. Such an evaluation is needed to guide and inform any next steps for these products consistent with the requirements of the Warren-Alquist Act.[1]

Consider, for example, various scenarios in the table below of how a purchaser may respond in a post-January 1, 2008 environment:

% of today's 60W users who switch to 57W lamp	% of today's 60W users who switch to 71W lamp	energy saved, per lamp (watts)	% energy saved
100 %	0 %	3 W	5 %
90 %	10 %	1.6 W	2.7 %
80 %	20 %	0.2 W	0.3 %
70 %	30 %	-1.2 W	-2 %
60 %	40 %	-2.6 W	-4.3 %
50 %	50 %	-4 W	-6.7 %

[1] NEMA and its members continue to maintain that California and all other States are preempted by federal law from adopting energy conservations standards applicable to general service incandescent lamps. Our willingness to engage California on the merits of its proposal should not be construed as a waiver of this position. See NEMA's Comments to the CEC dated October 29, 2004 and December 13, 2004 (Dkt No. 04-AAER-1). 42 U.S.C. §6297(b) preempts States from adopting energy conservation standards for covered products to which 42 U.S.C. §6295(i) is applicable. Section 6295(i)(5) and subsequent DOE regulation confirm that section 6295(i) is applicable to general service incandescent lamps.

The options presented highlight the impact of purchasing decisions on whether energy savings is or is not achieved, and by what amounts. We know of no one who can predict with a significant degree of certainty how purchasers will respond when they are faced with selecting a lower wattage product. This is an experiment designed to save energy, whose outcome is very uncertain. We submit that without the educational campaign and a subsequent market evaluation, the CEC should not proceed with adoption of Tier Three regulations.

2. NEMA has recommended that CEC regulations should be focused on the high volume, common wattages of 60, 75 and 100. During the workshops and in our follow-up letter of December 14, 2005, we have offered recommendations and data to substantiate that focusing on these three wattage families would represent 91% of the potential energy savings in this category, and would result in industry redesigning 86% of the lamp types by volume contained in the CEC proposal based on a 5% reduction in lamp wattage (e.g., 60 watt re-designed to 57 watt).

3. NEMA does not support imposing additional efficiency requirements beyond the Tier One level for low wattage products (e.g., 40 and 25 watt) and for the 150 watt product. As demonstrated in NEMA's December 14 submittal, the 40-watt category only represents 7% of potential energy savings, not the 20% suggested by some parties at the October 26 workshop. Further, leaving the low wattage products at the Tier One level will not create a risk of purchasers selecting a higher wattage because they think the new "lower" low wattages are too low for their lighting needs. The 150-watt lamps are sold in very low volumes of this product category. Applications requiring 150-watt lamps require maximum light output. An example would be for reading requirements of the older eye. This product should continue to be offered to California's older residents to provide maximum light output for reading and other visual tasks.

4. NEMA is in strong disagreement with the regulations proposed for "enhanced/modified spectrum" lamps as proposed in the 45-day language. As we have previously testified during the workshops (see our follow-up letter of December 15, 2005), it is an extreme proposal that would essentially ban current products from the market. This proposal is also in direct opposition to the thoughtful discussion between industry, the commissioners and the staff at the last CEC public workshop on this topic. At that workshop, there was general consensus to move forward by developing a tighter technical definition for "enhanced spectrum" or "modified spectrum" lamps. There was clearly no agreement or consensus to move forward with stringent energy efficiency regulations for a niche product.

NEMA appreciates CEC accepting the improved technical definition for "enhanced spectrum" as proposed. We note that the adoption of the proposed definition of these products (contained in the 45-day language) will thwart unscrupulous producers from circumventing the general service incandescent regulation by labeling their product

enhanced/modified without undertaking full steps required to make this special effect product.

NEMA asks the commissioners to consider 4 major reasons why these proposed efficiency regulation for enhanced spectrum lamps should not go forward.

a) "Enhanced-Spectrum" or "Modified Spectrum" lamps have been around for more than 20 years and have always remained a niche product line. The reasons that this product will continue to be a niche product line despite many years of promotion are: 1) much higher cost than standard lamps and 2) unusual color appearance acceptable for limited applications. NEMA estimates that this product line remains at less than 5% of the total A-line market and has minimal energy savings potential.

b) The current proposal for energy reduced 60W, 75W and 100W clear, frosted and soft white lamps is an experiment. The results of this experiment are, as yet, unknown. As it is unclear if consumer behavior will lead to a selection of incandescent lamps that produces energy savings in the state, it is extremely premature and risky to apply such an experiment to high-priced niche products where energy savings, at best, will be minimal and could easily be negative.

c) There are no enhanced-spectrum lamps, using a standard incandescent filament, that pass the current efficiency proposal. Such energy efficient "enhanced-spectrum" incandescent lamps do not exist. A single lamp identified by the consultant that may pass was a halogen-based lamp. This completely extreme and unfounded proposal eliminates 100% of the current product line, with no alternatives available on the market. Each company would have to evaluate the business case for new niche products. As significant company resources are required to develop one new product, and this proposal would require the creation of an entire product line of many wattages, it is doubtful that all companies could justify such a time and resource expense for a product line that would have very few sales. Therefore, this proposal will reduce consumer choice without justification and with no assurance of any energy savings.

d) As we have encountered before with the soft white regulations, the proposed regulations are technically flawed and cannot be justified as proposed. As no such products exist, regulations can only be proposed on a correct theoretical technology basis, not a marketing basis. The proposed regulations are not technically correct. Much more analysis would be needed to produce a correct theoretical proposal.

5. We have no changes to recommend to the proposed definitions of "Clear type lamp" and "Lamp" in the 45-day language.

6. We have reviewed the proposed formulas and lines contained in the 45-day language, and we offer an alternative proposal that lessens the adverse impact on business, without sacrificing energy savings. Our proposal is in Table K-3 below. We will present and review this table and its relationship to the 45-day language table,

including formula errors/adjustments, at the February 14th workshop. We believe our alternate proposal should be accepted because:

a. It restricts our experiment to the 57-95 watt range, the range where >90% of the energy savings are to be realized if our experiment is successful. This lets us conduct the test in a way that limits the number of lamp types to be redesigned until we know whether the experiment saves energy.
b. Similarly, it exempts enhanced spectrum lamps from the regulation, preventing the redesign of these niche products until consumer behavior in response to the clear-frost and soft white changes can be assessed.
c. It simplifies some of the details of the clear-frost and soft white lines in the 57-95 watt range, correcting what we believe to be a couple of unintended irregularities.

While we believe our proposal has a much greater chance of resulting in energy savings than the 2006 standard that is now in force, we don't know that. Simplifying these tables, and reducing the number of types to those of highest volume and largest impact, give us the best chance of seeing both what happens and why.

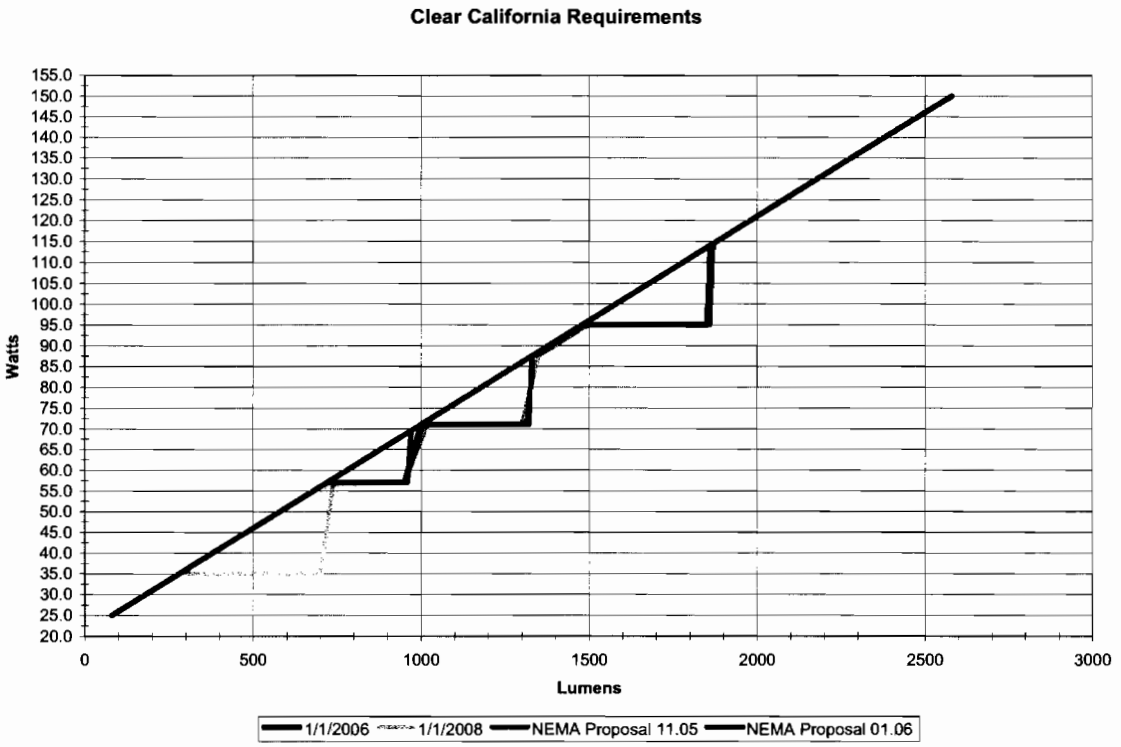
CEC 45-day language for Frost or Clear
Lumens (L) Maximum Power Use (watts) Frost or Clear CEC

	January 1, 2006	January 1, 2008	January 1, 2009
L ≤ 300	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	(0.05 * Lumens) + 20
300 < L ≤ 700	(0.0500 * Lumens) + 21	35	35
700 < L ≤ 740	(0.0500 * Lumens) + 21	(11/20 *Lumens) - 350	(11/20 *Lumens) - 350
740 < L ≤ 950	(0.0500 * Lumens) + 21	57	57
950 < L ≤ 1020	(0.0500 * Lumens) + 21	(1/5 * Lumens) - 133	(1/5 * Lumens) - 133
1020 < L ≤ 1300	(0.0500 * Lumens) + 21	71	71
1300 < L ≤ 1350	(0.0500 * Lumens) + 21	(33/100 * Lumens) - 358	(33/100 * Lumens) - 358
1350 < L ≤ 1500	(0.0500 * Lumens) + 21	(0.05 * Lumens) + 20	(0.05 * Lumens) + 20
1500 < L ≤ 1850	(0.0500 * Lumens) + 21	95	95
1850 < L ≤ 1900	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	(2/5 * Lumens) - 645
1900 < L ≤ 2500	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	(0.05 * Lumens) + 20
2500 < L ≤ 3000	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	145

NEMA Proposal for Frost or Clear:
Lumens (L) Maximum Power Use (watts)

	January 1, 2006	January 1, 2008	January 1, 2009
L ≤ **720**	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	***No Change***
720 < L ≤ 950	(0.0500 * Lumens) + 21	57	***No Change***
950 < L ≤ **1000**	(0.0500 * Lumens) + 21	(7/25 * Lumens) - 209	***No Change***
1000 < L ≤ **1325**	(0.0500 * Lumens) + 21	71	***No Change***
1325 < L ≤ **1480**	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	***No Change***
1480 < L ≤ 1850	(0.0500 * Lumens) + 21	95	***No Change***
1850 < L ≤ **2850**	(0.0500 * Lumens) + 21	(0.0500 * Lumens) + 21	***No Change***

Derivation of equation for 950 to 1000 lumen range:
57 – [(71 – 57) / (1000 – 950)] * (950 – Lumens) → (7/25 * Lumens) – 209


Clear California Requirements
155.0
150.0
145.0
140.0
135.0
130.0
125.0
120.0
115.0
110.0
105.0
100.0
95.0
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
Watts
0
500
1000
1500
2000
2500
3000
Lumens
1/1/2006
1/1/2008
NEMA Proposal 11.05
NEMA Proposal 01.06

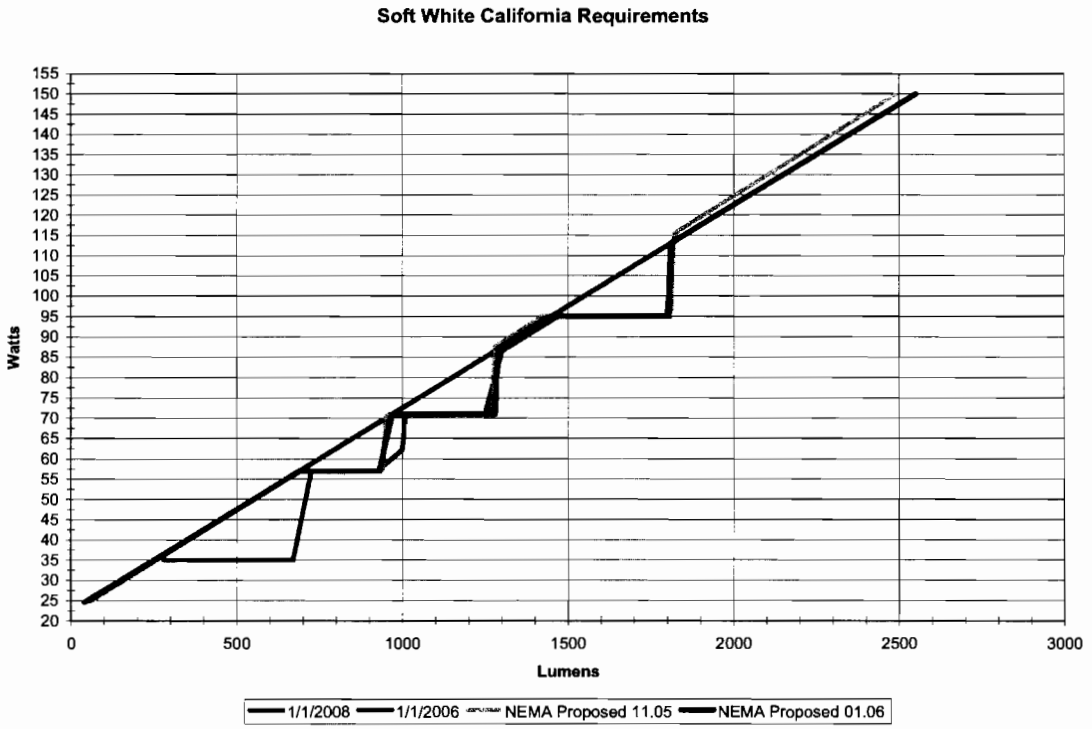
CEC 45-day language for soft white
Lumens (L) Maximum Power Use (watts)

	January 1, 2006	January 1, 2008	January 1, 2009
L ≤ 270	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 21.5
270 < L ≤ 670	(0.0500 * Lumens) + 22.5	35	35
670 < L ≤ 725	(0.0500 * Lumens) + 22.5	(2/5 * Lumens) – 233	(2/5 * Lumens) - 233
725 < L ≤ 925	(0.0500 * Lumens) + 22.5	57	57
925 < L ≤ 1000	(0.0500 * Lumens) + 22.5	(7/100 * Lumens) - 31/4	(7/100 * lumens) - 31/4
1000 < L ≤ 1250	(0.0500 * Lumens) + 22.5	71	71
1250 < L ≤ 1300	(0.0500 * Lumens) + 22.5	(31/100 * Lumens) – 633/2	(31/100 * Lumens) – 633/2
1300 < L ≤ 1470	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 21.5	(0.0500 * Lumens) + 21.5
1470 < L ≤ 1800	(0.0500 * Lumens) + 22.5	95	95
1800 < L ≤ 1850	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	(19/50 * Lumens) - 589
1850 < L ≤ 2470	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 21.5
2470 < L ≤ 3000	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	145

NEMA Proposed Soft White
Lumens (L) Maximum Power Use (watts)

	January 1, 2006	January 1, 2008	January 1, 2009
L ≤ **690**	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	***No Change***
690 < L ≤ **930**	(0.0500 * Lumens) + 22.5	57	***No Change***
930 < L ≤ **970**	(0.0500 * Lumens) + 22.5	(7/20 * Lumens) – 268.5	***No Change***
970 < L ≤ **1280**	(0.0500 * Lumens) + 22.5	71	***No Change***
1280 < L ≤ **1450**	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	***No Change***
1450 < L ≤ 1800	(0.0500 * Lumens) + 22.5	95	***No Change***
1800 < L ≤ **2850**	(0.0500 * Lumens) + 22.5	(0.0500 * Lumens) + 22.5	***No Change***

Derivation of 930 to 970 Lumen Equation:
57 – (71 – 57) / (970 – 930) * (930 – Lumens) → (7/20 * Lumens) – 268.5



Incandescent Reflector Lamps

NEMA and ACEEE submitted a joint consensus proposal dated October 20, 2005, which was discussed at the October 26, 2005 public workshop. Subsequent to the workshop, NEMA and ACEEE jointly submitted by letter dated December 2, 2005 to the Energy Subcommittee that our respective organizations had agreed to work together to establish national energy efficiency standards for incandescent reflector lamps based on the October 20 joint consensus proposal, and to work with states based on the proposal.

The 45-day language incorporates the joint consensus proposal with a significant change that impacts the R-20 product. We believe that the sentence regarding R-20, which should be struck, may have resulted from a mis-reading of the NEMA-ACEEE language and is not an intentional change. This needs to be clarified by CEC staff.

Also, in order to appropriately include Blown PAR38 lamps in the regulations, we recommend a modification to the Section 1602 definition of "State-regulated incandescent reflector lamp" as follows:

(1) a BR, ~~or~~ ER, or Blown PAR bulb shape with a diameter 2.25 inches or more;

In addition, NEMA proposes that the effective date for the full provision be January 1, 2008. This is proposed to provide consistency of implementation dates with other states which have January 1, 2008, such as Massachusetts. It will be costly and complicated for the industry to implement "manufactured on or after" requirements if they vary by state.

We have marked-up the 45-day language below with our proposed changes:

"The average lamp efficacy of state-regulated incandescent reflector lamps manufactured on or after ~~June 1, 2007~~,January 1, 2008, shall be not less than the applicable values shown in Table K-5. ~~The average lamp efficacy of state regulated incandescent reflector lamps that have a bulb classification of R-20 and have rated lamp wattage of 45 watts or less manufactured on or after January 1, 2008 shall comply with Table K-5.~~

Exemptions: The following incandescent reflector lamps are exempt from the requirements in Table K-5:

- ≤ 45 watt R-20 (reflector, 2.5" diameter)
- ≤ 50 watt etc. .... *remainder of list remains in place*"

Metal Halide Luminaires – Pulse-Start Lamps

The proposed 45-day language would adopt a standard that mandates pulse-start technology for all lamp operating positions by January 1, 2008. As we have previously submitted to the CEC and discussed at the workshops, the NEMA Lamp Product Group conducted a survey of lamp manufacturers on when pulse-start lamps for the various operating positions would be available from at least three suppliers for the full range of wattages (150-500) covered by the proposed regulation. Based on these data, we recommend that the CEC modify the 45-day language to cover only vertical base-up, vertical base-down, and horizontal lamp positions for the 150-200 watt category on January 1, 2008, and for those same burning positions for the 201-500 watt category on January 1, 2009.

Metal Halide Luminaires – Ballast Efficiencies

At the October 26, 2005 workshop, Mr. Bob Erhardt, on behalf of one of the NEMA ballast manufacturers, gave a detailed presentation about ballasting metal halide lamps, and he explained fundamental problems with the proposed "minimum ballast efficiency" standard. He referred in some detail to the report of the PIER Lighting Research Program, Project 5.2 "Evaluation of Electronic Ballasts and Related Controls for HID Lighting Systems". It was not clear at the workshop if CEC staff were aware of this report nor if they developed the metal halide proposal in light of the report's information.

We presume it has been studied since, and we refer the Commission to the report, its findings, and its LBL author for valuable insight and information.

We were very hopeful that a result of the extensive October workshop discussion would be that the CEC staff would fundamentally re-think its approach to regulating higher wattage metal halide ballast efficiencies. We see from the 45-day language that this is not the case. We don't know if Mr. Erhardt's message was not understood, or was not believed, or was considered irrelevant. We thought it was accurate and relevant. In any case, the NEMA Lamp Product Group leaves to the NEMA Ballast Product Group and individual ballast manufacturers to highlight the underlying problems with the CEC approach and its timing, even with the "new" efficiency equation reflected in the latest draft.

The NEMA Lamp Product Group offers the comments below because the proposed standard affects lamp performance and offerings, as well as ballasts.

1. The practical implementation of the efficiency criterion, as written, permits only these ballast designs for the higher wattage metal halide lamps covered by the regulation:
    a. high frequency (HF) electronic ballasts
    b. "reactor" magnetic ballasts
2. For a given lamp wattage in the 150-500W range, there is no HF ballast in the market that will operate all metal halide lamps from all manufacturers (in a way that the lamp manufacturers will warrantee).
3. There is no combination of HF ballasts in the market that will operate all metal halide lamps offered in the 150-500W range (in a way that the lamp manufacturers will warrantee). Some ceramic metal halide lamps will not operate satisfactorily on any available HF ballast. To be clear, technical viability for these HF ballasts for these lamps has not been demonstrated.
4. Specifically, ceramic metal halide lamps are frequently not warranted to work on such HF ballasts. Ceramic lamps tend to be those with better color properties (color spread, color stability and color rendering), and, according to page 28 of the PIER report, better lumen maintenance than quartz metal halide lamps – at least for the lower wattage lamps tested in this part of the PIER Report. We believe that most of the largest metal halide lamp manufacturers in the world spend the bulk of their metal halide R&D resources on such ceramic lamps because they see them as the next generation of efficient high quality (color) lamps and lighting systems. At least we believe this to be true for lamps intended for general lighting applications.
5. Today, the largest manufacturers of higher wattage ceramic metal halide lamps approve their lamps for use on HF ballasts only after extensive testing following a ballast-by-ballast, lamp-by-lamp approach. Most of this testing to date has resulted in "no approval". One of the largest manufacturers of such lamps has not approved any HF ballasts for their lamps.
6. A particular difficulty with such HF ballasts is that they may appear to work satisfactorily with a lamp early in lamp life, even for a few thousand hours, but

the operation later in lamp life can be very erratic and unstable. (This occurs because the inside dimensions of the lamp can change subtly over the lamp life. See pt. 7 below.)

7. Related to point (5), the use of an HF ballast typically means a loss of design freedom for the lamp manufacturer. For example, a luminaire installation may contain a ballast that is approved by lamp manufacturer A to work on its 400W lamp. However, when the lamp fails at the end of its normal life and needs to be replaced, there is no assurance that another 400W lamp – even from the same manufacturer – will still be compatible with the ballast. HF ballast-lamp compatibility is very sensitive to the absolute lamp dimensions (or, more correctly, the discharge tube dimensions).
8. "Reactor" magnetic ballasts allowed by the proposed efficiency standard work only when the line voltage is at least 277-volts. They do not work on 120-volt systems at all. It is well known that these ballasts have exceptionally poor power regulation; i.e., the lamp power can change a lot due to relatively small changes in line voltage, giving rise to relatively large changes in lamp behavior as well. We sincerely believe that California does not want its higher power metal halide lamps predominantly operated on such systems.
9. The proposed efficiency standard limits the introduction of "ballast power using" but "system power saving" features like dimming, reduced harmonics, and color enhancement, even for HF systems, much less for other systems. Any regulation should anticipate the development of ballasts with these features.
10. The proposed efficiency standard may preclude the future development of low frequency (LF) electronic ballasts for the 150-500W range of lamps. Today only a few such designs exist. While somewhat less efficient than HF ballasts (a few percent), such ballasts dominate the electronic ballast landscape for lower wattage lamps, and there is some evidence that such LF ballasts can give higher system efficiencies (lamp-ballast-luminaire) than even the more efficient HF electronic ballasts. LF electronic ballasts offer lamp manufacturers the highest degree of freedom in developing energy efficient systems.
11. The proposed regulation, as drafted, precludes the use of "non-reactor" magnetic ballasts for EMI/EMC sensitive applications. In such applications, EMC can be much more important than the highest theoretical ballast efficiency.
12. HF ballasting (for metal halide lamps) is a technology in its infancy. So is the technology of higher wattage ceramic metal halide lamps. As documented above, lamp-ballast compatibility issues are very complex, especially for ceramic lamps. There is minimal likelihood that ANSI standards can be written and agreed upon by 2009 for such systems. No such discussions have even begun, because the design rules for compatibility are not well known. Even if they could be developed by a 2009 effective date, additional time would be needed to incorporate these standards into new ballast designs. Once these new designs are available, some months are needed to get UL approval of luminaires with these ballasts in them.

    The lack of an ANSI standard is not a trivial consideration. Today customers match lamp and ballast ANSI codes to ensure compatibility. The absence of an

> ANSI ballast code means that customers will have to figure out for themselves which ballasts are fit to drive which lamps – or more specifically, which versions of which lamps, adding to what is already a very complicated lamp selection process.

We don't know how to say this euphemistically: the establishment of a metal halide ballast efficiency standard, as proposed, is a bad idea. Its provisions and its timing are poorly conceived. From the lamp perspective, the design space should certainly allow for low frequency electronic ballasts, for which most of the compatibility issues described above disappear. (ANSI is well underway with the development of electronic ballast electrical operating codes for low frequency operation.)

We do not now know the best way to offer an effective, comprehensive counterproposal. We are, after all, the Lamp Product Group, not the Ballast or Luminaire Product Group. If ceramic lamp systems were to be excluded from the regulation, many but not all of the problems listed above would go away. If lamp systems with CRI>80 were excluded from the regulation, so that they could operate on any suitable ballast, many but not all of the problems would go away (and such an approach would prevent the exploitation of the regulation by manufacturers of low quality lamps). We encourage the CEC to take a fresh look at this part of the Title 20 regulation, and we suggest that your approach reflect the findings of the PIER report. The CEC may want to engage with LBL and other people experienced in the field. We would be happy to work with CEC staff to develop a proposed regulation that addresses these issues so that workable solution is found that will benefit California's lighting users.