UNITED STATES OF AMERICA

DEPARTMENT OF ENERGY

PUBLIC MEETING ON THE ENERGY CONSERVATION STANDARD FRAMEWORK DOCUMENT FOR HIGH-INTENSITY DISCHARGE LAMPS

U.S. Department of Energy
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AGENDA

P R O C E E D I N G S

MR. BROOKMAN: Let's start. Just take your seats. Good morning everyone and welcome. This is the U.S. Department of Energy's public meeting on Energy Conservation Standard Framework Document for High-Intensity Discharge Lamps. Today is Thursday, March 29, 2012 here in the Forrestal Building in Washington, D.C. My name is Doug Brookman from Public Solutions in Baltimore. So happy to see you here this morning.

We're going to start off with welcoming remarks from Lucy deButts.

Welcoming Remarks

MS. deBUTTS: Hi everyone. I am Lucy deButts, Project Manager for DOE's lighting team. Some of you may have already talked to me and some not, but Tina Kaarsberg, the previous manager is on detail, so currently I am leading the team. Again, welcome to our public meeting today. I'd like to start by reminding you that the Notice of the Public Meeting and the availability of framework document were published in the Federal Register on February 28th. It is also available on DOE's website for

stakeholders to review, so feel free to visit our website and read the documents.

Today we will provide an overview of the HID framework and analytical approaches. We will talk about the history of HID standards, scope of coverage and analyses that DOE is planning on taking. So we are looking forward to industry's input and hoping for your collaboration and cooperation in this process. So at this time, I'd like to give it back to Doug for further introductions. He is the meeting facilitator. He will set some ground rules and go over the meeting agenda.

MR. BROOKMAN: Thank you. Let's start over here. Give your name, and organizational affiliation, and this will give you practice at turning these microphones on and off. The little green button needs to be illuminated.

Introductions

MR. HOWLEY: Thanks, Doug. This is Joe Howley, Manager of Industry Relations for GE Lighting, and also chairman of the NEMA lamp section.

MS. ANDERSON: Susan Anderson, Osram Sylvania and I'm the Manager of Energy Relations.

MR. COOK: Keith Cook, Phillips Electronics.

MR. HARDING: Tom Harding, Venture Lighting.

MR. GREEN: John Green, Cooper Lighting.

MS. MAUER: Joanna Mauer, Appliance Standards Awareness Project.

MR. YOUNG: Daniel Young, California Investor-Owned Utilities, Pacific Gas and Electric, Southern California Edison and Semper Utilities

MR. MORRIS: Scott Morris, Pacific Northwest National Laboratory.

MR. MYER: Mike Myer, Pacific Northwest National Laboratory.

MR. BROOKMAN: You can just stand up, that’ll be sufficient.

MR. WALKER: Matthew Walker, Navigant Consulting.

MS. WALKER: Merry Walker, Navigant Consulting.

MS. EDWARDS: Brenda Edwards, Department of Energy.

MR. BROOKMAN: Please.

MS. THAKKAR: Mansi Thakkar, Navigant Consulting.

MS. KOHL: Betsy Kohl, DOE, GC.

MR. CHESTER: Matt Chester, Navigant Consulting.

MR. BROOKMAN: Okay. Thanks to all of you for being here.

Agenda Review

MR. BROOKMAN: All of you received a packet of information as you came into the room. In there was a copy of the agenda, and the PowerPoint slides that will be the basis for both presentation and discussion today. And also a copy of the Federal Register Notice.

I'll give you a very brief agenda review. You can see that following this agenda review and a few preparatory slides, there's an opportunity for anyone that wishes to do so, to make opening remarks, brief summary statements about issues that matter to you.

Following that we'll dive straight into the detailed content, the regulatory history, rulemaking overview, scope of coverage.

We'll take a break mid-morning, around about 10:15 or 10:30 or so. Following that, market and technology assessment, screening analysis, engineering analysis. We'll break for lunch around

about noon. Energy use analysis, immediately following lunch. Markup analysis, life-cycle cost and payback period analysis. Moving on directly to shipments analysis, national impacts analysis, life-cycle cost, and subgroup analysis.

We'll break mid afternoon as required and needed. Following the break, or whenever we get there, manufacturer impact analysis, utility impact analysis, employment analysis, environmental assessment, regulatory impact analysis.

You can see as listed in the agenda, yet another opportunity for comment at the end of the day, any issues you think have not been covered sufficiently from your perspective. I see a few things here at the outset, both Keith and Susan.

MR. COOK: Doug, I just want to ask, is there anybody on the line?

MR. BROOKMAN: I'm certain there is. We -- the Department anticipated that there would be folks on the line.

MR. COOK: Should we ask for them to introduce themselves?

MR. BROOKMAN: I'm not sure we have the capacity to do that. We know who they are, because they signed on, and their comments and questions

will be inserted in the record of the meeting. The Department's trying to make that happen effectively. Susan.

MS. ANDERSON: I'd just like to confirm if Susan Callahan from Osram Sylvania is on the line.

MR. BROOKMAN: Okay. Let me look to see. Do we -- yes.

MS. ANDERSON: Thank you.

MR. BROOKMAN: Yes, our web mistress says yes. Okay.

MR. COOK: Can she read off the names?

MR. BROOKMAN: Can you read off the names? Let's get you so you can be heard.

MS. EDWARDS: We have Austin Gilder, Carl Abramson, Dan Skorksi (ph), David Ellis, James Carl, Larry Liepso (ph), Brenda Wilson, Rachel Dickenson, Rich Ozanich (ph), Ronald Darbauch (ph), Susan Callahan.

MR. BROOKMAN: Okay. So the Department is trying hard to make these meetings accessible via the web. So, finally, I'd ask for your consideration. Please during the course of this meeting today, speak one at a time. Say your name for the record each time you speak. You don't need to say your organizational affiliation unless that's

what you would like to do. I'm going to be cuing individuals by name to speak. I also wish to encourage follow on comments, particularly the back and forth is useful to the Department as they consider these issues.

If you can, keep the focus here. Please turn your cell phones on silent mode, and limit sidebar conversations. Make sure to turn the microphone on, be concise, share the air time. There's a lot to be said and we want to be efficient here today. So that's all I have to say at the outset, then back to Lucy.

Introductory Remarks and Purpose

MS. deBUTTS: I just wanted to confirm to everyone that we are broadcasting this over the internet for those participants that cannot attend in person. They can listen in and review the slides. They can't really talk to us at this point, but they can provide their comments. Webinar provides the comment and questions feature, so we will try to address all comments and questions as they come in. We have over 30 participants registered for this webinar so far, but we'll try to reply to everyone, time permitting. The webinar questions will be treated as a secondary though, to

the group that is here. So your questions are going to be addressed first. However, as I said, we will try to answer all questions and comments.

MS. ANDERSON: Are you saying they can't comment?

MS. deBUTTS: They can comment via the comment feature within the webinar.

MS. ANDERSON: In the past, we've been able to hear them, and quite frankly, our technical people are the ones that are on the web, so really need that feature of them being able to speak and us being able to hear them as a group.

MR. BROOKMAN: I see.

MS. ANDERSON: Because they'll be the appropriate people to comment and answer some questions.

MR. BROOKMAN: So, thank you Susan, for that. Do we have the capacity for them to speak and be heard here in the room? We do have that capacity.

MS. deBUTTS: We will try to do so, then.

MR. BROOKMAN: So let's see how that works. Let's try and make that work.

MS. ANDERSON: Because we did do that last time.

MR. BROOKMAN: Yes, it's been done several different ways during the course of these meetings.

MS. deBUTTS: But regardless, as Doug said, anything that they comment on via the webinar feature, by typing in questions, will be attached to the transcript and will be treated as the regular written comments.

MR. BROOKMAN: And for those joining us via the web, welcome. I'm glad to have you with us. If you could try to either in written form, or orally, if that succeeds, try and be brief, concise in your comments. That would be helpful to all of us.

MS. deBUTTS: All right. As a last reminder, the transcript itself, including the comments that were received today from the webinar participants, and the presentation slides, are going to be posted on DOE's website shortly after this meeting. Again, as soon as we get the transcript ready, we'll post it on the web.

As for the purpose of this public meeting, it's of course to review the HID framework document that we issued. The PNNL and Navigant staff will assist DOE in presenting the procedural and analytical approaches to the evaluation of HID

standards. We will be discussing the rulemaking process itself, and the next steps that we're planning on taking, so once again, you are invited to comment on those.

In addition, we would like to get any data or information or summary comments you may wish to add to be consider while we are working on the rulemaking.

So, comment boxes. You will see the comment boxes like on this slide throughout the presentation. These comment boxes highlight the specific issues we are seeking comments on. The item numbers in these comment boxes correspond to the list of items that were listed in the framework document. Obviously, we have more issues that could be addressed, so please feel free to comment on any aspects of the materials that we're going to present today.

As far as the comment period submission, I just wanted to mention that the due date is April 12th, which is an extension from the originally published date in the framework. The comment period extension published this morning, so we would like to get your remarks by April 12th if possible.

And last, but not least, we will discuss

the avenues of submitting the comments at the end of this presentation so everyone's aware of how to submit them, where to submit them: via docket, e-mail, or by mail.

So at this time, I think my part of introductions is pretty much over, I will turn back to Doug for opening remarks.

MR. BROOKMAN: Thank you. Now is the opportunity for brief summary remarks, issues that are important to you. Who'd like to start? Joe? Alex?

MR. BOESENBERG: We are ready to comment on the individual items. We have no opening statement.

MR. BROOKMAN: Okay. Thank you. Other comments here at the outset? No additional opening remarks. Okay. So then let's go right into the content.

Regulatory History, Rulemaking Overview And Scope of Coverage

MR. WALKER: Good morning. I'm with Navigant and my name is Matthew Walker. Let's get started with the regulatory history for this rulemaking. So the Energy Policy Act of 1992 added HID lamps to the covered equipment of the appliance

standards program here at DOE. EPCA 1992 specified three requirements that are relevant to these products. The first was to conduct a determination to decide whether standards would be technologically feasible, economically justified, and have the potential to save significant energy. And DOE has completed this determination by publishing a publication on July 1, 2010, and this document concluded standards would be feasible.

The second requirement is that DOE must complete a test procedure, final rule within 30 months of completing the determination document, and DOE has initiated this process with a test procedure Notice of Proposed Rulemaking that was published on December 15, 2011.

And finally, the third requirement of EPCA 1992, which is the subject of today's presentation, is that DOE is directed to prescribe an energy conservation standard within 18 months of completing the test procedure final rule. So the time intervals put forth by EPCA bring us to the rulemaking schedule.

This slide presents the projected schedule for the intermediate stages of this rulemaking. Like we said before, the framework document was

published in February of this year, and DOE is anticipating an interim analysis being available September this year, followed by a NOPR in June 2013, and a final rule by July 2014. The compliance date for this rulemaking would be about three years after -- or would be three years after the publication of the final rule, so approximately July 2017.

I should also point out, there have been comments in both the HID determination and the metal halide lamp fixtures rulemakings that those two rulemakings should be combined in some fashion. So at this time, DOE intends to regulate each product separately, both with separate metrics and with separate rulemaking documents, but does intend to share data and decisions between the two rulemakings to coordinate the analysis and the adopted standards.

So, at the bottom of this slide, in item two, DOE is welcoming comments on any specific ways it should coordinate the development of the final rules for these two products.

MS. ANDERSON: We, NEMA, --

MR. BROOKMAN: Susan.

MS. ANDERSON: Susan Anderson, Osram

Sylvania. NEMA does agree that they should be kept separate, handled separately, and what we'd like to point out is that in the luminaire rulemaking you're only covering ballasts for new metal halide luminaries, so you're not covering anything there relative to mercury vapor or high pressure sodium. So in that respect, the rulemakings don't coincide.

MR. BROOKMAN: Okay. Thank you. Joanna Mauer.

MS. MAUER: Joanna Mauer. Just a question about the schedule. Is the interim analysis that DOE plans to publish -- is that different than what a typical preliminary TSD would be?

MR. WALKER: It is. It's very related. It has some distinctions. There will be a more substantial executive summary document, and a less substantial Chapter 2, which is usually where there's a response to public comments and discussion of decisions. And the way it's been described in the framework document is that the public comments would be saved until the NOPR for an official discussion, but of course the comments that come out in the framework document, both from this meeting and in written form, would be informing the interim analysis that's published later this year.

MS. MAUER: Thank you.

MR. BROOKMAN: Other comments on the schedule? Okay.

MR. WALKER: So between now and July 2014, DOE will consider the following seven factors in its analysis:

- It looks at individual impacts on consumers
- Individual economic impacts on consumers in the life-cycle cost analysis
- It then looks at energy savings and economic impacts on consumers as a whole in the national impact analysis
- It looks at economic impacts on manufacturers in the manufacturer impact analysis
- And DOE also looks at impacts on utility or performance, as well as any other factors the Secretary considers relevant.

Scope of Coverage

So now we'll discuss the scope of coverage that's under consideration in the framework document.

HID lamps have not been previously been regulated to this rulemaking establishes the first scope of coverage for these products. EPCA's

definition of HID lamps includes mercury vapor, high-pressure sodium, and metal halide lamps. And while low-pressure sodium lamps are often included in the HID family, they're not included in the EPCA definition or this rulemaking.

There's also another lamp technology referred to as an electrodeless HID lamp or light-emitting plasma. These lamps emit light through a process that's related to HID lamps and have a gas composition that seems the most similar to metal halide. So in item three on this slide, DOE is welcoming comment on whether these electrodeless HID lamps should be considered a subcategory of HID lamps.

MR. BROOKMAN: Susan.

MS. ANDERSON: Susan Anderson, speaking for NEMA. We do not consider them a subgroup. They're most similar to metal halide, but we consider them to be their own unique technology, and right now there are no standards at all for these lamps, and there are none in development. So there would be no reference standards for evaluating these products. And our recommendation would be that you not include them in this rulemaking.

MR. BROOKMAN: Is there a test procedure?

No test procedure.

MS. ANDERSON: Not anything across the industry.

MR. BROOKMAN: Interesting.

MS. ANDERSON: And very limited manufacturing of these products.

MR. BROOKMAN: Okay. Thank you. That was clear. Do you have any follow up questions from that?

MR. WALKER: I would just maybe ask if there was an agreed upon definition of those types of lamps that would help us understand the distinction between the two.

MS. ANDERSON: Tom, I'm going to defer to you, but not that I know of.

MR. BROOKMAN: Tom. Tom, turn the mic on.

MR. HARDING: Tom Harding. No, they're a new technology. They're electrodeless. The biggest feature is they're electrodeless, they're driven by radio frequency to heat up and then emit light. But it's done much differently than a ballast, for example, running current through electrodes. So it's kind of an altogether different technology. Been around and the analogy would be fluorescent has systems where they have electrodeless lamps, so

they're similar to that, but there are no standards, no technology work being done, simply a few companies are doing these.

MR. BROOKMAN: One thing that would be of interest to the Department is the trajectory of this product, if you think it's going to be -- there's going to be more of them, it's going to go mainstream, that sort of thing.

MR. HARDING: I wish I knew. I don't actually know, there's so few of them right now.

MR. BROOKMAN: Joe.

MR. HOWLEY: It appears to be a niche product right now, very few manufacturers, very few product sales. It's going to be competing against some other technologies. There doesn't seem to be widespread investment in this technology by the major manufacturers. So it appears to be a niche product right now that doesn't offer a lot of opportunity for either energy use or energy savings at this point.

MR. BROOKMAN: Okay. Thank you.

PARTICIPANT: Can we have the microphone?

MR. BROOKMAN: The mic's on.

PARTICIPANT: Maybe closer?

MR. BROOKMAN: Okay. I'll speak up. I'll

do that. Alex, do you want to --

MR. BOESENBERG: Just one last point. These are operated on electronic ballasts and in our scope discussions we were -- the DOE is planning to exclude those products, so this wouldn't fall under the scope then.

MR. BROOKMAN: Okay. Other comments related to the scope and these definitions? Okay, we're going to keep going.

MR. WALKER: So two of the more significant parameters considered in the framework document for the scope of coverage are lamp input wattage and correlated color temperature, or CCT. So, HID lamps span a wide range of input wattages and CCTs, and these ranges vary according to the lamp technology. So DOE is considering a subset of the available input wattages and CCTs for its scope in the framework, and those lamps that are outside of the subset have a -- represent a very small number of available products according to catalog availability, and as a result, a limited potential for energy savings.

So in summary, DOE is considering including the lamps on the table on this slide:

- metal halide lamps between 50 and 2000 watts and between 2500 and 6999 Kelvin;
- mercury vapor lamps between 50 and 1000 watts and between 3200 and 6800 Kelvin;
- and high pressure sodium lamps, 50 to 1000 watts and between 1900 and 2700 Kelvin.

Then from this table, DOE is considering excluding certain types of lamps, and those include:

- HID lamps designed and labeled for use with electronic ballast only;
- Directional HID lamps
- Self-ballasted HID lamps
- Colored HID lamps, and
- Specialty application mercury vapor lamps.

And similar to what I just said a few minutes ago, these lamp types represent a very small portion of the available products according to catalog availability, and therefore a limited potential for energy savings.

So this brings us to two items for comment on the scope of coverage. In item four, DOE is welcoming comment on its decision to define the scope of coverage using rated wattage instead of lumen output, as well as the specific range of

wattages included in coverage. I'll go ahead -- we'll just leave it at that and pause for that one.

MR. BROOKMAN: Yes, Joe.

MR. HOWLEY: In terms of the ranges of products to be covered, we believe that the 50 to 1000 watt category in all three products represents the high volume, general lighting use category, so that would include metal halide as well. Although there are metal halide products that are over 1000 watts, these tend to be niche products for specialty applications, such as sports lighting, which are operated for fairly low periods of time, and they have relatively short lives as well because of the high lumen output requirements. We don't believe that that particular specialty product category should be regulated above 1000 watts.

Would you like me to comment on item five as well?

MR. BROOKMAN: Why don't you read it, Matthew?

MR. WALKER: Sure I'll read it. So in item five, DOE is welcoming comments on the decision to exclude certain types of lamps and specifically, on unique characteristics of colored HID lamps that can be used to characterize and define that

exclusion.

MR. HOWLEY: And we would agree that these do represent niche product categories and they should be exempted. The areas that you have listed here, certainly would qualify. There may be some additional categories as well, such as high CRI, low color temperature lamps, such as the high CRI, high pressure sodium lamps that are on the market. We'd also recommend they be treated as a niche exempted category. We may have further comments as well as we review this a little more carefully.

MR. BROOKMAN: Okay. Thanks, Joe. Yes, Susan.

MS. ANDERSON: Yes, we also had a comment on the color temperature range covered for metal halide. We would stop it at 6000 Kelvin, because any lamps that are available that are at higher color temperatures, are for very specialized applications, like aquarium lighting. They're not used for general application lighting.

And then the other thing to note is that there are specialty application metal halide lamps that also need to be taken into consideration.

MR. BROOKMAN: They wouldn't be included in these?

MS. ANDERSON: No.

MR. BROOKMAN: Oh. So what would the definition of -- what would be their specifications?

MS. ANDERSON: We actually have comments on that further on. We plan to provide some definitions to help guide the DOE on what would include specialty versus general lighting.

MR. BROOKMAN: Okay. Thank you. That's good. Other comments on these scope of coverage issues? Yes, Daniel.

MR. YOUNG: Yes, Daniel Young. With regards to electronic ballasts, our understanding is that the trajectory of the market is trending towards metal halide electronically ballasted products, and within three or five years this may represent a much larger share of the market. Does DOE or other manufacturers have any other comments on that?

MR. BROOKMAN: Susan.

MS. ANDERSON: Most of the electronic ballasts are being developed right now are for the metal halide family, and typically right now they are very low wattage, though we have some higher wattage ones on the market. How fast they become adopted by the market may depend very much on the

metal halide luminaire rulemaking, and what ballast efficiency standards are set there.

MR. BROOKMAN: That means you don't know. Keith.

MR. COOK: Keith Cook. You have -- basically the problem, I think, is the fact that we have such a huge installed base already with magnetic ballast, that even as this grows and the growth has not been huge, it's still going to be a very, very small percentage of the installed base, even going forward.

MR. BROOKMAN: Thank you. Those are all very useful comments. Final comments before we move on?

MR. WALKER: I was going to ask a follow on.

MR. BROOKMAN: Please.

MR. WALKER: I was going to say one thing if it was possible, if NEMA was able to provide specific shipment percentages of some of these excluded lamp types to support the niche application and limited potential for energy savings.

MR. BROOKMAN: Alex.

MR. BOESENBERG: For this subject and a few others on the list of items, NEMA is open to

discussing if we can reach an arrangement to provide data, yes. I can't promise it. It depends what you ask, how you ask it and what data we have and how we can parse it up. But we're open to that discussion.

MR. BROOKMAN: You'll be the point of contact --

MR. BOESENBERG: Yes.

MR. BROOKMAN: -- for that discussion? Yes. Joanna. Oh, you want to -- yes.

MS. deBUTTS: We received a question from the webinar participant, and Larry Liepso (ph) -- I apologize for not pronouncing the name correctly -- he's asking why self-ballasted lamps are not included, because they're fairly efficient.

MR. BROOKMAN: What's the category again?

MS. deBUTTS: The self-ballasted lamps.

MR. WALKER: Self-ballasted HID lamps?

MR. BROOKMAN: Susan?

MS. ANDERSON: Susan Anderson. I mean the two families where you have self-ballasted lamps, the original ones are self-ballasted mercury vapor lamps that were basically incandescent replacements, and the volume is very, very low. It's been dying for years. The other, a couple of companies, my company being one, we have self-ballasted metal

halide that's actually a replacement for halogen, and the main market for that is retail. But it's long-lived and much more efficient than the halogen. But once again, it's a small market application. Niche market.

MR. BROOKMAN: Okay.

MS. deBUTTS: Thank you.

MR. WALKER: I think that's all.

MR. BROOKMAN: All with that. Yes, Joanna.

MS. MAUER: Joanna Mauer. I think, Joe, you were mentioning the high CRI HPS lamps. Do they provide some different utility than metal halide lamps, or what's the application for these types of lamps?

MR. HOWLEY: It just gives architects or landscape designers a different color palette to paint with light, if you will, so it's a very low chromaticity, so it's only 2200 degrees Kelvin. It still has a very large yellow component, but it provides a high color rendering index at a very low chromaticity. It is -- there's very few applications for it. There's a few applications for it, but it would definitely qualify as a niche product category. It's not growing. It's used in a

few, mostly outdoor -- specialty outdoor kind of applications for highlighting various finishes. Provides a different effect.

MS. MAUER: Okay.

MR. BROOKMAN: Yes, Daniel.

MR. YOUNG: Daniel Young. Just a follow on question to that. What's, I guess, kind of the efficiency penalty for going up to a higher CRI? Is it a big difference?

MR. HOWLEY: I'd have to look at the catalog, but I -- they're still very efficient. It's still high pressure sodium, so it still has a very high efficiency relative to other light sources.

MR. BROOKMAN: Additional comments before we move on? Okay.

MR. WALKER: All right, so item six continues with comments on exclusions and this one is welcoming comments on whether lamps for special applications have defining characteristics that differentiate them from lamps used for general illumination purposes, and in addition, whether the specialty applications that are relevant to mercury vapor technology can be served by high pressure sodium or metal halide technology.

MS. ANDERSON: Susan Anderson, speaking for NEMA. I want to start with the mercury vapor versus metal halide and high pressure sodium first. You cannot substitute metal halide or high pressure sodium for mercury vapor in those applications, because it is the UV output of the mercury vapor that is essential in those applications.

MR. BROOKMAN: Pardon me, Susan. Are you getting her? Just a little closer. You're coming across great here.

MS. ANDERSON: All right. So there really isn't an exchange possible there. You don't get the same output. And then in terms of other specialty application lamps, both when you look at mercury vapor and metal halide, they're generally short arc tube lamps, very short arcs, so you get very precise, optical control and very high internal pressures. In fact many of them can't even be shipped unless they're within a protective container and the way the equipment maintains them that utilizes them, it has protective coverings around them because they can experience non-passive failures. So they are very specialized.

In other cases, they have very short usable life because they're required to have very

high lumen output for the applications where they're used, so when you get into lumen maintenance, they can't be used in applications where the general lighting lamps are. In many cases, in fact Alan found one base in common for most of those lamps.

And others that you run into -- specialty -- we've mentioned plant growth, we've mentioned color-corrected high pressure sodium, we mentioned aquarium lighting. So for like for plant growth, they're lamps that give you light output in the blue spectrum and the red spectrum, because that's all that plants care about, so they're not really suitable for general lighting applications. Aquarium is very high color temperature that's not acceptable in general lighting applications. So there are specialized features about them, and NEMA plans to provide you with definition guidance to help you exclude those items and make it clear so that it's much -- so there's no confusion as to what's general lighting versus what's specialty.

MR. BROOKMAN: Okay.

MS. ANDERSON: The one family where there may be some issue are the clear mercury vapor lamps with medium screw bases and mogul screw bases and medium skirted screw bases. They are used, you see

them used, for outdoor illumination. They're the ones that turn green as they get older. But they also have a utility as a UV curing, and for inspection purposes. So that's the one family that there may be some -- we need to very closely define or label the lamps in some way.

MR. BROOKMAN: Should they be included or excluded?

MS. ANDERSON: In the sense that they can be used for general lighting applications, which would typically be outdoors, in less color-critical applications, they should be covered. But I think there needs to be some provision for the UV curing and the inspection applications, because they are widely used for that.

MR. BROOKMAN: And it would be a separate definition?

MS. ANDERSON: We'll try to work out something, try to work with DOE and Navigant and PNNL.

MR. BROOKMAN: Okay. Well, thank you, that was very helpful. Daniel.

MR. YOUNG: Daniel Young. Just a follow on question to that. Is there -- what about LEDs? Could those be used in the specialty applications?

MS. ANDERSON: You have some LEDs with UV output, but really the UV output of LEDs is pretty limited at this point, and not sufficient for those applications. You have short arc to high pressure mercury vapor lamps, for example, that are used to etch the circuitry on silicon chips, and you would never get the output from LEDs at this point in time for that type of application.

MR. BROOKMAN: Okay.

MR. YOUNG: Thanks.

MR. BROOKMAN: Joanna.

MS. MAUER: Joanna Mauer. Just another clarification question. Susan, all of these types of mercury vapor lamps that you're talking about, these are ones that are used with ballasts that are exempted from the --

MS. ANDERSON: In the case of mercury vapor, they are exempted based on, if we go back to EISA 2007, but metal halide was never considered at that point, because it was only mercury vapor ballasts that had been eliminated.

MS. MAUER: Okay. So it's mercury vapor lamps that are using ballasts that are exempted from the --

MS. ANDERSON: The ballasts are specially

labeled right now, for specialty application only, so I'm thinking we could do something similar for clear mercury vapor lamps that are used for the UV curing and the inspection processes.

MR. BROOKMAN: Okay. There are several distinct pieces of information that the Department is asking about in item six and seven, particularly I call your attention to item seven, "any additional lamps that should be excluded from the scope of coverage." Yes, Keith.

MR. COOK: Keith Cook. Basically, the one thing that was in the written text which is not included so far in this is whether or not standby mode should be included. And standby mode does not apply, really, to lamps. It's an electronic driver which is excluded anyway. We also, though, agree with the current coverage except as Joe pointed out earlier, we think it should be stopped at 1000 watts - above 1000 watts is -- should be also excluded, because it's not a general lighting.

MR. BROOKMAN: Okay. Additional comments on these two. Look at them. Defining characteristics and also specialty applications, and then in seven, exclusions. Nothing additional. Okay.

MR. WALKER: All right, so we'll move on to metrics. DOE is considering several metrics for assessing the performance of HID lamps. The first will be initial lamp efficacy. Initial lamp efficacy is the ratio of light output to input power at the beginning of the life of the lamp. An alternative metric could be a maximum input power, or maximum input wattage. In this case, DOE would establish a maximum input wattage for a given light output or range of light outputs.

So these metrics cover omni-directional lamps, which are lamps that cast light in all directions. But if DOE were to include directional lamps in the scope of coverage, it would plan to pursue a different metric.

So this slide goes over possible metrics that could be employed if directional lamps were included. Center beam candle power and beam (or zonal) lumens could be possibilities. Center beam candle power or CBCP measures the intensity of light at the center of the beam angle, and DOE could require a minimum CBCP for a given lamp shape diameter or input power. And alternatively, for beam lumens, DOE could require a minimum beam lumens or zonal lumens per watt for a particular lumen

output, or input power range.

So this slide provides opportunities for comment on the metrics. In item 13, DOE is asking for comments on the use of efficacy as a metric for omni-directional lamps, and then item 14, essential metrics that could be used if directional lamps were to be included. Though from the discussion that we've had so far, the interest seems to be for them to be excluded.

MR. BROOKMAN: Okay. We'd like to get further confirmation, I believe. Susan.

MS. ANDERSON: Well, I notice that you skipped over several items.

MR. BROOKMAN: Oh.

MR. WALKER: You mean in terms of the numbering?

MS. ANDERSON: Yes.

MR. WALKER: The numbering doesn't match the framework document. The numbering matches the comments that you would have seen in the framework document, but are not necessarily in the same order.

MR. BROOKMAN: But everything in the framework document you'll cover rather systematically?

MR. WALKER: There may be one or two

exceptions where an item is left out, but there's still an opportunity for that to be done in a written comment.

MR. BROOKMAN: So I don't want to -- it looks like you're very well prepared. We don't want to mess you up.

MS. ANDERSON: We can -- so long as we have the opportunity to comment there.

MR. BROOKMAN: Great. We'll make sure you've got that. Okay. Let's try and -- I think it's useful to make the comments as they fit with the order of the slides. It's better for the record, I think.

So you can see item 13 and 14, potential metrics in HID lamp conservation standards and also, let me see, differentiating between center beam -- well, the center beam intensity metric. Susan.

MS. ANDERSON: Susan Anderson. We absolutely agree that the lamps should be measured based on initial lumen output. Our standards are, Tom, I believe, you measure them at 100 hours, so you have achieved lamp stability. We also had, in our earlier comments when we did the test and measurement procedures, we had recommended that you use the definition for lamp efficacy that's in IES

RP16. On double checking it, we find that they don't define lamp efficacy. They define luminous efficacy, which is the lumen output of the lamps divided by the input wattage, which is what you're going after. So our recommendation would be that you still use the definition in RP16, but perhaps you should use the term lamp luminous efficacy as the appropriate term.

Then in terms of other measurements, say for directional lamps, the DOE has already suggested discarding these and excluding them from this particular rulemaking, and NEMA definitely agrees with that. And if that's the case, then you don't need to come up with metrics for those, specific to those lamp types.

MR. BROOKMAN: Joe.

MR. HOWLEY: Yes. We would agree with that, that there is very limited use of directional lamps in the HID area, and it certainly -- new metrics based on zonal lumen, center beam candle power, would be complex to develop. They have not been developed yet and don't think it would be appropriate to develop them in the HID family. We recognize there's other rulemakings going on that deal more with directional lamps that might be more

appropriate to develop such metrics, but we wouldn't recommend developing them here.

MR. BROOKMAN: Susan, you were speaking on behalf of NEMA, and Joe as chair of that section, you're reinforcing what she said.

MR. HOWLEY: Yes, that's correct.

MR. BROOKMAN: Thank you. Okay. So then any additional questions you have about this? No? No additional. Joanna.

MS. MAUER: Joanna Mauer. My understanding is that lighting designers typically use mean lumens when choosing lamps and fixtures, and then if you have a lamp that has poor lumen maintenance that you'd have to use lamps with higher wattages or use more fixtures. And so that lumen maintenance has a direct relationship to energy use in the field. So I'm wondering if DOE is considering including or incorporating lumen maintenance somehow in the standards?

MR. WALKER: For now the plan per the framework document is that when considering more efficacious and lower energy-consuming replacements, and when considering the effects of standards, that those replacements would be -- make sure that those replacements could have the same lamp lumen

depreciation, LLD, mean lumen output. I don't know if that answers your question exactly. Maybe a manufacturer could speak to the relationship between initial efficacy and mean efficacy.

MR. BROOKMAN: Let's let Joe try. Joe, go ahead.

MR. HOWLEY: Yes, just want to make a comment that lighting designers do consider that but recognize that this standard is for all HID lamps in all applications. New construction, new design represents just a small percentage of sales in any one year. So when you're considering the 95 percent or more of installed base that these lamps would go into, it doesn't really have any effect because the user would have to use a lamp that's appropriate for that fixture. HID lamps are very difficult -- systems are very difficult to use other sources. You're typically locked into to a certain HID system once that's designed and installed.

With regard to new installation, there is a separate rulemaking going on with the ballast that will more directly affect those new installations, as opposed to this rulemaking, which is going to have a much bigger effect on existing installed base, which is really how we should be looking at

this rulemaking.

MS. MAUER: This is Joanna Mauer again. And in the existing installations, would lumen maintenance affect the wattage of lamps that you would install?

MR. HOWLEY: No, it only affects how fast you lose light output, but the wattage is the same, so there's no energy impact on that.

MS. MAUER: But if you're moving towards a lamp that's much more efficious, you might kind of go a step down in wattage to account for the extra lumens you're getting at the same wattage?

MR. HOWLEY: If that was possible, but it often requires a different fixture, a different ballast to do that, and in some cases -- there may be a few opportunities where that's possible, but it's limited right now, and most HID systems, the user really doesn't have a lot of options.

MR. BROOKMAN: Because of the installed base.

MR. HOWLEY: Well, yeah, they're just technically not a lot of options for the user to say if they're using a 250 watt metal halide, they really don't have the option of putting 175 watt metal halide lamp in there. It's not like

incandescent. The ballast is driving that lamp at a specific wattage. If you put 175 watt lamp in there, the ballast will try to drive it at 250 watts, will overdrive it and give you very short lamp life if they try to do that. And probably violate UL ratings and other things if you tried to do that. So it -- it's much more difficult for users of existing systems to lower the wattage of those systems.

MR. BROOKMAN: Susan, you want to add on? No. Okay. Alex.

MR. BOESENBERG: Alex Boesenberg, NEMA. I just wanted to point out that we will include some comments relative to this under item 38 and 39 where questions are asked about group relamping and relamping practices as well as maintenance and repair of HID lamps, ballasts, and fixtures. And it's pretty much the same answer. No, we don't think anything's going to change, and no, it's not economical often, to repair one of these devices, you just replace them.

MR. BROOKMAN: Okay. Thank you. Final comments here?

MR. WALKER: Okay. So we had a break on the agenda, but we're doing pretty well.

MR. BROOKMAN: We've only been at this for about 50 minutes. So keep going.

MR. WALKER: Okay. Keep on going.

Market and Technology Assessment, Screening Analysis

MR. WALKER: Let's start with the discussion of the Market and Technology Assessment, followed by the Screening Analysis. You can see on this flow chart that decisions and information thought about in these two steps flow through to the rest of the interim analysis.

So in the market technology assessment, it serves two main functions. First would be to determine equipment classes and the second to identify technology options that can be used to increase efficacy. And in the screening analysis, DOE examines its list of technology options from the technology assessment, and determines which ones should and should not be considered in the engineering analysis.

So we'll move into the first output of the market and technology assessment, which is equipment classes. And equipment class establishes the category of lamps that are subject to the same standard, and so in considering potential groupings, DOE looks at criteria such as capacity of the

product, type of energy use, and other performance-related features such as those that affect consumer utility.

So in the framework document DOE outlined equipment classes on the basis of CCT and initial light output, and DOE did not consider separating equipment classes based on lamp technology because it determined CCT effectively segregated those groups, or segregated high pressure sodium from metal halide or mercury vapor.

If we look at CCT in a little more detail, HID lamps are available with a variety of CCTs, but equipment usage indicates that consumers specify lamps of particular CCTs for certain applications. For example, the higher CCT of metal halide lamp is preferred to the lower CCT of a high pressure sodium lamp in an indoor warehouse application where people would be moving about. And so this indicates consumer utility on the factor of CCT. And then based on a review of catalog information, it does indicate that initial efficacy varies with CCT.

So based on the difference in efficacy and the presence of consumer utility, DOE is considering establishing equipment class on the basis of CCT.

So the table at the bottom of this slide

shows the three CCT ranges under consideration in the framework document. The 1900 to 2500 range would include high pressure sodium lamps, and the 2501 to 5000, and 5001 to 6999 would include metal halide and mercury vapor.

So I'll go over the second class-setting factor.

MR. BROOKMAN: You want to comment here, Susan? You can do that.

MS. ANDERSON: Well, just a comment that we made earlier, that the highest temperature range should really be capped at 6000 because anything above that is more than likely aquarium lighting.

MR. BROOKMAN: Okay. Thank you.

MR. WALKER: Okay. So if we look at the second class setting factor, which was initial light output, again, HID lamps are available with a variety of light outputs, input powers, and while light output and input power are highly correlated, DOE decided to use light output as the class setting factor because it's the feature more directly valued by the customer. And again, customer light output preferences vary by application. For a high ceiling, the customer would require a higher light output lamp than for a lower ceiling or a short pole.

So this indicates the presence of consumer utility and again, a review of catalog data indicated lamps of increased light output or increased input power, were generally more efficacious. So based on the difference in lumen efficacy and consumer utility, DOE considered establishing separate equipment classes based on initial light output.

So this table outlines the equipment classes for two of the three CCT ranges under consideration, and again, moving forward, if directionality and ballast location are not factors for this rulemaking because directional lamps and self-ballasted lamps have been excluded, they would be removed from tables such as these. And I also want to point out that the lumen ranges that you see on the far right-hand side of the table, have the potential to be collapsed into much fewer categories as we'll discuss in the engineering analysis, because DOE is considering an equation-based approach that could span more than one of these ranges.

So this brings us to two items for comment on equipment classes. In item 16, DOE is generally requesting comment on the equipment classes and

additional approaches that could be used that are in accordance with this requirement, and specifically, input on the proposal to establish equipment classes based on light output, rather than rated wattage, as well as on CCT, and the appropriateness of the specific lumen output and CCT ranges selected. I know we've heard on the 6999 range, but we could also look for comment on the other ranges as well.

MR. BROOKMAN: Susan.

MS. ANDERSON: Okay. NEMA disagrees with setting these standards based on lumen ranges. We plan to provide an alternate proposal that will be wattage-based, because of all of our tested measurement is done at wattage, all the standards are based on wattage, and quite frankly, lamps are locked into fixtures based on lamp ballast compatibility and wattage.

Also, besides color temperature impacting lumen output, you also have coated versus clear lamps. Generally, coated lamps have a lower lumen output than clear lamps , yet there's a specific utility for the coated lamps. You have things like our standby lamps, which are double arc tube lamps, that have two utilities specific to them. One is longer lamp life, and the other is a safety issue.

Those are generally lower lumen output. You also have protect lamps, where you have a shroud around the arc tube to provide special -- additional containment properties, so it's another safety issue. In fact, in your opening slide, you had two protect lamps, shrouded lamps, pictured there. That generally impacts lumen output.

So, as I said, NEMA will be providing an alternate proposal that will be wattage-based.

MR. BROOKMAN: Thank you. Additional comments here? Do you want to talk -- do you want to give them any initial thoughts about the many different ranges listed here in this table?

MS. ANDERSON: Well, one thing we found when looking at these ranges, for a given wattage you could have a coated or a protect or a standby lamp in a different category from where the clear version would be. So that's why we think you need to take those things into consideration and do a wattage-based system, rather than a lumen based system.

MR. BROOKMAN: Joe, you want to add on here?

MR. HOWLEY: This was in line with what Susan was saying, that you could have a single

wattage lamp and have it be in two different categories simultaneously, depending on some of the physical construction of the lamp or even depending on testing variability. There is a wide tolerance range on these particular lamp types with regard to lumen output, which could vary by testing facility or other measurements and we believe this would create a lot of issues and problems going forward in trying to determine exactly where a lamp falls in what lumen category. Which is why we're going to suggest that the proper way to differentiate this product line is by wattage, not by the lumen output.

MR. BROOKMAN: Matthew, did we address 17? I don't think we did.

MR. WALKER: Well, Susan got into it a little bit. I mean this 17 lists some of the other factors that DOE might consider for equipment classes, including operating position, open versus enclosed fixture rating, CRI-based type, the bulb finish.

MR. BROOKMAN: If NEMA's going to come back with a different proposal based on wattage, this is still relevant, right? Shouldn't you comment on 17 as well? Susan.

MS. ANDERSON: Seventeen does include some

of the things that we've talked about, for instance, the enclosed versus open -- that would be the protect lamp is suitable for an open fixture, where an unprotected lamp would typically be used in an enclosed fixture. We've addressed -- well, we talked about color temperature, not necessarily CRI, but in some cases, in some technologies, when you improve CRI, you're doing it by adding a coating and that lowers the lumen output, the fact that you've added the coating.

And if you look at metal halide technology, we changed the chemistry so a lot of times the 4000, 4200 Kelvin lamps are higher lumen output than the 3000 Kelvin, yet they both have utilities, you know, depending on the application. And coated versus clear, we've already talked about that.

When you talk about base type, lamp orientation specific, for instance, most of us have higher performing probe-start metal halide lamps and they are position-specific, so there's a specific lamp for a horizontal, specific lamp for base up, and specific lamp for base down. And we change the arc tube configuration based on where -- the position the lamp's going to be operated in. So

that doesn't necessarily affect lumen output, so long as they're used in the correct position. But then again, if you do have a universal lamp, say, and that would be most typically in standard probe-start technology, that's a lamp that has a higher performance in a vertical position, base up or base down, than it does in horizontal, but yet there's a utility for those lamps in the fact that if you have an aiming application, you can't use a restrictive position lamp in those applications.

You also have an issue that we use position-oriented mobile bases on those position-specific lamps, and they won't fit in a standard socket, which would be in many fixtures, and you also have issues with end users misapplying lamps. And one of the great things about the universal burning lamp is that you cannot misapply it. It can be used in any position.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. One, I guess, housekeeping comment, relative for that, is that table 3.1, the initial proposed classes based on lumen range, as we've stated clearly, we are developing a NEMA proposal for a wattage-based approach, but just one housekeeping note relative to

that table is it includes direction, self-ballasted and things like that, and as has already been discussed, those are outside of the scope per the DOE's initial determination. So, if that table is kept, and we recommend you don't keep it, you should at least pull those things out of it.

MR. BROOKMAN: Okay. Thank you. And I just wanted to -- so you need to be submitting that rather quickly, right, since the comment period ends April 19th.

MR. WALKER: Twelfth.

MR. BROOKMAN: Twelfth. I tried to give you an extra week.

MR. BOESENBERG: Yes. It will be as quickly as possible.

MR. BROOKMAN: Thank you. Trying to slip that in there.

MR. BOESENBERG: Yes, we understand the deadline and I've got what we think is the final draft of that table, we're just not ready to show it to you today until everyone's had a chance to see it.

MR. BROOKMAN: Good. I'm sure the Department appreciates your getting that done. Additional comments? Yes, Daniel.

MR. YOUNG: Yes, Daniel Young. I had a question for NEMA about the change to a wattage-based system. My understanding is that the efficacy is a component of the wattage and the lumen output, and efficacy being the thing that we're trying to regulate, I'm just a little confused about since one kind of leads to the other, what the difference is.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, in HID, if a ballast is designed to operate a 400 watt lamp, it's designed to operate a 400 watt lamp. So if you've got a 400 watt lamp, it doesn't matter whether it's 35, 36,000 lumens initially, or 42,000 lumens initially. Remember, most of these are sold into existing installations, the fixture installation is the fixture installation. The ballast is the ballast. If that system uses 450 watts, it's not going to matter whether it's a 36,000 lumen lamp or a 42,000 lumen lamp. There's no energy savings to be realized.

MR. BROOKMAN: Daniel.

MR. YOUNG: Right. I understand that. I guess my question is, doesn't that just make one lamp perhaps not meet the standard and one that does meet the standard?

MS. ANDERSON: But the whole purpose of this rulemaking is to realize energy savings.

MR. YOUNG: Sure, right.

MS. ANDERSON: There's no energy savings.

MR. YOUNG: So I think maybe --

MS. ANDERSON: The rulemaking that's covering the ballast and the new metal halide luminaries, that can result in energy savings, and that can determine then, the lamp that's used in that luminaire. Like what's already in place, because of EISA 2007, if it's between 150 and 500 watts, it has to be pulse-start. And pulse-start, in general, has better performance than probe start. So that is providing for additional energy efficiency. This would not.

MR. HOWLEY: I think in this particular case, just a follow-on. For instance, let's consider the case with HID lamps, there's a 400 watt mercury vapor lamp and a 400 watt metal halide lamp and they both use the same amount of wattage. If, for instance, the standard was set such that the 400 watt mercury vapor lamp couldn't meet it, the user of that system would have to replace their entire system, would have to replace their fixture, and the theory then is once they have to replace that

fixture, they would replace it with either high pressure sodium or metal halide at a much lower wattage for the same light output. And that would drive energy savings.

This is one case where often it's a whole system change that's required as these older inefficient systems go away. It does put a much greater burden, though, on trying to show cost-effectiveness, since the users in the HID world typically are going to have to invest somewhat significantly once these -- if lamp types are eliminated. But it would then ultimately produce energy savings as they switch to a different technology. They may even switch to an LED technology if it's an outdoor fixture, but it would force their hand to do something.

MR. BROOKMAN: Okay. That was good. Thank you. Yes.

MR. WALKER: So that's all for equipment classes. So we'll move to the second main function of the market and technology assessment, which is development of the list of technology options that can be used to increase lamp efficacy. These technology options are based on those used in commercially available lamps as well as working

prototypes.

So this slide and the next goes over options identified for each lamp technology. So starting with mercury vapor lamps. These lamps have been heavily replaced with metal halide and high pressure sodium, and DOE is not aware of options for the mercury vapor lamp itself, but rather use the transition to other lamp technologies as the pathway to increased efficacy and reduced energy savings -- I mean, reduced energy use.

So then moving to high pressure sodium lamps, catalogs indicate a range of high pressure sodium efficacy exists, but DOE is not aware in the framework document of specific options used to achieve these different efficacies. DOE is also not considering other lamp technologies to be substitutes for high pressure sodium, just contrasted with the mercury vapor situation.

And then finally, we have metal halide lamps, and the table on this slide describes some of the options available for increasing the efficacy of these types of lamps.

- First the use of pulse starting rather than probe start;

- The use of ceramic material in the arc tube as opposed to quartz;
- The use of formed or offset electrode arc tube design;
- The use of novel gases or different gas compositions within the arc tube; and finally,
- New electrode designs or fluoro… materials could reduce losses in the electrodes, and just in general, all of these methods could increase the efficacy of metal halide lamp.

So item 18 welcomes comment on the technology options identified in this section for all three lamp technologies, as well as any additional options that should be taken into account.

MR. BROOKMAN: Joe.

MR. HOWLEY: Just a few comments, perhaps one on the pulse start versus probe start technologies. The pulse start lamps aren't necessarily more efficient than the probe start lamps if you're looking at initial efficiency. Also an existing user of a probe start system, which are the older metal halide systems, can't just switch to a pulse start lamp. They would have to put new

ballasting system in that fixture for that to operate.

MR. WALKER: Right.

MR. HOWLEY: So there are limitations to some of these technology options.

MR. WALKER: I mean that sort of transition would be accounted for in the engineering analysis, transition from probe to a pulse start lamp would also require a purchase of a new pulse start ballast.

MR. HOWLEY: Right, and it's already occurring as well, and I know you're to consider other rulemakings, but there's another rulemaking on fixtures that is basically also already forcing this transition in new fixture design where it's the most cost effective. We do not believe this would be cost effective for existing users, but the way to do it is to transition it through the new fixture design, the fixture rulemaking. But I'm sure in the analysis you'll take that into account.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, I was just going to say it's not just the ballast that also has to be changed. If you were to try to retrofit a fixture, you also have to change the socket. You have to

change the wiring in the fixture, because what's there for a probe start system is not rated to take the high voltages required for the pulse start system. So that's why, in general, if they could not buy replacement lamp, they would have to go to an entirely new luminaire.

MR. BROOKMAN: Okay.

MS. ANDERSON: So for some end users, that could be a huge financial impact on them. And, you know, further on in here you talk about incentive programs. Well, the incentive programs for HID are generally for outdoor applications, and it's usually for eliminating HID and going to LED. It's not for installing HID. And, in fact, the fluorescent programs, incentive programs, are taken, when you look at a tear out applications, are actually incentivizing people to go from HID to fluorescent. So there's a declining market for HID lamps. They're being hit from multiple sides.

MR. BROOKMAN: Okay. John.

MR. GREEN: Yes, John Green. As a fixture manufacturer, I totally agree with what Susan said about rewiring and what's necessary to change over a fixture. There's also another item. We have to add a starter into this new electrical circuit for a

pulse start lamp, and many fixtures may not be able to handle the additional components.

MR. BROOKMAN: They won't fit?

MR. GREEN: They won't fit. There's just no place to put it, correct.

MR. BROOKMAN: Okay. Daniel.

MR. YOUNG: Daniel Young. So I understand there are some products that are built to work as a pulse start lamp on a probe start ballast. So just a note for DOE to make sure to take those into account.

MR. BROOKMAN: Okay. Keith.

MR. COOK: I think you're referring to some of the new ceramic metal halide type lamps, like the all-start, and yeah, they can be replacement, but they very -- also very efficacious too.

MR. BROOKMAN: Joanna.

MS. MAUER: Joanna Mauer. Just on the ceramic metal halide, I think DOE said in the framework document that it's considering ceramic metal halide as a technology option for lamps up to 400 watts, because that's maybe what's on the market currently. But I think we just encourage DOE to consider not just where the technology is being

applied today but where it is kind of evolving, and where it may be or could be applied, and if it could be applied to higher wattage lamps if we're talking about a standard that won't go into effect until 2017 or so.

MR. BROOKMAN: Thank you. You can see several different technology options there. I don't think we've covered all of these yet. I'm quite sure we haven't. So additional comments on -- additional thoughts on technology options. Daniel.

MR. YOUNG: Daniel Young. Just a quick comment. Someone noted that a lot of the incentive programs are pushing people away from HID, but I just wanted to make the comment that we have rebate programs that are focused on pulse start metal halide and ceramic metal halide technologies.

MR. BROOKMAN: Those are the companies you represent in California?

MR. YOUNG: Yes, California Investor-owned Utilities.

MR. BROOKMAN: What about the rest of the country? Do you know about that?

MR. YOUNG: I don't.

MR. BROOKMAN: Okay. Susan. No? Nothing additional? Additional -- yes, Daniel.

MR. YOUNG: One more thing. Daniel Young. So again, on the previous slide there's a sentence that says DOE does not consider other lamp technologies to be substitutes for HPS. Does that mean that DOE doesn't include LEDs as substitutes for HPS, or is that not something that's relevant to this right now?

MR. WALKER: I think the intention of that statement was looking at the HID world.

MR. YOUNG: Sure. Thank you.

MR. BROOKMAN: Okay.

MR. WALKER: Can I ask a follow-on to John, on fixtures? So, I was wondering if you could comment on the extent to which a customer would have to purchase a new fixture if they're converting a mercury vapor installation to high pressure sodium or metal halide?

MR. GREEN: John Green. I'm not sure I understand the question.

MR. WALKER: I guess I'm asking if a new ballast, igniter, lamp could be installed in the existing enclosure --

MR. GREEN: For mercury --

MR. HOWLEY: For mercury vapor fixture and simply retrofit the guts into a metal halide --

MR. GREEN: That's probably even less likely than if you had a probe start metal halide current fixture and tried to fit a pulse start into it. Mercury vapor fixtures would be even less likely to accommodate pulse start.

MR. BROOKMAN: You're better off pulling it all out and putting in something entirely new?

MR. GREEN: Well, the fixture is something -- you mean the entire fixture, yes, that's true. You'd have to probably just consider replacing the entire fixture.

MR. BROOKMAN: Susan.

MS. ANDERSON: This is going back to my days when I was a … fixture rep. But there's also something called redirected energy, and you have to make sure that the arc tube is correctly positioned within the optical system of the fixture, and if it's not then the reflector can redirect energy back into the arc tube and cause the arc tube to self-destruct. So if you try to retrofit, there's a lot of things you have to take into consideration beyond just whether you have the right operating system or not.

MR. BROOKMAN: Okay. You okay? Get to the microphone, please, Merry. Say your name for

the record.

MS. WALKER: Merry Walker. As a follow-up to John's comment about replacing mercury vapor lamps with --

MR. BROOKMAN: Merry, get close.

MS. WALKER: -- pulse start metal halide, were there any issues with replacing mercury vapor with a probe start metal halide, or just with the pulse start?

MR. BROOKMAN: John.

MR. GREEN: Yeah, the probe start metal halide would probably be a more likely fit. It's so dependent on how the fixture was originally constructed. But there are differences in light center lengths and things that make the optics work correctly, so it's not just an electrical issue, it's a matter of are you distributing light correctly as well. And will the optical system work with the other source. So there's a lot of variables and that's why I hesitate to give you a pat answer. But the probe start would be a more likely fit, at least from the electrical component viewpoint. I don't think I can say any more than that at this point.

MR. HOWLEY: And maybe just -- industry

experience hasn't been that people retrofit mercury vapor fixtures to the other technologies. We just don't see it done. What we see done is brand new fixture. They might use the same pole, but they put a brand new fixture on that pole, that's either designed specifically for metal halide or high pressure sodium.

MR. BROOKMAN: John, follow on. Just for the record, thank you, Joe, and now back to John.

MR. GREEN: John Green again. I think that's a good point Joe made, because most of the mercury vapor fixtures that are out there are probably very old. Mercury vapor lasts a long time, so if someone's going to the expense of trying to retrofit an electrical system, they're probably going to just go ahead and do the entire fixture change out.

MR. BROOKMAN: I see. Okay.

MS. WALKER: Thank you.

MR. BROOKMAN: Susan.

MS. ANDERSON: I hope everyone remembers that because of prior legislation, you can't buy replacement mercury vapor ballasts, so we already have things in place to get rid of mercury.

MR. BROOKMAN: Okay. Great. Thank you.

Yes, one more slide.

MR. WALKER: So, last slide for me, screening analysis. DOE reviews its technology option list and decides which of those options should become design options for consideration in the engineering. So DOE uses criteria like technological feasibility, the practicability to manufacture, install and service that particular design, as well as any adverse effects on product utility or availability, or health and safety.

So in item 19, DOE is welcoming comment on how these four criteria could be applied to the technology options that we discussed in the previous slides.

MR. BROOKMAN: Joe.

MR. HOWLEY: NEMA agrees that DOE should focus on the maximum practical design. But in the HID world, especially, there's a lot of limitations on what represents a practical retrofit. As you work through what's practical, we agree on assessing it this way.

MR. BROOKMAN: You wish to change the wording here and emphasize practical.

MR. HOWLEY: Number two does say practical to manufacturing, so --

MR. WALKER: I'm with you.

MR. BROOKMAN: I think we've got that. Okay. Additional comments? Yes, Susan.

MS. ANDERSON: Well, our fear is, because this had happened in prior rulemakings, is looking at prototype lamps that have never been made on regular production equipment or ever installed in the field to get any kind of service data on them, you know, let's stick to something we know works.

MR. BROOKMAN: That's a useful comment, thank you. Other comments related to 19 and these criteria, these aspects of screening? Nothingadditional.

Let's take a break. We really covered a lot of ground very efficiently, very effectively, so my thanks to everyone in the room. It's now 10:20, we're going to take a break for 15 minutes, which means we'll resume at 10:35. Thanks to those joining us via the web, we want you to continue to stay with us. If you're going to -- please --

(Whereupon, at 10:20 a.m., the meeting was recessed for a 15 minute period.)

MR. BROOKMAN: For those of you joining us via the web, I understand that here in the room that we don't have the capacity, at this point, to unmute

the lines that are incoming, although we're working on it, trying to reverse that. So those of you that are joining us via the web, if you have questions or comments, please type them in and we'll try to insert them in the conversation. In the meantime, we've got the tech guys coming up here to see if we can solve that issue.

MS. deBUTTS: I mean that was not an issue so far in our conversation, people were able to submit the comments, but we just want to make sure that we can unmute the participants.

MR. BROOKMAN: Doing our best to work on that. So we really made good progress already today, and now we're going to hear from Merry Walker, engineering analysis.

Engineering Analysis

MS. WALKER: My name's Merry Walker, and I'm also from Navigant. I'll be discussing the engineering and the product price determination analysis. So as you can see, the outputs of the engineering and the product price determination analyses uses inputs for the life cycle cost and national impact analyses.

This slide depicts the engineering analysis methodology. So first DOE chooses representative equipment classes from the full

equipment classes that were discussed earlier. Then DOE selects the baseline models from the representative equipment classes and we'll use the base line models to assess changes due to establishing energy conservation standards.

Then DOE will identify higher efficacy substitutes from a database of commercially available lamps and develop efficacy levels that range from the baseline model baselines to the maximum technologically feasible level.

Finally, DOE will scale the results from the representative equipment classes to those that are not directly analyzed.

The representative equipment classes are those that have high volumes or unique performance characteristics. DOE concentrates its analytical effort on these specific equipment classes. Within each representative equipment class, DOE then selects the lamp models that are the most common and least efficacious to be the baseline models. When there's a large portion of the market that has already adopted a more efficacious lamp, then DOE will consider analyzing two baseline models.

This table here shows the nine representative equipment classes and their

associated 13 baseline models that DOE has preliminarily chosen its analysis. DOE chose these lamps by analyzing commercially available lamps and found that the listed models are the least efficacious and most common. For the representative equipment classes below, you see that there are two baseline models selected. The mercury vapor lamps are the least efficacious -- are typically the least efficacious within their respective representative equipment class, but a large portion of the market has already adopted metal halide lamps. DOE is analyzing both as baseline models because it is important for DOE to be able to correctly assess the life cycle impacts and efficacy level against what is currently used in the market today.

So with that, I'd like to open the floor for comments on the representative equipment classes as well as the baseline models selected.

MR. BROOKMAN: Let's go back to the previous table. Susan.

MS. ANDERSON: One kind of a general comment that we had is that the scaling doesn't typically work with HID lamps. They're non-linear. Whereas scaling worked for halogen car lamps. We don't see it working for HID lamps.

And the other thing, we are going to present an alternate proposal that will be wattage based and in that we will establish proposed baseline lamps as well. And then one other thing -- and one of the lumen ranges here, this is in the metal halide/mercury grouping, in the 8001 to 12000 lumen range, one of your proposed baseline lamps is a 150 watt probe start metal halide. As far as I know, all 150 watt metal halide lamps are pulse start. Is there an exception --

MR. BROOKMAN: Tom.

MR. HARDING: Tom Harding. There is one. There's a 150 watt probe start that actually works on the 175 watt ballast as a replacement lamp -- and saves --

MS. ANDERSON: It's a retrofit?

MR. HARDING: It's a retrofit lamp for a 175 watt probe start ballast system.

MR. BROOKMAN: So what does -- I didn't understand what that does to the categories that are here.

MS. ANDERSON: I was just pointing out that except for this one exception, then, there's no 150 watt probe start metal halide which was chosen as a baseline lamp.

MR. BROOKMAN: Okay.

MS. ANDERSON: All the medium screw-base lamps, when those were developed, those were pulse start.

MR. BROOKMAN: NEMA's going to come forward with an alternate proposal, based on wattage. Okay. Additional comments on these -- this table? None. Okay.

MS. WALKER: Okay. After establishing the baseline models, DOE selects higher efficacy substitutes by collecting and analyzing commercially available lamps. DOE recognizes the lamps lumen package and other performance characteristics, such as CRI and CCT are important design criteria for customers and chooses more efficacious lamp substitutes with performance similar to that of the baseline lamp. In order to maintain lumen output, DOE may select a reduced wattage, high efficacy lamp replacement or replace and reduce the number of fixtures to equalize lumen output.

Because lamps and ballasts operate together in practice, DOE is basing its energy consumption analysis on a lamp and ballast system. When the ballast is also taken into consideration, it will more accurately characterize the cost

effectiveness of an efficacy level.

We'd like to open the floor for comments on high efficacy lamp substitutes as well as the availability of reduced wattage lamps, and the practicality of replacing and reducing fixtures as well as whether barriers exist in developing new lamps that would provide reduced wattage alternatives in today's lamps.

MR. BROOKMAN: Susan.

MS. ANDERSON: Yes. A lot -- we've already made a lot of comments that really apply to this and do please remember that when you're looking at a retrofit like if someone were to go from probe start to pulse start, remember the issues with that, and as John said, you have to add a starter into the fixture and there really isn't -- he doesn't expect there to be room for that, so it's really not practical. You're talking about going to a whole new fixture. So you should take in to when you do your cost analysis, it should be based on a new luminaire. Not a retrofit situation.

The other thing, I think John is going to comment.

MR. BROOKMAN: John.

MR. GREEN: Yes, John Green. As far as

the idea of changing the spacing of fixtures, maybe bringing them closer together or further apart, based on a new lamp, is really impractical. There are a few wiring systems out there that allow fixtures to be moved around. They're called flexible wiring systems or modular wiring systems, that are specifically put in to make a space flexible in the way it's utilized. However, the vast majority of installations are done with a fixed conduit system, with fixed terminations where the luminaries are located, and to move luminaries would be a very expensive and time consuming proposition, because conduits would have to be moved, hanging systems redone, and in a lot of cases, a building layout drives the way the fixtures are located anyway. The aisle-ways in warehouses, or grocery stores or wherever this fixture is being used, the location of the fixture is important because of the layout of the application. So the fixture cost may pale in comparison to trying to move electrical systems and repositioning fixtures. So it's a very impractical assumption to make.

MR. BROOKMAN: Okay. Susan.

MS. ANDERSON: Kind of an additional comment along that line. A lot of times, it's the

location of other systems -- duct work, sprinkler heads and that sort of thing that really have the final determination of where the lighting fixture can be located. And in the case of sprinkler heads for safety and insurance reasons, that takes precedence over the ideal location for the luminaire. So it's -- chances are you're not going to see any gain from assuming something like that. And it seemed to me as I read this, that the DOE had come to the same conclusion there.

MR. BROOKMAN: Okay. Tom, you want to comment? No. Okay. Susan, please.

MS. ANDERSON: One other thing. We did want to note that when you look at mercury vapor being replaced by metal halide or high pressure sodium, it's really application driven. So indoors you tend to see mercury vapor replaced with metal halide or fluorescent, and outdoors, you tend to see mercury vapor replaced with high pressure sodium. That's been the traditional replacement, but in more recent years, because of a lot of the incentive programs that are out there, it's been going to LED, particularly in the last three years, with the stimulus funding that many states and communities have received.

MR. BROOKMAN: Okay. Thank you. Yes, Mimi.

MS. GUPTA: Mimi Gupta, Navigant. So earlier we talked about a lot of the limitations associated with using reduced wattage lamps and how that might necessitate a ballast change. And then we talked about how changing technology would necessitate a ballast change also. Does the industry see any opportunities for energy savings that would not necessitate ballast change?

MS. ANDERSON: We do have some lamps, in our case we call them supersavers, that's our traditional name, where we have a 360 watt metal halide that replaces a 400 watt metal halide. But it operates on the same ballast, and your savings is that 40 watts difference in the lamp. Those are already in the market place.

MS. GUPTA: Right. And so I think we've seen those on the market, but there aren't reduced wattage options for every wattage out there. Is there that capability of designing those?

MR. BROOKMAN: Keith.

MR. COOK: Keith Cook. In all honesty, it's highly unlikely, and the reason is there's such an emphasis on LED systems now as a replacement for

a large part of this whole market, that the resources are being spent in that area, as opposed to developing new technologies and new replacement lamps in the HID market. The long term bet is really on the LEDs, and so as far as developing new models, highly unlikely.

MR. BROOKMAN: Joe.

MR. HOWLEY: I would agree with that. Pretty much what is on the market today, you have to assume that that is what you have to work with.

MS. WALKER: Is there a certain tolerance in terms of wattage that a ballast can tolerate, like, you know, you talked about going from 400 to 360 as you can operate that on the same ballast. But maybe going from 250 to 175 is out of that capability, it's too big of a difference. Is there a percentage change that --

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, yeah, that's not within the ballast tolerance range. And there you'd have such a difference in light level, would not be -- you wouldn't be providing equivalent light.

MR. BROOKMAN: Keith.

MR. COOK: Yeah, essentially what we have to do when we design a new lamp is to actually make

sure that there are ballasts available that will drive it. So it's almost an impedance match, and so we have to look at that and to make sure that the replacement that we're putting in will work in that application.

MR. BROOKMAN: John.

MR. GREEN: Susan noted about the -- I think we've all noted about the technology and where resources are being spent. They were commenting on the lamp manufacturers' viewpoint, but the same thing applies to fixture manufacturers. Very little is being placed now on sources other than LED, so we'd rather place our development funding and resources into a technology we feel is going to be more appropriate in the next five years. So just wanted to reinforce that.

MR. BROOKMAN: Thank you. Okay.

MS. WALKER: Okay. After identifying more efficacious lamp substitutes, DOE develops a set of candidate standard levels, also known as CSLs, that are considered in the interim analysis. The CSLs span the range of lamp efficacies from the baseline to the maximum technologically feasible level, and considers other factors such as design options.

The equipment class structure that was

previously discussed reflects a bin efficacy level approach in which DOE would establish one lamp efficacy for each lumen range. Although this may simplify standards, it would subject all the lamps within a lumen range to the same level. Because high efficacy lamps typically have higher lumen output, it could potentially shift the market towards high lumen output lamps that also have higher input power within each bin, thereby negating energy savings. Because of this, DOE is considering an equation-based approach in which lamp efficacy would be defined as a function of lumen output, thus eliminating the need for equipment classes to be set on lumen output.

So we had some comments earlier about using wattage instead of lumen output, but we would also like to receive comment on the use of an equation-based approach rather than a bin approach, and also whether highly efficacious lighting systems could be eliminated given a particular lamp efficacy requirement.

MR. BROOKMAN: Yes.

MR. HOWLEY: This is Joe. We, for this particular product area, we don’t believe an equation-based approach is practical -- is a

practical way to apply an analysis. We believe, in this case, you have to look at, since this is mostly going to affect new -- mostly going to affect existing systems, you have to look at the existing system installed, for instance, a 200 watt -- or 250 watt, say, metal halide system -- and determine is there any practical replacement for that system. They're going to have very limited ability to just change a lamp, which means they'd have to change a lamp and a ballast. And if they have to change a lamp and a ballast, the question is, will the starter, for instance, if you're going to pulse start, the pulse start system fit. In most cases it wouldn't, and so you would have to assume you have a fixture change. If you're going to a fixture change, you have to determine whether or not it's cost-effective to change out an entire system that's already fairly efficient to one that's perhaps slightly more efficient. And given that each system represents its own discrete problems, and there might be different options, whether you're talking 175 or 250 or 400, we believe you have to look at each of these in a binned approach. You have to look at each wattage bin, which is what we'll be suggesting, creating wattage bins. And you have to

analyze each wattage bin to look at what options there are for the existing system, because this is going to have the biggest impact on existing systems.

We believe new systems are already being converted by two other rulemakings, one that essentially eliminated mercury vapor ballasts, and the other one that's forcing fixtures to go to -- brand new fixtures to go to pulse start systems. That has taken care of the new systems going forward which represent the future systems. But in terms of the existing system, this rulemaking is going to have the biggest impact on existing systems, existing users, and you have to really look at what they have and what their real options are, and whether or not it's cost-effective to force them, in most cases, to go into an entire new fixture, including electrical labor rates associated with putting in a new fixture.

So, again, we don't think -- an equation only works in theory. It's a good theoretical concept if we're in college, maybe that's a good approach. But in the real world, we have to look at specific systems and what these specific equipment options are for that application.

MR. BROOKMAN: Keith.

MR. COOK: Keith Cook. For item 25, we're not against evaluating highly efficacious light systems, but we do want to proceed very, very cautiously here. And the reason we're saying that is, we know for a fact right now that an unprotected lamp is going to be more efficacious than one that is protected or one that's coated. And yet there are many applications where we absolutely have no choice but to put in a protected lamp. Like gymnasiums or grocery stores or those kinds of environments. And so if we jump to the conclusion that we have to go to this because it's the most efficacious light system, we end up with no solution to the market, I'll tell you right now. So, you know, we agree, let's look at it, but we can't rule out that a lot of these lamps that we know for a fact are less efficacious.

MR. BROOKMAN: Okay. Susan.

MS. ANDERSON: Well, there's another thing to think about in terms of the protect versus the non-protected lamp too, and that the protect lamp can go in an open luminaire, and in many cases those are more efficient systems and they stay -- the whole system stays cleaner longer, it has better

lumen maintenance over its life because of the design of the luminaire not having that lens in place. There's one manufacturer where it's always open around the top of the optical system, so there's literally a chimney effect so that dirt rising up into the fixture, the air movement, the hot air rising from the heat generated by the lamp, lifts it up and out of the fixture, so the inside of the luminaire stays cleaner. So there are definite advantages to these open fixtures as opposed to enclosed.

MR. BROOKMAN: Daniel.

MR. YOUNG: Daniel Young. I have a question for NEMA. Is your proposal then looking at specific rated wattages, or are there still going to be multiple rated wattages per bin? So instead of DOE's approach, which is to look at bins that might include multiple rated wattages, --

MR. BROOKMAN: Daniel, get close to that microphone, please.

MR. YOUNG: Sorry. As opposed to DOE's proposal which could potentially include multiple rated wattages within a single bin, is NEMA's approach to split completely by rated wattage and to look at -- so for this rated wattage, this energy

would be set here, and so forth?

MS. ANDERSON: Our technical folks are actually in discussion on that now. We started out with a proposal that came from our company, and it was strictly wattage based. I'm sure there'll be some binning, but not in terms of today's existing wattages. So like a -- it's possible, I don't know what they're going to come up with -- like the 360 watt energy saving lamp would end up in the same bin as the 400. Because they operate on the same ballast.

MR. BROOKMAN: Did we cover it? Mimi.

MS. GUPTA: I just want to ask one question, following on a comment that Joe made earlier on -- in the meeting, relating to the variability of lumen output for a given wattage lamp. This is an issue that's kind of come up in a lot of the previous lighting rulemakings, having to do with, you know, say we find a commercially available lamp on the market that saves energy, and DOE wants to target as an energy saving option. What is the efficacy standard that represents that lamp? And how does variability fit into that? So I would just request industry to submit whatever data they can as early as possible, regarding the

variability in terms of efficacy of a given model and how that should be incorporated into the analysis.

MR. BROOKMAN: Okay.

MS. WALKER: Okay. Well, actually I have a question, and this is related to the bin versus the equation-based approach. So the same concern that when there's one efficacy level set for a particular bin, it might shift the market towards one end of the bin because it's easier to meet a standard because the lamps are more efficacious at one level. Would you anticipate the same thing happening with the wattage bin approach, shifting it towards higher wattage lamps, perhaps?

MR. BROOKMAN: Joe.

MR. HOWLEY: No. We wouldn't expect that to happen because the ballasts are rated to drive a specific lamp design, a specific lamp wattage, so you just can't put in a 400 watt lamp in a 250 watt, say, system, because it's more efficient. In fact, the regulation grouped 250s and 400s together in the same bin, and you set the reg based on the 400, it would eliminate a 250 watt lamp, and there would literally be no product that could go into that system if you did that for that user, because he

couldn't use it. He'd have to go to a brand new fixture in that case. So, bin hopping in this particular case, that might be more of an argument for perhaps a source where you can go up and down quite easily with wattages, perhaps more of an incandescent type of source, where you can move it anywhere. Where, with metal halide, they're discretely designed. The wattages are discrete. The ballasts are discrete. There really isn't any opportunity for the user to bin hop up or down. So we wouldn't expect that to be a concern with this particular product line.

MR. BROOKMAN: Joanna.

MS. MAUER: Joanna Mauer. I think we'd encourage DOE to consider an equation-based approach if DOE can develop an equation that represents the relationship between lumen output and efficacy, I think it would just better represent that relationship between efficacy and lumen output.

MS. WALKER: Okay. The final step to the engineering analysis is to scale the efficacy levels that are established for the representative equipment classes to those that are not directly analyzed. DOE intends on using scaling factors that are observed in catalog data or by extrapolating

lumen output using regression equations.

We'd like to open the floor for comments on the scaling approach.

MR. BROOKMAN: Susan?

MS. ANDERSON: Well, as we've already mentioned, HID lamps are non-linear in response, so we really don't see how you can go down that path. You also have the issue, once again, of coated versus clear, protect versus unprotect, standby versus not standby, CCT, CRI --

MR. HOWLEY: Orientation.

MS. ANDERSON: -- orientation.

MR. HOWLEY: Orientation is a big one.

MS. ANDERSON: We have all those issues.

MR. BROOKMAN: Mimi.

MS. GUPTA: So, I guess I think the question here, this is Mimi Gupta, is for those other issues that you're talking about, can none of them be characterized by a percentage reduction in efficacy if we're talking about coated versus uncoated or maybe can orientation be represented in that way?

MS. ANDERSON: Well, orientation is already pretty clearly represented, because if you look in our catalogues, for -- say, for instance, if

it's the universal operating lamp, we give you vertical lumens versus horizontal lumens. And in lamps where we have position-specific oriented lamps, you can compare those ratings base up, to base down, to horizontal. That's all published information. And as is coated versus clear. And when you get into the metal halide family, in particular, you can see the different chemistries and the impact on the lumens, 3000 Kelvin versus 4000 Kelvin.

MS. GUPTA: So when you say, you know, you don't think scaling is appropriate for HID lamps, you're more talking about scaling across wattages?

MS. ANDERSON: Yes.

MS. GUPTA: Okay.

MR. BROOKMAN: Okay.

MS. WALKER: In considering standards, DOE will not set a level -- oh.

MR. YOUNG: Sorry, Daniel Young. A question about the scaling. So you've mentioned that it's not a linear relationship. Is there no relationship, or can you isolate certain factors like CCT or coating and develop some kind of relationship.

MR. BROOKMAN: Tom.

MR. HARDING: Tom Harding. There are relationships. There was a general statement made that as you go up in wattage, you generally get more efficacious. The problem is trying to do one size fits all. There are so many jumps: clear/coated, universal, correlated color temperatures. There are different chemical technologies. I mean from a standpoint of materials, metal halide is one of the most complicated ones. Most light sources have one or two elements. Metal halide can have ten. So they're very complex, and they all do different things. And so it's very hard to find an equation that covers everything. But within very narrow parameters you can make short jumps in equations. But then you can't jump, as Susan said, if you want to make a more efficacious fixture, you might take a lens off and use a less efficacious lamp, say a protected lamp, makes a better system, doesn't make it a more efficacious lamp. So just so many jumps. But in general there are rules that -- not rules, there are observations as you go up in wattage you generally get more efficacious.

But I can sit here and give you all kinds of exceptions. I can tell you now a 400 watt lamp that has higher efficacy than 1000 watt lamp.

Changing chemistry and materials. There's just so much of that in these metal halide systems.

MS. WALKER: Okay. So, again, in considering standards, DOE will not set a level that can only be met by a single proprietary design. Because of this, DOE is seeking feedback on the existence of proprietary designs. We'd like to open the floor for comment on this issue, as well as any other issue related to the engineering analysis.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Given the individual nature of the comment, NEMA will not be able to provide comment on this subject. So my comment is I have no comment.

MR. BROOKMAN: Joe.

MR. HOWLEY: There may be individual manufacturer designs, but as you're going through the manufacturer interview process, you may ask them about unique designs that companies may have.

MR. BROOKMAN: So you would just --

MR. HOWLEY: They do exist.

MR. BROOKMAN: That's what I wondered. You anticipate that there could be proprietary designs that the Department of Energy might need to consider.

MS. ANDERSON: Yes, patent protected.

MR. BROOKMAN: And so they will need to seek that out.

MR. HOWLEY: Yes.

MR. BROOKMAN: In a protected sort of a way. Okay.

MS. WALKER: Thank you. For this rulemaking, DOE plans on estimating end user price directly, rather than using a bill of materials and marking that up to generate the manufacturer's selling prices, also known as MSPs. This is because it's not practical to reverse engineer an HID lamp to derive the manufacturer production cost of the lamp. They are not easily disassembled and fill gas composition and partial pressures are difficult to assess. Therefore, DOE is considering collecting manufacturers' suggested price lists, also known as blue book values, and applying discounts based on distribution channels through which the lamp is purchased. DOE will gather price information from state procurement contracts, large distributors, and other publicly available end user prices to determine discounts.

We would like to open the floor for comment on end user price approach for calculating

the cost of this efficacy relationship for HID lamps. In particular, DOE seeks comment on typical distribution channels for HID lamps, as well as the allocation of market share between these channels.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. That's another topic we refer to the individual manufacturer interviews, given the individual nature of such arrangements and cost structures.

MR. BROOKMAN: You can't characterize typical distribution channels as we have in previous rulemakings?

MS. ANDERSON: Distribution channels, yes. Pricing, though, we're not allowed to discuss, due to antitrust rules.

MR. BROOKMAN: Okay.

MS. ANDERSON: And we do -- in our written comments we will have some modifications to the distribution channel.

MR. BROOKMAN: Okay.

MS. WALKER: Okay. Thank you. Should we continue?

MR. BROOKMAN: Yes.

MS. WALKER: I'll pass on to Michael Myer.

MR. BROOKMAN: Now, energy use analysis,

Michael Myer. How are we doing with the folks on line, Emily.

EMILY: We're going to patch them through so they can comment.

MR. BROOKMAN: Okay.

Energy Use and Markup Analysis

MR. MYER: Thank you. My name is Michael Myer.

MR. BROOKMAN: I guess we then need to remind everyone who's joining us online to mute their telephones if they're not going to speak and unmute them if you want to speak, and we'll be recognizing you as best we can when our webmaster over here sees that you want to contribute to the conversation. Okay, Michael.

MR. MYER: That was just --

(Problems with sound.)

MR. BROOKMAN: So we're having technical difficulty and we're going to try and resolve this very quickly, so hang in there those here via the web.

MR. MYER: I'm going to try it again. I think they've corrected it in the room while we're waiting, so I'll wait one more second. This works, I don't hear any echo, so I will continue on. Do

we need to wait for the court reporter? Okay. Thank you.

My name is Michael Myer, and I'll be discussing both Energy Use and Markup Analysis. These are both inputs that are factored into the life cycle cost and payback analysis, which then also get factored into other analysis later on.

Energy analysis is pretty straightforward. We're trying to determine the energy use data for HID systems. Obviously, as we discussed, ballasts have an important role here, mainly for the power input, so they'll be used. We'll take the input power data from the engineering analysis, just a median -- a typical wattage input that'll be generated in the engineering analysis. Ultimately, we want to get a sense of where lamps are used, in what type of spaces, and roughly how long they're operated in those spaces. We will look at the most recent 2010 US lighting market characterization, the commercial building energy consumption survey, also known as CBECS, and also the manufacturing energy consumption survey.

We'll take all that data and aggregate it and get a sense of what the typical operating hours are, and then we'll take the typical input power

and multiply them together and you get annual operating hours per year.

Brings us to items 31 and 32. On 31, we're requesting comment on ballast efficiency and ballast input power. This is separate from -- this is really more historic numbers, because the idea with the energy analysis is we're trying to get a sense of what the energy savings potential could be from standards, and so we're interested in ballasts that were previously installed, what their input powers are that are now probably covered by standards such as metal halide or the mercury vapor standard and what those ballast efficiencies should be. It's a slightly different scenario than usual. I'll pause for comment for a second.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, when taking into consideration the installed base, I mean the installed base is basically magnetic, so where magnetic ballast, you're going to have to make sure that you look across multiple manufacturers' catalogs, and look at those system input powers. And you might also look at luminaries because you also -- it's not as much so as in fluorescent, but you can have a fixture effect that can impact the

system input power.

MR. BROOKMAN: What is that? A system effect?

MS. ANDERSON: Once the ballast is installed in a fixture and it's in a confined area, it can change the input power of the system.

MR. BROOKMAN: Okay.

MR. MYER: I guess I'd like to elaborate on that. So using current catalog data for -- can we use stand-in for mercury vapor specialty ballasts, since they can still be currently sold and they're in catalogs, as a representative mercury ballast -- mercury vapor ballast input power for something, let's say, that was installed in 2006? That's -- ultimately that's the historic aspect we're trying to get at. And the same question would be for probe start metal halide fixtures, now that the ballasts are covered by a standard, can we use the current magnetic data that we're seeing out there and should we assume a different efficiency and thus a different input power for magnetic probe start systems that were installed in, again, let's say 2008, that were precovered?

MS. ANDERSON: For metal halide, you're

going to be able to get at least the ballast, for the ballast manufacturers, you'll be able to get those numbers because there's no restriction on selling replacement metal halide ballasts.

MR. MYER: Okay.

MS. ANDERSON: In the case of mercury vapor, for most applications, those ballasts that drive the specialty lamps are not the same ballasts that drive the general lighting lamps. But I would think that ballast manufacturers would have -- could help with older editions of their catalogs, or even luminaire manufacturers, older editions of their catalogs to help you get to that information.

MR. BROOKMAN: Thank you. John.

MR. GREEN: Yes, in a previous employment I actually did a lot of ballast design, and it may not be as simple as pegging one input wattage to a ballast. When I was designing ballasts, we actually manufactured two, one was a low loss version, which had lower input power than the standard. It had a premium cost associated with it, but it was a choice customers could make. So it may be a little more involved than just picking one number. May have to look at a number of different types of ballasts.

MR. BROOKMAN: Okay. Thank you. Joe.

MR. HOWLEY: On item 32, I just was going to agree that your proposed methodology and the sources that you have selected to look at seem appropriate. Trying to get at hours of use and various applications. We've seen those studies in reports and they seem like they represent a reasonable survey of actual operating conditions.

MR. BROOKMAN: So are you speaking on behalf of NEMA?

MR. HOWLEY: On behalf of NEMA, yes.

MR. BROOKMAN: Thank you. Susan.

MS. ANDERSON: I would say in one previous rulemaking, we saw when they took commercial offices different from retail, so just keep that in mind, because when we saw that previous rulemaking, the number for commercial did not reflect retail operating hours.

MR. HOWLEY: I suppose that's true. We reserve the right to actually see what numbers you're selecting. And further comment, if we think that they were accurately selected.

MR. MYER: Sure. Of course. In terms of follow on what you're saying, Susan, in terms of HID and typical applications, you're going to see

them much more common in retail than you are in commercial -- in commercial office -- and that's why you're pointing that out.

MS. ANDERSON: Right. Like you're going to see them in a big box retailer, that's our grocery store, that sort of thing. You're not going to see them -- so commercial generally reflects more office space as opposed to retail space.

MR. MYER: Thank you. Continuing on. So then the other analysis would be the markup analysis, and that was briefly touched on previously by Merry Walker. The purpose -- this is slightly different than previous passes -- Merry said, you can't really take apart an HID lamp and get a sense of the cost, so we're going to use the existing cost for -- not the existing cost, but the blue book or the price list where we can. But at the same time, we still look for markups that's been discussed many times in this meeting already, that in some cases you may have to replace a ballast, or in some cases you may have to replace an entire fixture, and those do have markups associated with them, as well we're interested in any costs associated that we can figure in as well.

So what we're going to do is we're going to identify distribution channels which we'll show in a second, and then we're also going to want to estimate markups from each step in the manufacturing process.

So we identified two initial HID lamp distribution channels. They're shown here as one and two. They're very similar. The first one would be from the manufacturer to wholesaler or electrical distributor, to a contractor, to an end user. The second one there's no contractor, it would be just the manufacturer to the electrical wholesaler to the end user.

As we've discussed also, in some cases you will possibly need to replace a ballast outright. We then identified a replacement HID ballast distribution channel. Again in this case, it would be the ballast manufacturer, to an electrical distributor, to a contractor to an end user.

And then the third option that we discussed rather in depth, is that the potential to have to change to a wholesale fixture. We identified in this case, it would be a fixture manufacturer to an electrical distributor, to a contractor, to an end user.

And that brings us to items 33 and 34. We welcome comments and suggestions concerning pricing and approach for existing consumer prices for lamps, but also for ballasts and fixtures, because they will have to get factored in there. And item 34, comments on typical manufacturer, wholesaler, and contractor markups.

MR. BROOKMAN: Susan. Alex first.

MR. BOESENBERG: I can do the first one on pricing. We can't do that here, sorry. Individual manufacturers, during their interviews, will have an opportunity to assist the DOE in that.

MR. BROOKMAN: Thank you. Susan.

MS. ANDERSON: My comment is on distribution channels. When you're looking at the HID ballast and also the luminaire distribution, remember that you have, particularly like with industrial businesses, they have people that can do the work. They don't need a contractor. So it may go from the manufacturer to the wholesaler, to the end user.

And then also, when you get to the fixture distribution channels, there are some fixture manufacturers that sell directly to the end user. And they totally skip the wholesaler and the

contractor.

MR. MYER: Would those be utilities or what type of industry would you expect those to be?

MR. COOK: Could be utilities, could be municipalities, typically project work.

MR. MYER: I'm sorry, I'm not familiar with the term "project work."

MR. COOK: It's when we're selling specific -- like we will bid on a job at a specific city, and so we will deliver straight to that city, and they will arrange installation and things like that.

MR. MYER: Would you characterize that as outdoor more you can't define it as whether it's outdoor or indoor?

MR. COOK: It doesn't have to be necessarily outdoor, although that is a good example of it.

MR. MYER: Okay.

PARTICIPANT: Sometimes they're sold that way.

MR. COOK: Depends on who the customer is.

MR. MYER: Thank you. At this time I'm going to turn the presentation over --

MR. BROOKMAN: Wait. Yes, John, please.

MR. GREEN: Back up. The HID lamp distribution channel. There's also probably a number three there, where a lot of -- I'll say some fixture manufacturers package lamps with fixtures, so it's actually a light manufacturer to the fixture manufacturer, and then that would be a third method of distribution of HID lamps.

MR. MYER: Okay. And that would be in a new construction scenario and not in a replacement scenario.

MR. GREEN: That's correct, yes.

MR. MYER: Okay. And they would be paying a markup -- so I guess I need to figure that out. So it would be fixture manufacturer with lamp, but it would be -- and then it would be the same channel, the fixture channel, but with a lamp.

MR. GREEN: Yes, just so you take number two and insert fixture manufacturer after lamp manufacturer, and then still go to the wholesaler and end user.

MR. MYER: Okay.

MS. ANDERSON: That's typically the most common scenario with new installations. Because it saves the contractor the labor of installing the lamp.

MR. MYER: Great, and appreciate any rough estimates of percentage of distribution channels as well.

At this time I will turn the presentation over to Scott Morris, who will introduce life cycle cost analysis and payback period analysis.

Life Cycle Cost Analysis and Payback Period Analysis

MR. MORRIS: Thank you, Michael. Good morning. I'm Scott Morris, and as Michael mentioned, I'll be talking first about the life-cycle cost and payback period analysis.

So the life-cycle cost and payback period analysis builds upon previous analyses to determine, as the name implies, the total life-cycle cost and payback period of the equipment considered in this rulemaking. The life cycle cost and payback period analysis considers the effects of a standard on individual customers. Specifically life-cycle cost is the total cost of HID lamps, including the price of the lamp, installation costs, and operating expenses through the end of the lamp's lifetime, expressed in today's dollar figures.

The payback period of a lamp more

efficacious than a baseline lamp, is the average number of years it takes a customer to recover the potentially higher first cost through decreases in operating expenses, as shown in the diagram in the bottom here. To account for the range of possible life cycle costs and payback periods, DOE will incorporate Monte Carlo simulations which uses inputs originating from probability distributions, as opposed to average values.

Of course, reduced energy use yields reduced energy costs. DOE will use the most recent annual energy outlook produced by the Energy Information Administration to project future electricity price trends. At the same time, DOE uses EIA form 826 data to establish current electricity prices, and then uses the annual energy outlook to project those prices into the future.

This brings us to item 35. DOE welcomes any comments on the proposed methodology for estimating electricity prices.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. I believe as we have in the past, we highly recommend that DOE consult the Edison Electric Institute --

MR. MORRIS: Pardon me?

MR. BOESENBERG: Edison Electric Institute, Mr. Steve Rosenstock, due to their excellent information regarding price by region and users.

MR. BROOKMAN: Okay. Thank you. Additional comments on electricity prices and the methodology also? Okay.

MR. MORRIS: Thank you. Discount rates are used to establish the present day value of future expenses. DOE uses the weighted average of … debt to equity ratios to develop a distribution of discount rates for use in the life cycle cost analysis. And as item 36 says, of course, the Department welcomes any comments regarding the approach for determining discount rates for the life cycle cost analysis.

MR. BROOKMAN: No comments? Okay.

MR. MORRIS: So there are two primary costs associated with the lifetime of HID lamps; installation costs and operating costs. DOE will consider the expenses involved with installing HID lamps, ballasts, and fixtures. The Department assumes HID lamps require no maintenance during their lifetimes, but are replaced upon failure or early retirement. For example, cleaning costs are

typically, we believe cleaning costs are typically part of a fixture operating cost. Any comments in that regard?

MR. BROOKMAN: Joe.

MR. HOWLEY: Yeah, we would agree that with HID, they're generally replaced as they fail, especially high wattage HID lamps cover a large area, and unlike fluorescent where if one fluorescent lamp goes out in, for instance, the fixtures in this room, it could be left out for quite a while and doesn't really impact the light level of this room. But if a, say a 400 watt metal halide goes out in a store, they're going to replace that lamp fairly quickly and not leave a whole section of their store dark. And generally, when they replace it, they may clean the fixture when it's being replaced. They usually don't do cleaning in between.

In terms of electrical rates, RS means is one source of electrical labor rates. I will note, however, that electrical labor rates can vary greatly in this country, depending on what city you're working in -- from past experience. So, somehow, I'm not sure how that's factored in, but this has to be cost-effective in the high labor

rate areas as well as the low labor rate areas.

MR. MORRIS: Part of the purpose of the Monte Carlo analysis is to incorporate higher and variable electricity costs, but we'll definitely keep that in consideration.

MR. HOWLEY: So that's electricity cost, but I was referring to the electrical contractor labor rates.

MR. MORRIS: Sorry.

MR. HOWLEY: They both have similar issues of quite a bit of variability throughout the country.

MR. BROOKMAN: So you can see the comment box.

MR. MORRIS: Yes, I forwarded to the two comments here, the two comment boxes.

MR. BROOKMAN: Leave that up.

MR. MORRIS: Okay. So each lamp's life cycle cost is of course affected --

MR. BROOKMAN: Pardon me, I wasn't clear. Would you go back to items 37 and 39?

MR. MORRIS: I'm sorry.

MR. BROOKMAN: I wasn't sure that we covered this and I lost track, so I just want to make sure that we did before we move on.

Installation and maintenance and repair. Okay. I think we covered it.

MR. MORRIS: We did. I mean the idea that you cannot repair or maintain an HID lamp is correct. Nobody removes an HID lamp and repairs it. It is definitely replaced.

MR. BROOKMAN: Thank you. Now you may move on.

MR. MORRIS: Sorry for the confusion, Doug. So each lamp's life cycle cost is affected by its lifetime. DOE will use manufacturer literature, other literature sources and inputs from other interested parties in determining lamp lifetimes. Lifetimes can be adjusted to account for group relamping practices, which decreases the cost per lamp because labor is less costly when many lamps are replaced at once.

On the next slide we have a couple comment boxes. Item number 40, the Department welcomes comments on lamp lifetimes and how group relamping practices may affect lamp lifetimes. And 38, comments regarding how relamping practices would change if HID lamp life is affected by new standards.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, basically, for HID lamps, it's much more common to see spot versus group, even though we do specifically recommend group relamping, particularly with metal halide. The reality is spot relamping is what is done. And the other thing that I would say, if you do evaluate group relamping, if you go to the IES recommendations for indoor applications, it's RP-36-03, and they recommend group relamping at 60 to 70 percent of rated life. And then it's DG-4-03 for roadway. So those would be good sources for that. You might also want to check with lighting service companies. Like, we have a division that's a lighting service company and find out if they do group relampings, what they actually do in practice. But they don't -- it's not a reduction of 91 to 94 percent or whatever is over there. It's much greater than that.

MR. BROOKMAN: Okay. Thank you. That's helpful. Michael.

MR. MYER: Michael Myer. Pacific Northwest National laboratory. Susan, you said kind of in general that HID lamps are not group relamped. Is there any other, within the three lamp types, or in applications -- I understand

street lighting probably is the least group relamped because of the magnitude of street lighting, but parking lots or interior, any -- either of those or metal halide -- any specific -- any --

MS. ANDERSON: They all tend to be much more spot relamped than group relamped. Because as Joe was mentioning earlier, a given fixture covers -- it's the only thing providing light in a given area, so when it goes out, it needs to be replaced.

MR. HOWLEY: You might be able to get a little better information from having conversations with these lighting service companies who generally are group relamping fluorescent systems, but you could ask them what their experience is with group relamping HID systems. I think it would be relatively minor, but they may be able to give you a better sense of how often these are group relamped.

MR. BROOKMAN: Okay?

MR. MORRIS: Okay. Thank you. I'll turn the mic back over to Michael Myer to discuss shipments.

MR. BROOKMAN: How are we doing here? We're ahead of schedule, and are we okay? Keep

pressing ahead here? Yes? We'll just see where we are as we approach noon. Okay.

Shipments Analysis

MR. MYER: Thank you, Doug. The shipment analysis works in tandem with the life cycle cost and payback period analysis to provide information into the national impact analysis. The shipment analysis is to look at -- we create two scenarios. One's called the base case scenario and the other one is called the standards case scenario. And we want to get a sense of how they affect national energy savings and net present value.

How we develop shipment scenarios or shipment projections, we look at a lot of data if we can get it. We look at manufacturer and industry organizations, any reports talking about shifts in technology, or continuation of technology, trends in technology, national energy and lamp surveys, and also historic HID lamp shipment data from NEMA. I know NEMA publishes a newsletter that often shows quarterly what some of the HID shipments are, and we use that as a source as well.

We'll discuss each of the different shipments and the methodology in a second. But I

want to first start with items 15 and 41. On 15, DOE welcomes input on disaggregated market share based on input wattage for each of the HID lamp technologies. And I'll pause for a second.

MR. BOESENBERG: Alex Boesenberg, NEMA. To item 15, first of all, we're a little confused about what was being asked for in terms of what the data is intended to drive. What's the goal from that data? Then to continue on, as you noted, we do collect data on these products, however, one challenge we have to providing the government with data is that we don't necessarily gather it in the way that you were asking. We don't tend to report, have our members report, based on wattages, but rather based on technology and base type. Since it's sales data, we want to know where -- who is buying it, where it's going, which means we care more about the application. As we've already stated, I think the discussions have borne that out. The fixture type and where it is, strongly dictates what goes in it. So we track it by application.

In our public comments, we're going to give you an excerpt of what one of our quarterly reports looks like, and we welcome discussions as

to whether or not there's a way for us to either analyze the existing data, or if necessary, I can ask my members to consider a special survey. But we welcome the opportunity to see if we can work something out, save the government time in gathering this information. And I'll pause if you have any questions on my comments on item 15, particularly what's the end goal, so we know what you're looking for.

MR. MYER: Ultimately, I mean, the end goal is to get a sense of if, rather than just say that metal halide was X million units or X percent, to get a sense of where the trends are in -- better than just low, medium or high wattage -- in the 175 watt versus the 250 watt, where are you seeing shipments? Whatever finer, granular resolution we can get related to shipments, related to -- again, at a global level, HID lamps up or down, limits some of the analysis we can do.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. Based on your shipments, do you -- it's your impression that the fact that our data is gathered then by application and base type, will that still be useful to you? It sounds to me like it will.

MR. MYER: In some cases.

MS. ANDERSON: It's technology.

MR. BOESNEBERG: Technology, sorry. What did I say?

MS. ANDERSON: Application.

MR. BOESNEBERG: Oh, yeah.

MR. MYER: Now that Susan's elaborated that it's technology, not application, that is different. In terms of technology, I assume you're separating out by mercury vapor, high pressure sodium and then the three typical types of metal halide. And then for base type, pretty much 150 is medium base and 150 and above is mogul base, but anything we can get beyond that would be helpful as well. I know some special surveys in the past have done, at least the wattage bins -- low, medium and high wattage bins. But again, anything -- so beyond just the base type would be helpful. Yes.

MR. BOESENBERG: Anything else, Susan?

MR. BROOKMAN: Susan?

MS. ANDERSON: The only metal halide family we separate out is ceramic. So we don't separate by pulse start versus probe start.

MR. HOWLEY: We would need a special survey.

MS. ANDERSON: Right.

MR. HOWLEY: To get what you're asking for. We can consider a special survey.

MR. BROOKMAN: So I think it's worth having that on the record, Joe. You could consider a special survey to gather that data?

MR. HOWLEY: Right. We'd want to discuss, you know, exactly what would be most useful before we would go through that exercise. Perhaps we could have that further discussion.

MR. BROOKMAN: Thank you.

MR. MYER: Continue on to item 41. DOE welcomes recommendations on other sources of HID shipment by proposed equipment class. We also welcome comments on future long term trends in HID lamp efficacy.

MR. BROOKMAN: Probe start, quartz, metal halide versus pulse start, quartz or pulse start ceramic. Sounds pretty complicated.

MR. HOWLEY: We understand it.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, I mean, the new products we're seeing an expansion in lower wattages, and we're seeing an expansion in pulse start ceramic. That's where the new technology is

going. It's not going in probe start.

MR. BROOKMAN: That's the industry at large?

MS. ANDERSON: Industry at large.

MR. BROOKMAN: Okay.

MR. MYER: I'm sorry, can we separate those two out, so I understand it better. You're seeing an increase in ceramic pulse, and then low wattage -- is that also in ceramic pulse or all.

MS. ANDERSON: Yes.

MR. MYER: So it's really con -- the same. Thank you.

MS. ANDERSON: But the new wattages that are coming out tend to be in the low wattage range, to replace halogen.

MR. MYER: So if you're saying replacing halogen, is that omnidirectional or non-omnidirectional?

MS. ANDERSON: Both.

MR. MYER: Thank you.

MR. BROOKMAN: Okay. That's helpful. Thank you. Additional comments on item 15 and 41?

MR. MYER: Continuing on to the methodology. So the shipments model will look at three different essentially accounting

methodologies for -- one is new installations. These are fixtures that are being brought to market with a -- a new fixture, essentially, for new construction with an HID lamp. Replacements. These are lamps that have failed or retired from service and they're being sold. And then retrofits. These are early replacements, such as an entire grocery store is being relighted and the equipment is still in good service condition but they're just going with a new design. So those are the three different scenarios there. And we would like to -- we'll ultimately estimate proportions of shipments based on those types of scenarios.

We welcome comments based on our accounting methodology here described.

MR. BOESENBERG: Alex Rosenberg, NEMA. We have no further edits or clarifications to that. Those definitions seem acceptable.

MR. BROOKMAN: Okay. Thank you. Joe.

MR. HOWLEY: The only thing I'll add is the overwhelming bulk of what this rulemaking would accomplish is going to affect the replacement options. The new installation is more affected by the existing ban on mercury vapor ballasts and the requirement to put a pulse start ballast in new

metal halide fixtures, most of the new metal halide fixtures. And there's not a lot of retrofits that occur because of the previous discussion, of how difficult it is to retrofit an HID fixture. So really the focus should be overwhelmingly on how this affects replacements.

MR. BROOKMAN: Additional comments. Keith.

MR. COOK: Well, just a real quick comment. Even on the new installations, this whole market is driven by efficiency and so to think we're going to have a huge impact, I think is misleading, because our market on HID is already being attacked by linear fluorescent, T5s, T8s, because of the efficaciousness of those applications, and that's typically in warehouses and industrial applications and things like that. And in the outdoor market, the LED is by far becoming dominant, again attacking what had predominantly been this market in the past. And so just a word of caution. We don't see where we're going to be able to impact this particular market very much going forward with new rulemaking.

MR. MYER: Thank you. Continuing on. So, as I mentioned earlier, there are two types of

scenarios. One is called the base case, the other one is called the standards case. The base case essentially assumes what would the shipments be projected into the future, in the absence of any amended -- or I'm sorry, new, in this case -- new standards. That being said, it will actually look at what the effects of lamp shipments are from other standards such as we've discussed many times, mercury vapor and metal halide having the effect. While those are separate standards, they do have an effect on future shipments of those two technologies, so they will be included here in the base case. … to wrap your mind around. And it'll be a mixture of the different efficacies sold and the absence again, of new regulation. We typically look at historical shipments and try to get a lifetime distribution and how they're installed and replaced, and that type of thing.

Then there's the standards case -- I think I'm having problems with the computer -- Thank you. That contrasts with the other type of analysis I mentioned, the standards case. This is what ultimately would be in -- what would the shipments look like into the future, assuming the proposed standards. We will -- it helps us to look at the

difference between the two programs and you look at the differential, and you get a sense of the savings and -- energy savings and the net present value.

We will also consider the effects from market pull programs which have been discussed previously in this presentation as well.

Brings us to item 43, DOE welcomes comments on proposed conservation standards might affect shipments of HID lamps, and also any information on market pull programs.

MR. BROOKMAN: Susan.

MS. ANDERSON: Well, as we've already talked about, the -- we already have regulations in place that are impacting what's happening in new fixtures, and those were both laws that were passed, EPACT 2005 and then EISA 2007. The other thing, I think somewhere in here I think it mentioned maybe the impact of state programs, but most state programs, except for California's Title 20, were negated by the federal regulations that passed there. So basically the federal regulations copied what had already been passed in existing state legislation.

And then on the pull through, I know the

gentleman from Energy Solutions said that they do have incentive programs for going from probe start to pulse start. But what we're really seeing happening in the market place is that people aren't going from probe start to pulse start, they're going from probe start to fluorescent. And you can get a lower wattage package, you have greater energy savings, you have longer lamp life, and the energy savings is compounded by the fact that you get better lumen maintenance out of those fluorescent lamps, so that means you can go with an even lower wattage system. So that accentuates the energy savings.

Where we are seeing incentive programs, it's impacting more outdoors, and people are going to solid state as opposed to going to another HID technology. In some cases they're going to induction, because induction is kind of a long-lived, lower cost option, compared to solid state. But most of it is going to solid state. I mean, the HID market, the market place is taking HID out of installations.

MR. BROOKMAN: Joe.

MR. HOWLEY: I just wanted to reiterate that the effect of the market pull programs might

be different than you're projecting, but it's actually -- the effect has been to shrink this market and to eliminate the lower efficiency sources, and we expect that will continue. So your projection on market pull should take that into consideration.

MR. BROOKMAN: Thank you. Okay. Okay.

MR. MYER: At this time I'm going to return the presentation to Scott Morris who will discuss the national impact analysis.

National Impact Analysis

MR. MORRIS: The national impact analysis effectively combines the results of the life cycle cost analysis and shipments analysis to determine the energy savings potential and monetary effect of a standard on the nation as a whole

So to state it differently, the NIA is designed to assess the monetary impact and energy savings of a standard on the entire country. So to put it simply, each year in a 30-year analysis period, which is DOE looks at a 30-year analysis period, which begins in the year when the standard takes effect, most likely, 2017. Each year has equipment purchase and installation costs and operating expenditures. In any given year, if

operating cost savings are greater than the increased equipment costs, the result is a net savings. If the equipment costs outweigh operating cost savings, the result is a net cost to the nation. The national impact analysis sums across all years of the analysis period to determine the economic effect on the nation, and the national energy savings resulting from a standard.

National energy use is calculated for the base case, shown on the left side in the base case scenario and for the standards case scenario shown on the right, for every year of the analysis period, all 30 years. The site energy use in both cases is converted into primary or source energy use, using a site to source conversion factor. The difference in energy savings between the base case and the standards case projections yields national energy savings.

Are there any comments or confusion on the diagram or anything I've said? Okay. Methodology is somewhat clear. Good.

The net present value calculations are done in similar fashion as the net national energy savings calculations. Monetary costs for both base case and standards case scenarios are calculated.

The difference between operating cost savings which in both base case and standards case scenarios is the sum of the energy cost and repair and maintenance cost boxes, the difference between operating cost savings and installed cost increases, discounted appropriately, yields the national net present value of savings.

So this brings us to a couple items for discussion. First of all, DOE welcomes comments on any data sources that should be used in the national impact analysis. In number 44 and 45, the Department welcomes comments on whether more efficacious lamps would be operated more as a result of their increased efficacy.

MR. BROOKMAN: Joe.

MR. HOWLEY: Well, in this particular case, the HID market is under tremendous change right now, given what was just talked about, the market pull programs, the existing regulations, making it -- perhaps a ten year analysis possible in terms of analyzing what we expect to see happen over the next ten years. But we think this is impossible to try to figure out what might happen over the next 30 years, given the dynamic changes happening over the next ten years. We don’t know

what this market's going to look like ten years from now, and what you would project over the last 20 years, it would be a wild card in terms of what may exist, what technologies -- I mean a lot of these technologies may not even exist in the market place at that time. Obviously, if they wouldn't exist, there wouldn't be any national energy savings to pull forward.

So we're not sure -- perhaps there's a reason why a 30 year analysis is required, but from a practical standpoint, it doesn't seem to make much sense. Perhaps we could even ask why -- why 30 years with such a radically changing market?

In terms of the --

MS. ANDERSON: (Comment off mic)

MR. MORRIS: So let's stop and see if there's a response --

MR. BROOKMAN: Do we have an answer for the 30 year?

MR. MORRIS: Historical precedence -- Michael, do you have a comment?

MR. MYER: No.

MS. ANDERSON: Is there a regulation? Something that requires you to use 30 years?

MR. BROOKMAN: Betsy.

MS. KOHL: This is Betsy Kohl from the DOE-GC. There may be something in our process rule that we publish that sorts of sets the standards for our analyses, and that's actually available on our website, but I mean if you guys have comments on a different or better analysis period, and why that might be useful, we'd certainly consider them.

MS. ANDERSON: I mean the comments that Joe just made, I mean technology is changing so fast. I mean, I don't -- as efficient as -- and I'm an old fluorescent person -- as efficient as fluorescent is, in 30 years, I don't know if it'll be here. And I think fluorescent will outlast HID, except in a very few limited applications. I mean the world is going solid state.

MR. HOWLEY: Basically, if this regulation doesn't make sense in ten years, it's certainly not going to make sense in 30 years, because of all the change happening in HID market place. And so maybe we would recommend that you look at a ten year analysis, might be more robust than a 30 year. If you still want to do your 30 year, I'm not sure what you're putting in your last 20 years. You may not have much product to play with at that point.

MR. BROOKMAN: Okay. Thank you. Susan,

yes.

MS. ANDERSON: The other comment that I would make -- and this will be in our written comments -- when we work with end users, three years is about the longest payback time any of them will tolerate. If it goes beyond that, they won't do the change-out.

The other thing that I want to say to you, and I'm speaking from my own experience within my own company, is we are an HID lamp manufacturer, but we took out HID in a brand new distribution center and replaced it with T5 fluorescent.

MR. BROOKMAN: In your facility?

MS. ANDERSON: In our own facility, economics were there to justify it. So -- and when we do all the evaluations, because we've retrofitted all of our facilities, when we do the evaluations, we don't do payback, we do ROI.

MR. BROOKMAN: Daniel, I'm looking at you, noting that California frequently leads the charge on these things with market pull programs, so I'm wondering if they have a -- if what's going on there tracks the manufacturers experience.

MR. YOUNG: Sure, absolutely. We're definitely trying to incentivize LEDs as much as

possible, and I think -- I personally would love to see LEDs wipe out HIDs in the next two years. But obviously that's not going to happen. But joking aside, I do think that in existing fixtures, that could last anywhere from ten to 20 years, there may still be a market for the lamps that go into those fixtures, so that's something that could help to justify a longer analysis period, even if it's difficult to project.

MR. BROOKMAN: Michael Myer.

MR. MYER: Thank you, Doug. The fact that mercury vapor is roughly 80-plus years old this year, and probe start is roughly 50 years old at this point, and they're still installed in the market place, and if users want a low payback or low ROI, there are probably legacy products out there that are still going to continue to just replace the lamps until they can't replace the lamps well into the future. I think mercury vapor is a great example. The ballast can no longer be sold, but we're still selling -- well, not we, but the industry is still selling lamps, at least over a couple million is the last NEMA estimate I've seen. I know it's a decline, but it's still existing. So I think even though we are projecting

out 30 years and it's hard to know where we will be in 30 years. Thirty years ago if I could have bought some Apple stock, I probably would have at this point. You know, projecting into the future with -- do we know that certain technologies live on, and so I think there's still -- we may not be able to project forward with great accuracy, but we still -- there's definitely precedent that mercury vapor and probe start which are very old, still exist in the marketplace and there's an abundance of installed stock.

MS. ANDERSON: But the other thing to keep in mind is that the innovation rate has accelerated dramatically from what it was in the past. And it's -- that's changing the world, and so are LEDs.

MR. BROOKMAN: Yeah, the lighting industry is being transformed as we speak, right. Keith, go ahead.

MR. COOK: And believe it or not, I have seen replacement LED devices to replace the quartz metal halides in street lighting fixtures. And so the replacement market is not stationary either. It's also changing. And so the thought that what's already installed base is going to continue there may not be true in this technology.

MR. HOWLEY: I think the point is that you should consider these shrinking as you project out five, ten, 15, 20 years. You should be projecting out shrinking market segments for mercury vapor, for probe start lamps, I mean these should be projecting down to zero at some point, because they probably -- I can't imagine mercury vapor systems lasting 30 more years.

MR. BROOKMAN: Joe, thank you, and Keith, thank you. Michael.

MR. MYER: I think those are -- I appreciate those comments. Those will be definitely factored into the shipments analysis in the base case already, based on what you're telling us. And just while I have you, do you project either pulse start or high pressure sodium, which way that line's going in roughly, you know, you were nice enough to prognosticate a year, rough time window for other technologies? Do you see high pressure sodium 30 years out, declining, or to a point? I know it's a guess, but --

MR. BROOKMAN: Joe.

MR. HOWLEY: That's harder to project. We don't expect, certainly, growth in that area. Whether utilities will stay with high pressure

sodium. High pressure sodium still is very efficient from a lumens per watt standpoint, so that may be the hardest to dislodge with the other technologies. That may still have a life, but that's a very efficient source right now. Probably the most efficient HID source we make.

MR. BROOKMAN: Susan.

MS. ANDERSON: I was just going to say one of the things that's happening is utility rate structures, the way they're set up, they -- in some cases they can't accommodate the LED retrofit, so there's a huge change going over there and how the LEDs -- how the utilities have their rates structure set up.

And something else that's going on, and it's happening at the University -- not the University of Virginia, but Virginia Tech -- and we're participating in it, and I know some of my other fellow NEMA member companies are -- there are studies that are being done, as to white light versus the more golden white light of high pressure sodium as we like to diplomatically refer to it, that -- to determine whether seeing in outdoor applications is better under white light sources than it is under the more golden white light. And

if that would, in fact, allow people to go to lower wattage systems than as opposed to using the high pressure sodium.

So there's a lot of research going on in that area in the white light and color temperature arena that may have a big impact down the road too.

MR. MYER: I just have one other question. I appreciate this candid feedback. As regards to shipments and changes in technology, is it fair to say that low wattage or low lumen sources are going to be the first on the bubble to be possibly replaced by other technologies? And essentially, you know, as you increase in lumen package or wattage, it's going to be harder, not harder, it's going to be a more delayed effect before other suitable other option, since you're talking about other technologies outside the HID realm.

MR. BROOKMAN: Susan.

MS. ANDERSON: Yes.

MR. MYER: Thank you.

MR. BROOKMAN: Okay. That was helpful.

MR. MORRIS: Thank you. It sounds like all the fun is in the shipments part of this. But jumping back to the national impact analysis, the Department of Energy will use the DOE national

energy savings and NIA spreadsheet which calculates energy consumption beginning in the first year of the analysis period through the end of the analysis period. And basically, this slide is especially important for item 46, the Department welcomes any comments on features it would like to see in the NIA model, as well as any other inputs on the national impact analysis model.

MR. BOESENBERG: Alex Boesenberg. We sort of glazed past item 45. I'd like to return to that for one brief comment, if I may.

MR. BROOKMAN: Yes, please do.

MR. BOESENBERG: The question is, will these more efficacious, more efficient HID lamps be operated longer, more, that is, on a given basis because they're more efficient? The rebound effect of, oh, don't worry, those CFLs are efficient, we don't have to turn off the lights in the living room any more. Because these products are not residential and don't have a lot of human intervention, but rather they are operated on astronomical clocks or as dictated by sunrise and sunset, we do not believe that there will be much, if any, change in operating hours just because they're more efficient. Perhaps more popularity,

but not -- they're just not going to leave street lights on all day.

MR. BROOKMAN: Gotcha. Okay. Thank you.

(comment off mic)

MR. BOESENBERG: Yeah, but the alternative is control systems are getting better, right.

(comments off mic)

MR. MORRIS: So then --

MR. BROOKMAN: Forty-six, thank you.

MR. BOESENBERG: NEMA has no comment on item 46.

MR. BROOKMAN: So we're at a point where we should decide what to do. It's noon. It's five after noon. The -- typically, the manufacturer impact analysis takes, I don't know how long, but the next -- the utility impact, employment, environmental, and regulatory impact analysis, those are downstream analyses, they don't take very long to breeze through those. So, do you want to just keep going?

PARTICIPANTS: Yeah.

MR. BROOKMAN: Strong preference to keep going.

MS. ANDERSON: We've got consensus, yes.

MR. BROOKMAN: I'm with you. Okay.

MR. MORRIS: You see nods from everybody.

MR. BROOKMAN: I think we can hang in here for 20 minutes or so.

MR. MORRIS: Very good. So we'll jump into the NOPR analyses.

NOPR Analyses

MR. MORRIS: I will be talking about this first one. So on the NOPR phase of this rulemaking, DOE will conduct several additional analyses to determine how this energy conservation standard affects things such as customer subgroups, manufacturers, utilities, and emissions. And I will briefly discuss the life cycle cost subgroup analysis.

The LCC subgroup analysis quantifies the impact of a standard on subgroups of customers within the general population. Chiefly, DOE will study the effects of this energy conservation standard on customer subgroups that may be adversely affected by the rulemaking.

In the comment box, DOE welcomes any comments -- I should mention too a couple examples of possible customer subgroups -- including utilities, municipalities, and transportation facilities. The Department would be very

interested in any other subgroups of the population who might be -- who should be considered in the rulemaking.

MR. BROOKMAN: Joe.

MR. HOWLEY: I think that subgroups here to consider as we do these analyses are people who are using existing mercury vapor systems, or -- if -- as you're projecting different levels of standards, I imagine one of the levels will get to the point where people using probe start metal halide lamps are affected at some point, and those subgroups, the users, are going to be forced to replace the entire fixture when you get up to that point. I suppose you could say the smaller users of those systems, say, school districts that might just use these in a gymnasium, or something of that nature, or a smaller retailer accounts, would be significantly affected if all of a sudden they could not get the lamp and they have to replace their entire lighting system with a brand new HID lighting system. That would have a significant impact and maybe not -- it would possibly be hard to cost justify, but certainly you should look at whether or not that kind of forced behavior could be cost justified on those smaller user groups.

MR. MORRIS: Thank you, Joe. You mentioned the school districts, specifically. Can you mention other entities?

MR. BROOKMAN: Susan's going to follow on.

MS. ANDERSON: I was going to say like community centers. You see a lot of community centers with HID lighting and like a general purpose gymnasium facility, or swimming pools and that sort of thing. Yeah, those are typically people on a limited budget, where it's going to have a much greater impact on them.

MR. BROOKMAN: Okay. Keith.

MR. COOK: Yes, similarly, roadway lighting ends up being a major issue, and the problem we've got is if you are requiring a situation where you can't get a replacement any longer, the utilities or municipalities or whatever, then has this significant problem, because unfortunately roadway lighting poles have a tendency to get hit by cars, and they don't want to have to go through and replace all of them, and they don't want one that's mismatched. And so you'll end up with significant push back from those areas if they have to change out their poles.

MR. BROOKMAN: Susan, keep going.

MS. ANDERSON: Something else I was going to mention. I worked in the Kansas City market area for a number of years, both with Holophane and with Sylvania. We sold roadway lighting systems, high mass lighting systems. And they -- the state of Kansas had an interesting philosophy when they did roadway lighting. They did the interchanges with metal halide, and then they did the roadways leading up to the interchanges with high pressures sodium. And had a couple good reasons for that. The color change signaled a change to the drivers, and then where the accidents were most likely to happen were in the congested areas of the interchanges, so they had better color rendering for all the investigative purposes, and for eyewitness accounts and that sort of thing. So they had a very distinctive purpose in wanting to have two distinctive colors. And the high pressure sodium was the more efficient, so it was used covering the greater area, but then in the more critical area they used the metal halide. So there’s value in different technologies.

MR. BROOKMAN: Alex, did you have -- nothing there. So additional comments on subgroups as requested, and also 49.

MR. MORRIS: Okay. Thank you. I'll turn the time over to Merry Walker.

Manufacturer Impact Analysis

MS. WALKER: The purpose of the Manufacturer Impact Analysis or also known as the MIA, is to identify the impacts of energy conservation standards on manufacturers, manufacturer subgroups, and the cumulative regulatory burden on the industry as a whole. DOE does this by analyzing the industry cash flow and net present value through the GRIM, or the Government Regulatory Impact Model, and interviewing manufacturers to assess the impact of standards, both qualitative and quantitative.

The analysis methodology is broken into three main phases. The first is in which DOE creates an industry profile to characterize the industry and to identify the key uses in manufacturing. The second phase, DOE prepares an industry cash flow model with the GRIM that takes into account any investment and revenue changes that the industry might experience, and an interview questionnaire to guide interviews with manufacturers. In phase three, DOE interviews manufacturers, assesses the impacts of standards,

both quantitative and qualitative, looking at the impacts on competition, manufacturing capacity, employment, and regulatory burden.

With that, DOE seeks comment on the HID lamp manufacturer subgroups and regulations that DOE should consider in examining cumulative regulatory burden.

MR. BROOKMAN: Keith.

MR. COOK: One concern that we've got is the fact that along with the new potential rulemaking comes significant testing and reporting requirements. And as we've discussed in previous Meetings, this can be significant due to the number of subgroups we may end up with, within the HID family. And, you know, we've estimated per manufacturer, the testing could easily exceed a million dollars per year on a market that's flat, as we've already discussed, flat at best, and probably even diminishing.

That amount of testing ends up being a significant burden to the smaller manufacturers who aren't even really represented here today, to the point where it could lead to them getting out of the market entirely if we're not careful. So this has a significant impact in, like I said, a market

that's not growing, and we're very concerned with it.

MR. BROOKMAN: Okay. Thank you. Susan.

MS. ANDERSON: To add to that, there was a suggestion made that instead of looking at initial, to look at mean lumens and maintained lumens. These are very long-lived products, so by the time we get to 40 or 50 percent of rated life, which the metal halide, mean lumens are measured at 40 percent, for mercury vapor and HPS it's at 50 percent of rated life. That's thousands of hours of operation, and you're talking about huge electricity bills, and not just from operating the systems, but then the necessary cooling for those facilities where we use those. There's a huge expense, an investment in the equipment, and then the operating expense will be huge.

MR. BROOKMAN: Okay. You can see the request for comment there, 48 and 49. Additional comments, and particularly -- have we heard about cumulative regulatory burden yet? Yes, Joanna.

MS. MAUER: Joanna Mauer. If I can just ask a follow up question to Susan. We're talking about measuring mean lumens, would that be something different than what you're -- because you

often report mean lumens in catalogs. Would this be additional testing?

MS. ANDERSON: But we don't do it on the number of lamps that we're anticipating the DOE might require us to do. So you're talking about a significant additional investment.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. So to follow up on Susan's statement. We did provide our best estimates in the test procedures NOPR over potential costs and comments on the, not only cost of performing the testing, but the cost of test rigs and things like that. Everything that adds costs increases the burden. We will mention in our written comments several additional considerations for cumulative regulatory burden, and I am personally open to being involved in the discussions of that, both to better understand it myself, and better represent the interests of the members.

But the reason NEMA created a manager of regulatory affairs is our existing legislative regulative guy couldn't handle the workload, and we've even had to add another position for state regulation. I consider it job security, but I've

always enjoyed putting myself out of a job by getting a system streamlined or properly set up. I'm never worried about finding work. Personally, as I said, I would like to see open discussions to better understand the models being used to quantify and estimate regulatory burden, because industry -- we are trying to figure it out ourselves.

But so many companies make multiple products, and almost every one's got a regulation or is slotted for one. These are the same people you saw at the last rulemaking, and these are the same people you saw at the one before that. We can only do so much.

MR. BROOKMAN: Okay. I'm with you. Do you have something here, Matthew?

MR. WALKER: Yes, I had a question back on the small business impacts. I was curious if you had kind of estimates of number of lamps that those types of companies would sell, or what the size of those businesses would be. Is that something you can talk about?

MR. BROOKMAN: Keith.

MR. COOK: I would say you really need to try and approach them to try and get that information.

MR. WALKER: We will include that, I was just ready for a sneak peek.

MR. BOESENBERG: That's something, when you come to me, to NEMA, to discuss how to obtain the lamp shipment and technology shipment sales data, that's a good question to ask at that time when I have a NEMA business office there, they will be able to answer it, whether or not that's something we're able to parse out -- I mean, we know who we get the information from, but we have very strict laws, internal bylaws, regarding the -- what's the right word -- the disclosure, thank you -- you knew what I was saying -- the disclosure of sales per company. So we usually aggregate the data and anonymize it. But relative to your question, we may be able to provide, I can't promise, but it comes to my mind that we do have small manufacturers, so for a given product type, we may be able to give you the aggregate small business sales or something. I don't know. That's a question we have to put not only to the NEMA business office, but probably to the NEMA lawyers.

MR. BROOKMAN: Okay.

MS. WALKER: I have just one follow up question to NEMA. I was wondering if we could also

receive some feedback on the percentage of all lamp manufacturers, specifically HID lamp manufacturers, that are part of NEMA. I know that the percentage is very high, but it would be nice just to understand approximately what percentage of the lamp manufacturers are part of NEMA.

MR. BOESENBERG: I'll see what we can do.

MS. WALKER: Okay. Thank you. I will pass it on to Michael Myer.

Downstream Analyses

MR. MYER: Thanks, Merry. As Doug said, I will be doing the remainder analyses which happen downstream, which means they happen not in the interim analysis, but in the NOPR analysis itself.

The first one that happens is the utility impact analysis. The focus of the utility impact analysis is to examine the effects of potential standards on electricity generation. We use a model called the National Energy Modeling System, NEMS. It's been modified for the DOE buildings technology program, so it's designated as NEMS-BT. We use some AEO data regarding generation. We model what the energy savings effects could be from standards compared to non-standards, and get a differential, and the output is what the deferred

generating capacity could be.

Brings us to item 50. We seek comment on input or plans to use NEMS-BT and conduct the utility impact analysis.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. We suggest the government follow up with that at the individual manufacturer interviews.

MR. MYER: The follow on question. There's something in there specific to each manufacturer regarding utility generation?

MR. BOESENBERG: This is a topic we historically do not have a lot of comments on, is the best way to answer your question. I wish I understood NEMS, but I haven't had the time.

MR. BROOKMAN: Thank you.

MR. MYER: Moving on. The next one is employment analysis. This -- the manufacturers impact analysis just looks at direct employment on the manufacturers. The employment analysis looks at indirect employment effects. It does look at both, direct and indirect, but the ultimate output is about indirect. It also uses a model, and this one is the Impact Sector Energy Technologies Model to look at the indirect employment analysis.

Again, it looks at what the potential effect on -- indirect employment could be as a result of standards.

Item 51, DOE requests feedback on its approach to assessing employment impacts for the equipment covered.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. This is another topic that varies greatly, I would venture to say, by individual company and their policies, and their individual geographic and regional considerations. So we have to defer to the manufacturer interviews for that.

MR. BROOKMAN: Thank you. John.

MR. GREEN: Yes, I understand you'll probably be interviewing lamp manufacturers, but will interviews be done for other companies that may be impacted by this, such as ballast and luminaire manufacturers? It was just a question.

MR. MYER: At this time, yes, lamp manufacturers are the only ones being interviewed, but it is something we will take into consideration, interviewing -- besides the ballast and fixture manufacturers, are there other manufacturers that could be potentially affected?

MR. GREEN: Those are the two that come to mind, but they could have some input on the impact on employment, so that's why I brought it up here.

MR. MYER: We appreciate it, thank you.

MR. BROOKMAN: Additional comments? None.

MR. MYER: The next one is the emissions analysis. Those who are familiar with the process might know this better as the environmental assessment. Same type of idea, just a new name. The whole point of the emissions analysis is to look at the environmental effects resulting again from energy standards, and changes in power plant emissions. There's four emissions that we look at:

- Carbon dioxide
- Sulfur dioxide
- Nitrous oxides, and
- Mercury.

Carbon dioxide is the main emission that is reported and reviewed. Because of existing legislation on sulfur dioxide, no major changes are expected, near zero is usually the way we describe it. With nitrous oxide, it's kind of a mixture. There are caps in 28 states, and so we look at the effects of nitrous oxides in the non-

covered 22 states. And then also we will report possible mercury emissions being affected because of all the standards.

Item 52, DOE seeks input on its plans again to use the NEMS-BT model to modify slightly to look at the different effects on emissions for this standard.

MR. BROOKMAN: Alex.

MR. BOESENBERG: NEMA has no specific comments to this.

MR. HOWLEY: I just have one thought is that I believe that the EPA has passed requirements for utilities to limit mercury emissions as well in the next few years, so if that has not been incorporated in this analysis before, you may want to look into that rulemaking, and see if that requires -- I believe it affects coal fired power plants primarily.

MR. MYER: I don’t know the exact extent of it, but yes, there was some recent work done related to mercury. It was added into the framework because it happened really recently as well, and since this is a downstream analysis, we will look at whatever the new guidance is, the new requirements are. But thank you for the direction.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Since we're pretty much at the end and we're ahead of schedule, I hope you'll entertain a couple questions about NEMS. You talk about using it for an environmental analysis. Does that mean that if it will greatly reduce carbon dioxide emissions, then it's a good idea? How does NEMS weight this? If you got rid of all street and area lighting, boy would we save a lot of electricity and reduce carbon dioxide consumption. Accidents and deaths might go up. So I'm just curious, what's the tool to balance all that?

MR. MYER: That's actually a fair question. This slide, monetization, helps with some of that. So yes, there is some monetization related to that. If you read the NOPR analysis, it does provide a breakdown of many things that are important. So when something goes from a NOPR which is a Notice of Proposed Rule, to the Final Rule stage, there's a whole -- the NOPR includes a whole list of things such as what this standard would potentially have the effect on employment; what it would have on costs; what it would have on emissions. I would say that there's no one guiding

rule, no bright line test that says if emissions went to this value then it's a go, because conversely, as you said, there's some other possible effects resulting from turning off all street lighting, something like that. So it's a -- there's no one guiding principle that says if you meet this bar, then it goes forward. It looks at a lot of potential effects. Again, employment, direct and indirect; net present value, both the industry net present value as well as the energy savings and generating capacity.

MR. BOESENBERG: Thank you. That's a very good explanation and I appreciate it. So that leads to the follow on concern that is far too complex for us to really be able to comment on. I have some discomfort with it, I hope you'll understand, I don't know.

MR. BROOKMAN: I'm sure that there are many resources here in the room and elsewhere in the Department that would, perhaps when they come to see you, they could give you more of a fuller explanation on NEMS.

MR. BOESENBERG: I welcome that, thank you.

MR. BROOKMAN: Okay. Thank you.

MR. MYER: So I briefly made mention of the monetization of emissions. We're going to use the social cost of carbon. The second bullet here kind of provides -- there's different intra-agency reviews of the social cost of carbon. They range from 4.9 to 67.6 dollars per metric ton -- those are in 2010 dollars. I'm sorry?

MR. HOWLEY: It's a big range.

MR. MYER: Yes, Joe, it is a wide range, and there's many things that factor that. There are different discount rates and it's actually there's a lot of different caveats of why it's a different range in different analyses. They're all reported in different tables within the NOPRs. And then we also estimate the potential monetary benefit of reduced nitrous oxide emissions resulting from considered … standard levels.

The final analysis that is done in the NOPR analysis is the regulatory impact analysis. I always personally find the regulatory impact analysis somewhat contradicting in title, because it actually says what could be done in -- separate from a standard, such as a non-regulatory action. Non-regulatory alternatives can be customer rebates, customer tax credits, manufacturer tax

credits, voluntary targets, early replacement and bulk government procurement. Again, we use -- in this case we use the national energy spreadsheet. It's modified to say well, what if we did this, what if we did this, to estimate the effects of non-regulatory scenarios, based on experience with considered policies.

And the outputs are again, national energy savings, and net present value for the described non-regulatory alternatives.

MR. BROOKMAN: Susan.

MS. ANDERSON: It's interesting that you mention the other alternatives. Right now there is legislation, it's Senate Bill 398, that would, in the case of outdoor lighting, one of the provision in it would be to eliminate mercury vapor for general lighting applications, the lamps -- the ballasts are already gone.

But something else, right now there's -- are you familiar with the Commercial Building Tax Deduction Program?

MR. MYER: Yes.

MS. ANDERSON: It's a federal program. Right now it only includes indoor lighting. It doesn't cover outdoor lighting. You know, a lot of

HID is used outdoors. And that's --

MR. HOWLEY: (comment off mic)

MR. MYER: Just some clarification for those in the room and those who may not be familiar with it. It's -- the deduction that Susan and Joe are referring to was part of EPACT. It gives a proportional income tax deduction, not a credit, related to reduction in installed power density against standard 90.1 2001. From my understanding, I think -- and it does not cover outdoor. The only quasi outdoor activity it does cover is parking garages, which the IRS ruled under an interim rule that they are a non-conditioned indoor space. So I know that there is some review of that ongoing by other agencies as well, that legislation, but I just wanted to clarify that it is a deduction, not a credit. But thank you for the suggestion or to possibly look at the effect of it.

MS. ANDERSON: Yeah, I mean there were a couple reasons why they didn't cover it to begin with, because 90.1 only covers systems that are managed by the power system of the building, and a lot of outdoor lighting is not. But still, there's a huge opportunity for energy savings if there were some sort of incentive there to get people to

convert outdoor lighting to something more energy efficient.

MS. deBUTTS: We will definitely consider that and since the folks that work on that program, you know, are close by as well, so we thank you for the remarks and we'll see if we can include that.

MR. MYER: Yes, I had one question for the manufacturers who are reviewing it. One of my concerns about it is that … it's not always used in interior applications, especially related to HID is the bilevel provision. Do you have any thoughts on how the bilevel provision related to HID lighting could be addressed related to -- there's a requirement that the lighting has to have a bilevel aspect to it.

MS. ANDERSON: We're actually working on that in order to accommodate new standards that will be coming out in California.

MR. MYER: Thank you.

MS. ANDERSON: So, with metal halide you can't -- you don't have this infinite dimming range or anything like that, like you can with fluorescent, but you can step it down, so there -- and there also already have been some studies done by California Lighting Technology Center on

implementing that type of system.

MR. BROOKMAN: I see. Joe.

MR. HOWLEY: To that point, the tax incentives so far has been to promote people taking out a HID systems out of warehouses and putting in fluorescent systems that can be more easily bileveled, controlled. And so it's -- that's another -- other regulatory activity that's going on that we hadn't mentioned to date, that you should consider in your analysis. That of course, just continues through 2013, unless Congress decides to extend it. The last time, they decided to extend it five years. All bets are off with what this Congress may do. But that's a 2013 Congress that hasn't been elected yet either, so I'm not sure what they might do next year. But that should be taken into account as well, perhaps, as another factor that is impacting the HID marketplace. Not in a positive way, in a negative way.

MR. MYER: Thank you.

MR. BROOKMAN: Alex.

MR. BOESENBERG: Alex Boesenberg. I have one clarifying question for this slide, non-regulatory alternatives for the regulatory impact

analysis. So am I correct when I say that your analysis is in that how non-regulatorial alternatives such as those listed might reduce the opportunity for energy savings from the rule and somehow they impact -- encourage energy savings any way or already, but you're not considering new ones, is that right? Because I don't know how the Department would extend the Commercial Building Tax Deduction, even if they agree with it.

MR. MYER: Well, there's definitely a mixture of things here. Certain -- the six items listed there, some are not actually promoted by -- customer rebates, obviously, would not come from the government, would come from --

MR. BOESENBERG: We're open to that option.

(Laughter.)

MR. MYER: So the way I tend to think of this in my head is that we look at what the national energy savings are, which is reported in quads of energy savings, and the net present value, which is dollar amount from the standards case. And then what could it be from these potential other alternatives. As Joe was saying that you're seeing other incentives push away from HID. Is

there greater savings from not doing a standard but encouraging manufacturers to retool or to upgrade through a tax credit, rather than a regulatory compulsory action, but financially - the carrot, I guess is the best example -- rather than requiring them, you must be this efficient, or rather saying, you know, you can write off much faster deduction of upgrading to a new machine that develops this type of lamp. So that's what it is, it's a comparison of could they do other things that are not standard driven.

MR. BROOKMAN: Okay. So comments on -- additional comments on the regulatory impact analysis?

MR. MYER: At this time --

MR. BROOKMAN: Then now we have an opportunity to have additional comments, anything that we haven't covered already today that perhaps some of you even have notes on, being as well prepared as you are.

MR. BROOKMAN: Susan, microphone.

MS. ANDERSON: We wanted to go back to eight, nine, ten, and eleven, and actually Tom Harding has the expertise to comment on those. Those were things impacting the -- where we were

allowed to make additional comments related to the test procedure.

Final Comments

MR. HARDING: Yes, being the 12:30 time, just because you wanted to hear from me. Quickly, I'll make it in five minutes, I think, unless you have a lot of questions.

Item eight, which is welcoming comments on test procedures, and particularly for photometry, and it was an open-ended question on integrating spheres specificity, and LM 78, and the answer is that's fine. We accept LM 78, the information needed to photometer these HID lamps is all in there. It related to source size versus sphere measurement size. It's all in there. We accept that. It's also related to the CIE recommendations on that.

MR. BROOKMAN: Michael.

MR. MYER: Michael Myer, Pacific Northwest National Laboratory. I'm supporting the test procedures. I just have one question. During the test procedure meeting, there was comment about LM 51 being updated. We were forwarded a draft copy of LM 51 and it appears that a fair amount of the new stuff in LM 51 is also related to sphere

specificity, and do you feel that LM 78 covers enough of that, or do you still will you direct us back to the new -- currently revised version of LM 51?

MR. HARDING: Well, I haven't seen the revised version of LM 51. I am familiar with the document, but I haven't seen any revision of it yet, so I don't know what they've changed in it. I don't think it's a big issue. I think we're all fine that there's historically a ten to one ratio from lamp arc size or source size to sphere diameter, and I don't see that that's changing.

Item nine was the document -- NEMA standard, LSD 26, which was on tolerancing, it's not been a published document, and because of all this regulatory work, we're revising it very regularly, a couple times a month, and we started with incandescents, added fluorescent, it's now adding HID. It's including not just lamps, it's including ballasts. And it deals with the standard deviations of all these measurements. And inherent in the source, as well as from lab to lab kind of things. So we're trying to put that all in, and it's a very active group, mid-year is kind of our target date to have this all out. But once you

know the statistics, you may be able to do better plans for measuring these things.

MR. MYER: Michael Myer, Pacific Northwest National Laboratory. I'm sorry, so mid-year, so would that be summer of 2012?

MR. HARDING: I'm guessing. I don't have a firm date. It's winding down, I know that, because we've submitted all our data. I just don't know what NEMA's looking at a target date, but we said mid-year and I believe -- there's discussions and I believe that's about right.

Item ten was the use of NVLAP accredited testing facilities. Data normally submitted to these things come from NVLAP facilities, but the way the lighting companies work, they typically have one setup, one sphere system for light sources that's NVLAP accredited. But the data is often taken at the factories where they produce the product, they pull samples out, put them on test and do the data. So the data bases we all have are not on NVLAP systems. And they're expensive to maintain, that's why basically each company has one. So if we're going to require a lot more data like this light testing data in particular, which is normally done at the plants, we have a NVLAP

situation. We've either got to overload the central unit, if we're not careful, or we've got to diversity out to some of the plants to make them NVLAP approved.

MR. BROOKMAN: Those labs in the plant, are they somehow NVLAP certified or something?

MR. HARDING: No, I don't think they're anything, they're just their own place. Now they often try to correlate the data to the central NVLAP-approved system, but it's not directly NVLAP measured.

MR. BROOKMAN: Michael.

MR. HARDING: It's used as a correlation headquarters, if you like, to make sure the plants stick there.

MR. MYER: Michael Myer, Pacific Northwest National Laboratory. I guess -- I read the written comments related to NVLAP, and I was a little confused. So it appeared that in NEMA's written comments related to NVLAP, they were supportive of NVLAP for color measurements, and you just said now but NVLAP is hard for --

MR. HARDING: Well, efficacy and color.

MR. MYER: So you were going to be okay with that -- I guess that's the clarification. So

NVLAP for efficacy and color is fine, but when something that's a long term, such as lumen maintenance, there's a burden -- not burden, but a potential, as you said, of overloading the center -- not enough … space.

MR. HARDING: There is that, yes. Efficacy of course is what you're measuring anyway. There was an issue when it came to incandescent, general service incandescent lighting, you know where there was a life requirement of 1000 hours and we're saying, how do you do 1000 hour light verification in a NVLAP facility? That was an issue.

But everybody will agree that lumens and color can easily be done there, in any NVLAP facility. The issue is how much money has to be spent to bring all this life testing into compliance with NVLAP. In other words, do we have to now NVLAP approved factories where the data is taken? Do we have to expand the central NVLAP facility? All of that costs money, manpower, and equipment, as well as the certification cost, which is not maybe so bad for huge corporations, but for some of the smaller companies, it's significant, let me tell you. I've been having trouble getting

the money allocated.

Those are the items that we had skipped over. I think that was all of them. Oh, the sample size one, yeah. Sorry. We did look at sample sizes where 21's one of the going numbers that's thrown around. We're kind of reserving our own judgment until we get done with this LSD 26 paper and know some of the statistics. Knowing some of the statistics will help us perhaps make a better recommendation as to how to do it.

One of the things is, if we have to do long life testing, how do you choose, for example, the infamous three lamps a month over seven months in a 12 month period, and then put them all up for life testing. Or do you put them up three a month? And then you've got staggered outputs or one thought is maybe we do a chunk at the beginning if we have to do this kind of testing. But we wanted to see what the statistics showed up, and this LSD 26 working group is looking at this one as well.

MR. BROOKMAN: Okay. Thank you. Alex.

MR. BOESENBERG: Alex Boesenberg, NEMA. And as a reminder, we did submit comments on a 21 lamp sample size in our test procedures NOPR response and we continue to stand by that. It's a

very challenging number at that size for the equipment, manpower, and cost of performing those tests.

MR. BROOKMAN: Okay. Thank you.

MR. BOESENBERG: A thousand watt lamps, boy does that burn a lot of juice.

MR. BROOKMAN: Thank you. So you seem quite systematic. Michael, go ahead.

MR. MYER: Michael Myer. Reading the NEMA comments and going back to what Tom was saying about three lamp samples per month, is it fair to say that unlike other lamp technologies that production runs are not continuous for certain HID lamps, or that if they're continuous they happen on maybe a more staggered cycle and there's not monthly? It would be, you know, six or eight weeks, some longer -- some more intermediate period than a monthly lamp run?

MR. BROOKMAN: Tom.

MR. HARDING: Tom Harding. Depends on the type. There's some very specialized products, well, I shouldn't say specialized, lower volume products, and you're not going to run those all the time. You're going to do it at intervals. The more higher production, higher sales items, you're

going to run more often. So it does vary. I don't know, I can't speak for the other companies, so I don't know how often they run the various types. We do them, of course, in significant enough runs to justify the equipment setup.

MR. BROOKMAN: Now is an opportunity to make any additional comments, raise additional issues that haven't been covered fully and seems as though you all had quite a lot of preparation that went into this. I'm certain the Department really appreciates that. Anything else that you'd like to raise at this point? Because we're nearing the close of this meeting. Nothing additional at this time? So back to then, Lucy deButts for closing remarks.

Closing Remarks

MS. deBUTTS: Sure. Well, again I would like to thank everyone for providing us with your input. I think it was a very interesting discussion, and we got a lot of good information from all of you, so thanks. If you'd like to submit written comments, which we expect from you and appreciate, there are several avenues for you to do that. As usual, when you submit written comments please address the rulemaking, provide the

docket number, and refer to the RIN for that rulemaking.

We encourage you to submit them through the regulations.gov or through the e-mail address shown here on this slide. However, if there are difficulties with doing it electronically, there's always an option to send it in via postal office or courier, as shown here. Brenda Edwards, who we met earlier and during all the previous meetings, will be taking care of the comment collection.

So again, comment period is closing on April 12th, and we extended it to accommodate everybody as much as we can. We have to consider the test procedures so we'd like to get your comments by April 12th if possible.

And again, if you'd like to give additional information or you need to access the framework document, or agenda, and the transcript of this meeting, these are the links that will be useful for you to consider. As well as the website for each product pages.

Any questions on that?

MR. BROOKMAN: There's one more thing. The Department frequently provides a Xerox copy of the business cards of the individuals that have

checked in, and I see Brenda is going to be handing out a copy of that right now for your reference.

MS. deBUTTS: Any questions before we conclude? Well, Doug, it's back to you.

MR. BROOKMAN: Thanks to all of you. Appreciate it, and safe travels.

(Whereupon, at 12:46 p.m., the meeting in the above captioned matter was adjourned.)

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings

before:

U.S. DEPARTMENT OF ENERGY

In the Matter of:

PUBLIC MEETING ON THE ENERGY CONSERVATION STANDARD FRAMEWORK DOCUMENT FOR HIGH-INTENSITY DISCHARGE LAMPS

Were held as herein appears and that this is the original transcript thereof for the file of the Department, Commission, Board, Administrative Law Judge or the Agency.

Further, I am neither counsel for or related to any party to the above proceedings.

Wendy Greene

Official Reporter

Dated: April 3, 2012