U.S. DEPARTMENT OF ENERGY

PUBLIC MEETING ON ENERGY CONSERVATION STANDARDS FOR COMMERCIAL REFRIGERATION EQUIPMENT

Room 8E-089
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A G E N D A

ITEM:	PAGE:
Welcome	6
Opening Remarks, Introductions and Agenda Review Doug Brookman	6
Rulemaking Overview Charles Llenza	11
Comments from Participants Doug Brookman	14
Engineering Analysis Aris Marantan and Matt Millard	28
Energy Use Analysis and Life-Cycle Cost Analysis Dave Winiarski	74
National Impact Analysis Dave Winiarski	90
Afternoon Session	
Trial Standard Levels and Manufacturer Impact Analysis Dave Winiarski and Aris Marantan	146
Utility Impact Analysis, Employment Impact Analysis, Environmental Assessment, Regulatory Impact Analysis Dave Winiarski	161

ATTENDEES

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P R O C E E D I N G S

9:15 a.m.

Welcome

Opening Remarks, Introductions and Agenda Review

MR. BROOKMAN: Good morning, everybody, and welcome.

This is the U.S. Department of Energy's Public Meeting on Energy Conservation Standards for Commercial Refrigeration Equipment, and thanks for being here on time.

My name's Doug Brookman and I'm with Public Solutions in Baltimore.

Let me introduce Ron Lewis, Supervisor of Regulatory Activities.

MR. LEWIS: Good morning, everyone. Appreciate your being here. We've had a real pick-up in the last couple of years with a number of these meetings and a lot of familiar faces here that have gathered a lot of frequent flier miles coming to Washington and we're glad you're here.

Looking forward to a good day and looking forward to your candid input on what you think about what we posted and want to get everything on the table and have good discussions and so we don't want anybody

holding back but giving us your thoughts.

So thanks for being here and look forward to an engaging day.

MR. BROOKMAN: Thank you. It's our tradition to have each person introduce him or herself and so let's do that. Would you say your name and organizational affiliation?

Charlie?

MR. HON: Charlie Hon, TRUE Manufacturing.

MR. BROOKMAN: Thank you.

MR. HOWINGTON: Larry Howington, Hill Phoenix.

MR. AMRANE: Karim Amrane, Air-Conditioning, Heating and Refrigeration Institute.

MR. BALLO: Tim Ballo, EarthJustice.

MR. deLASKI: Andrew deLaski, Appliance Standards Awareness Project.

MR. BURT: Lane Burt, Natural Resources Defense Council.

MR. SACHS: Harvey Sachs, American Council for An Energy Efficient Economy.

MR. FERNSTROM: Gary Fernstrom, Pacific Gas and Electric, one of the few, if perhaps not the only, utility pursuing codes and standards improvement in the country.

MR. HIERLMEIER: Bruce Hierlmeier, Zero Zone.

MS. PINTO: Francine Pinto, General Counsel's Office, DOE.

MR. LLENZA: I'm Charles Llenza. I'm the Project Engineer for the Department of Energy.

MR. RIVEST: Mike Rivest, Navigant Consulting.

MR. LEWIS: Ron Lewis, DOE.

MR. MILLARD: Matt Millard, Navigant Consulting.

MR. MARANTAN: Aris Marantan, Navigant Consulting.

MS. LEGGETT: Rebecca Leggett, Navigant Consulting.

MR. PARKER: Graham Parker, Pacific Northwest National Laboratory.

MR. BROOKMAN: Want to introduce yourself, please?

MR. FINKELSTEIN: Roy Finkelstein, Kason Industries. Thank you.

MS. DiMASCIO: Marianne DiMascio from Appliance Standards Awareness Project.

(Introductions Off Microphone.)

MR. BROOKMAN: Thank you. So I'm going to go real fast and give an overview and then we're going to

go from there to providing a short Rulemaking Overview. Following the overview, there's an opportunity for each of you, any of you that wish to do so, to make brief summary remarks about issues and concerns.

Following Charles Llenza's Rulemaking Overview, there's an opportunity for each of you, anybody that wishes to do so, to make brief summary remark about the issues that are of particular importance to you in this rulemaking.

From there, we'll go directly into a presentation followed by discussion on Engineering Analysis. We'll take a break midmorning, around about 11 o'clock or so. From 11:15 till noonish, we'll have Energy Use Analysis and Life-Cycle Cost Analysis.

We'll take a break for lunch around about noon. Following that, we'll have the National Impact Analysis presentation and discussion. Following that, Trial Standard Levels and Manufacturer Impact Analysis. Then Utility Impact Analysis, Employment Impact Analysis, Environmental Assessment, and Regulatory Impact Analysis.

We'll take a break midafternoon, around about 2:45, and then at the end of the day, this afternoon, there's yet another opportunity for those of you that wish to do so to raise additional issues that you think

you'd like to try and cover and emphasize before we leave this meeting. We'll close with Next Steps and Closing Remarks.

We intend to adjourn today no later than 4:30. That's our plan.

Questions and comments here at the outset?

(No response.)

MR. BROOKMAN: I'd ask your consideration. You can see I've listed on the board. Please speak one at a time. I think this is nothing more than basic courtesy. Please speak one at a time. Say your name for the record. You'll see we have a court reporter here. There will be a full transcript of this meeting provided.

I'm going to be trying to queue each of you by name. I also wish to try to encourage follow-on comments, so we have something more than a block by block rote by rote comment here. We do wish to encourage discussion and dialogue exchange. So say your name for the record. I'll be trying to queue you. Please be concise, share the air time, and if you keep a focus here, turn your cell phones on silent, and if you need to have a sidebar conversation with anybody, we'll understand if you simply -- if it's going to go for more than about 10 or 15 or 30 seconds, please take

it out of the room. We'll understand that.

As I said, I'll be queuing people as best I can to speak. Questions? Comments?

(No response.)

MR. BROOKMAN: I see none. Okay. Charles Llenza.

Rulemaking Overview

MR. LLENZA: Welcome to the Department of Energy and we're here today to receive your comments on the Proposed Notice of Rulemaking for Commercial Refrigeration Equipment.

The website where you can obtain all the information on the material for the Notice is on the bottom of the first page.

The purpose of today's meeting is to invite you all to comment for the Proposed Energy Conservation Standards for Level TSL-4 and to request recommendations for alternatives, if you have any, to present the different methodologies and characterize the results that we utilize in this rulemaking, to discuss specific issues and reach analysis, to seek input for the ANOPR, and to describe the next steps that we are to follow in achieving the final rule, encourage the participants to provide your summary comments of statements and to raise additional issues

to discuss today as we go through the presentation.

Please also note that the comment period ends October 24th.

The standard statutory authority of the Energy Policy and Conservation Act, as amended, is addressed in the requirements of 42 USC 6313(c)(4)(a), as you can see, and basically we are to issue a rule by January 1st, 2009. The effective date becomes January 1st, 2012, and the rule is part of the report to Congress.

Okay. The test procedure that we have used for establishing the standards was published in December 8, 2006, known as the rule and the Energy Conservation standards, where we're at at this point is that we have -- we've gone through the same -- the Framework Document was published in April 2006. We had the Advanced Notice of Proposed Rulemaking July 26th, 2007, and we've issued the Technical Support Document, the TSD, and we have -- the NOPR was issued on the 12th of August and published on August 25th. The final rule is scheduled again end of the year.

The Energy Policy and Conservation Act, EPCA, has directed the department to consider seven factors when setting our Energy Conservation standards and these are the seven factors here.

We have selected the proposed standard. We considered five trial standard levels and we began with the most efficient level of TSL-5 which is also known as the max tack, and we worked on it to a level where the benefits and potential standards outweigh the burdens.

We tentatively concluded that TSL-5 is not economically justified because of the energy savings commercial consumer average LCC savings and emission reductions would not outweigh the costs, the national MPV decreases and loss in the IMPV.

So DOE's proposing at this moment in time TSL-4, which represents the maximum improvement that -- in energy efficiency that is feasible and economical, economically justified. I'm sorry.

We request comments also at this time whether it should -- if we should adopt TSL-5 or some other mix of efficiency levels of the equipment classes, and the following tables is the Proposed Amended Energy Conservation Standard TSL-4. I'll go through them rather fast here, but they will be discussed further down in the presentation.

Okay. I'm going to skip this slide. Basically, the Summary of Issues that we seek comment today are data or information on predicted LED costs

reductions based on such projections, base case efficiency trends, determining operating temperature ranges for equipment classes, use of offset factors and methodology used to calculate them, extending the results for the engineering analysis for the -- to the 23 secondary equipment classes, determining appropriate standard levels for hybrid classes and wedges and consideration of TSL-5, whether its benefits would outweigh the burdens.

At this point, I'm going to hand this back to Mr. Brookman.

Comments from Participants

MR. BROOKMAN: Thank you. So this will be an opportunity for any of you to make comments, brief summary remarks about your key concerns.

Did you hear from anybody in advance that they wanted to speak at this time?

MR. LLENZA: No.

MR. BROOKMAN: Okay.

MR. LLENZA: We didn't get any comments.

MR. BROOKMAN: So this will be more free form than normal.

MR. LLENZA: Yes.

MR. BROOKMAN: Opening remarks from anybody that wishes to do so. Yes, please, Larry.

MR. HOWINGTON: I had -- Larry Howington with Hill Phoenix. I had three points that I wanted to cover. I'll try to cover those as briefly as I can.

One has to do with the operating ranges or thresholds for the rating temperatures, and in the proposed standard, the operating range for a low temperature goes to minus four degrees and the operating range for ice cream goes from minus five and below. The rating temperature for ice cream is minus 15.

We originally some time ago asked that the rating temperature for ice cream cases be changed from minus five to minus 15 because folks in our industry make cases that require a different construction that uses more energy and has to run at a colder temperature for a number of cases that are used for ice cream that are different than the typical cases that are used in a grocery store for display of ice cream, that reach into our cases is really what I'm talking about.

The cases that we make for grocery stores in general and this is, I think, true for the industry, also, the same case, same construction operates at zero down to minus 10 or so with no change in construction, simply changing the set point on the product.

Cases with different construction are

required, as you know, to go to the minus 15 temperature and below; that is, additional anti-condensate heat and other factors built in to prevent condensation and to hold the product at that temperature.

What I believe needs to be done is the operating range simply needs to be changed from minus four up to 32 degrees for the low temp to minus 14 up to 32 degrees for the low temp freezer and then the ice cream freezer would be minus 15 and below for the operating range. No change in threshold, just the operating range.

What it would -- if it didn't, it would force us for ice cream application to rate a low temperature case at the minus 15 rating point when it's really not capable of running at the minus 15, but it's normally used in the minus five and minus 10 and that's the point.

MR. BROOKMAN: Okay.

MR. HOWINGTON: And then equipment not capable of operating at rating temperatures, what we would call special application cases, and typically this is a case that is used for frozen meat applications most often, and they will run in the minus -- excuse me -- the plus 10 to plus 20 product

temperature range.

Usually they are a merchandiser that's used Thanksgiving, Christmas, that type of thing. They put turkeys and hams and those kinds of things. It's not required to run at zero degrees for frozen. So it really can't be rated at zero.

We would like to propose that we use the zero degree rating energy limit and rate it at the lowest temperature at which it is capable of operating against that energy limit. As long as it uses less energy than that, it would be acceptable.

The problem is if we actually adapt it to run at zero degrees, it will use more energy and the irony would be is we would have to change the product used for energy in order to meet the rating. So that's kind of the conundrum we're stuck in there.

And then the third point has to do with the wedge-type cases. Most of the wedges that we make are used to fill in between line-ups of straight cases in a corner. As a product, they are not a stand-alone display merchandiser. They require straight cases on either side in order to operate.

So -- and for that reason, they were excluded from HRI or ARI, ANSI Standard 1200, so they're not included in that standard, because traditionally it's

always been a problem to have a rating standard for them because they required the other cases in order to operate.

So based on that, we would like those just excluded from the certification. They're a fill-in merchandiser. A few are used in a typical store. Most -- a majority of the stores don't use them because they are much more expensive per linear foot than a standard case and for that reason, most stores don't use them. Some stores do, but when they do, they use very few within an entire store, and for per linear feet, they probably only represent a few linear feet out of the several hundred linear feet of merchandising in the store.

Those are the three points that I have.

MR. BROOKMAN: Okay. Thank you. Thank you. Other comments here at the outset? Issues and concerns? Yes, please, and if you'd say your name, please, for the record.

MR. GRASSMUCK: Yeah. Mike Grassmuck with Hussman. I would just like to make a few more points like Larry brought up.

First on the operating ranges, we used the term "ice cream," and I'm a little concerned that we might get confusion actually using a product definition

in setting the temperature ranges.

As Larry started to point out, in the remote case business, we build a single cabinet that can be operated, typically operated at two temperatures. One is published for frozen food and the other is published for ice cream, and the exact same case only operating at a different evaporator temperature.

We came back and specifically requested a minus 15 ice cream temp application for the folks making self-contained equipment because in that particular market, they like to run it harder and they referred to it as having rock-hard ice cream, if you will. So just using the term “ice cream” might cause some confusion down the road.

And the other point, I’d like to talk a little bit more about wedges as well. We have inside and outside wedges. The thing about an inside wedge is many of them have a TDA that approaches zero because they come to a point. So it makes it extremely difficult to try to set an energy standard for something that has zero in the denominator.

Thank you.

MR. BROOKMAN: Thank you. Thank you. Yes, please. Your name, please. Bruce?

MR. HIERLMEIER: Bruce Hierlmeier, Zero Zone.

I have two areas and maybe we'll get to it as we go through the analysis.

First, in Standard 72 and 1200, those aren't written to include all the types of equipment that are available in the marketplace. So how you're going to address that or how you'd test to something like that when there's actually not a standard available to test the equipment to.

The other area of concern is that not all of our customers use air conditioned stores, so all the standards are applying for a well air conditioned store and the equipment will perform properly. When you move to a non-air conditioned environment, typically you only need more anti-condensate beat to prevent water from running on the floor and a lot of those customers in their facilities are unlikely to upgrade their air conditioning system so they can buy new pieces of equipment. So there probably will be a performance gap there with water on the floor and slip and falls.

So if the DOE had any plans to work in that type of an environment to provide equipment that would operate in that type of environment.

MR. BROOKMAN: Okay. Thank you. Yes, please, and your name for the record.

MR. NESHAN: Yes, Massoud Neshan with

Southern Store Fixtures. A couple of comments.

One is the ice cream versus frozen food. Their applications were actually frozen juice is displayed in ice cream-type cases. The temperature requirements are such, depending on the sugar content and all that, frozen juice is displayed in ice cream case. So one has to distinguish between those two. So it needs to be very careful about identifying case of frozen food versus an ice cream. So it really is a temperature application than the type of product is displayed in the case.

Number 2. As Bruce indicated, we manufacture a lot of cases that do go into stores that are not fully air conditioned. Through the NSF standards, we have Type 1 and Type 2 display cases. All these standards -- all the members have been looking at referring to an energy efficiency requirement.

However, there are two different ambient conditions, different drywall conditions or room temperature and relative humidity. So there needs to be a distinction. If you go to the store that is not air conditioned or go to convenience stores, the ambient conditions are not ASHRAE Standard 55 percent relative humidity. Therefore, they do require higher energy consumption, higher BTU requirement and higher

electrical requirement due to anti-condensate heaters and so on.

There are stores in areas, such as, for example, Hawaii, it's almost impossible to get a 55 relative humidity and 75 degree room temperature, even though it is air conditioned in the stores, but we do have to supply additional electrical components to ensure the case performs properly. Therefore, the energy consumption is going to be higher.

We want to make sure that we do not manufacture a case that is shipped to the store that meets the standards and then on the side ship components to be retrofit in the stores to make it comply with the requirement in the store and not comply to the standard requirements.

MR. BROOKMAN: Additional comments here at the outset? Andrew.

MR. deLASKI: There are a couple remarks that are general and may come up later in the day, but I wanted to address right at the beginning.

First is to acknowledge that the department's done a very nice job with the analysis in this rulemaking. I think you deserve credit for having (1) stuck with a schedule that was imposed on you by Congress in 2005. Typically, it takes three years to

do a rulemaking.

Well, the law was passed three and a half years ago, so here we are close to having a final rule. So congratulations for sticking within a legal deadline that was not easy to meet. I think that your objective of getting a final rule out by December is doable and one that I expect that you'll meet.

I also want to congratulate the department on their proposal today, the proposal for TSL-4 standard which will deliver significant energy savings. It's a solid proposal.

DOE, in the proposal today, did a number of things which I want to highlight because they address concerns that we in the advocacy community, the energy advocacy community, have been raising in several rulemakings over the years and in a way that shows that you're listening. We appreciate that.

I want to highlight those issues right now at the outset and they make come up today, they may not. One is that in the level that you chose for the proposed standard, you proposed a standard where DOE found the maximum net present value using a seven percent discount rate.

We will have some discussion. We may disagree with the criteria that you used. For

instance, we often have advocated using a three percent discount rate as being the right discount rate and the societal discount rate. We will have discussion later on today about LED lights and how that should fit into the analysis. We'll have a discussion about how the value of carbon should be brought into the analysis.

Each of these things, I think, will point us towards the TSL-5 as being the right standard level for the final outcome of this rulemaking, but what I want to emphasize in my opening remarks here is the department chose in the proposal a standard level which followed -- which attempts to follow the statutory notion of the maximum level that's cost effective rather than, as we sometimes have seen in the past rulemakings, a gravitation to minimum LCC, okay, and we have emphasized over the years the law says DOE must set the standard at the lowest maximum level that meets the criteria of being economically justified and technically feasible, maximum energy savings, rather than maximum dollar savings.

The department, thank you, seems you've heard that point by looking at the levels which are cost effective. This is important. My colleague, Harvey Sachs, has often raised the point that we need to be careful about using LCC as a straitjacket for analysis

and he may comment on that today, but I think it's important that you've shown some flexibility here and looked at how do we maximize energy savings rather than maximize dollars savings.

I also want to recognize two other things where we've seen some progress in the department. We'd like to see some more progress, but I want to recognize the progress that we've seen.

In two final rules issued last year, we saw the department apply discount rates to pollution, discount rates to carbon dioxide emissions, to NOX, to mercury, to sulfur dioxide. The notion that you can somehow take a financial factor of a discount rate and discount pollution, that that was somehow a -- and the department has stopped that practice. Thank you. You've heard us, that applying discount rates to physical quantities is not appropriate. You've heard us. We appreciate that.

You're still applying discount rates to quads. That I don't get. That's a mistake. It's wrong. You can't apply a financial discount rate to a physical quantity. The department recognizes that a discount rate is a financial instrument and applying discount rates to quads isn't appropriate. You stopped it on pollution. We urge you to stop applying those

discount rates to physical quantities of quads.

The department also -- one other area I want to recognize that will also come up later today is applying -- is in the monetization of carbon emissions.

In the last couple of proposed rules that have come up, DOE for the first time has begun to address this issue repeatedly in rulemakings over the years. We think more work needed to be done, but we want to acknowledge the progress that's being made in coming up with some initial estimates of ranges of impacts.

We want to dispute that the low range can possibly be zero. We think that's incorrect, but having these estimates in the analysis, I think, is a positive step forward.

Most importantly in the rule today, DOE has, in your opening remarks here from Charles and in the ANOPR, has opened the door to TSL-5. You proposed a level and you've acknowledged that you've made a mistake in the analysis. Essentially, you said, look, we just used today's value. We used 2007 prices for LEDs. No one thinks that in 2012, the prices for LEDs are going to be the same as 2007.

I think you've acknowledged, you've opened the door to a TSL-5, and I think that's a very

important point, enabling the department to move forward with the final rule that considers strong standard levels.

The difference between TSL-4 and TSL-5 is important. It's big. Fifty percent more savings with TSL-5 than TSL-4. 7.4 quads, over 300 megawatts peak demand reduction for the 20 megatons of carbon dioxide global warming emission reductions. That's a big difference on the savings side of the equation. So we appreciate the fact that you've opened the door to TSL-5 and are entertaining comments that will help us get to a strong standard level.

MR. BROOKMAN: Okay. Thank you. Additional comments here at the outset?

(No response.)

MR. BROOKMAN: Okay. So I see -- thank you for all those comments.

Let's then proceed with the first presentation and I think most of you are familiar with how we generally do this, which is that we have lead presenters and they present a lot of information. You in your packets have the complete slide package here and at certain break points in the presentation, there's opportunity for question and comment and elaboration.

So Matt.

Engineering Analysis

MR. MILLARD: Yes. Okay. Good morning. My name's Matt Millard.

So as we move on with the NOPR Analysis from the ANOPR, the first thing that we do is revise our ANOPR Analysis based on all the comments that we've received from stakeholders and as the first part of that, I will be talking about the Engineering Analysis.

The purpose of the Engineering Analysis is to characterize the cost-efficiency relationships for equipment currently on the market for higher-efficiency equipment and we will determine a baseline unit and then look at various design options that will get us higher efficiencies.

For the Engineering Analysis, DOE prioritized the equipment classes based on the highest shipment volumes. For the industry data that we received, that broke -- we looked at equipment with 100 shipments or more and that ended up being 14 equipment classes and after talking to the manufacturers, we found that there's actually an additional equipment class that had high shipment volumes that we should analyze which was the vertical open remote-condensing low-temperature equipment class.

For the Engineering Analysis, we used the design option approach and, as I said, that involved 15 shipment -- 15 equipment classes and we also received four cost-efficiency curves from the industry which we used to verify our curves.

So the first issue is, as was brought up earlier, the operating temperature ranges. For medium temperature, it would be at or above 32 degrees Fahrenheit. For low temperature, between 32 degrees Fahrenheit and five degrees -- minus five degrees Fahrenheit, and for ice cream temperature, less than or equal to minus five degrees Fahrenheit.

MR. BROOKMAN: So we've already heard some comment on this. Anybody that wishes to go further with their comments, we can do that now.

Karim Amrane.

MR. AMRANE: Karim Amrane, AHRI. I guess I want to understand from DOE what was the logic behind picking the minus five degrees for ice cream temperature and the rating temperature.

MR. MILLARD: Well, I can respond to that. We felt that the temperature descriptions weren't specific enough and there was some variability. There was some uncertainty as far as what would actually fall into the various temperature ranges -- the temperature

descriptions.

So temperature ranges were developed and then those associate with the various rating temperatures in the test procedure.

MR. BROOKMAN: Aris?

MR. MARANTAN: Aris Marantan, Navigant Consulting. Specifically, the ice cream temperature operating range was selected based on the definition of an ice cream freezer that was included in the test procedure final rule, December 8th, 2007, I believe. It's on the test procedure final rule.

In that final rule, DOE included a definition of ice cream freezer as operating at minus five or below and so that's how the range for this rulemaking was chosen.

MR. BROOKMAN: Karim, does that answer it for you?

MR. AMRANE: I guess, yes.

MR. BROOKMAN: Okay. Additional questions at this point or comments on the operating temperature ranges you see there in Slide 14? Yes, Harvey Sachs.

MR. SACHS: Harvey Sachs, ACEEE. If I move back one slide to the Purpose and look at Bullet 1, Characterize Manufacturer Cost Efficiency Relationships, when is the appropriate time to ask

questions about that particular bullet?

MR. MILLARD: You can ask questions now. That'd be fine.

MR. SACHS: I hate the thought of playing bad cop and Andrew's good cop, and I feel a little bit like a broken record because this has come up more than once or twice in this context, but I'm still very puzzled that each time the department begins with a snapshot analysis, the engineering options which are available on a given date, Mike and I've had discussions about the increasing sophistication of these analyses and they're beautifully done, but somehow I keep going back to the historical record of prices and the response of prices to efficiency regulations and find no support.

The historical record is that the redesigns to meet new efficiency standards, we're in unchartered territory with this category, have almost unvariably led to substantial reductions in cost relative to the forecasts in the DOE analysis, that it should be clear by now that the use of a still camera instead of the large knowledge base manufacturing processes and declining costs may be a useful indicator but it's hardly definitive and yet each time I ask DOE to review its own record, I'm met with yet another assumption that the snapshot of the incremental costs of adding

features, done without any concern of what happens when you re-engineer your manufacturing processes, leads to substantial increases in costs.

It doesn't look like that's the case in the record. Again, this is a different class of product, many of which have very small shipment volumes. I don't claim to understand the commonalities among sizes and among product classes and the piece parts that are put together for a given product, but I'm frankly just very depressed that the department sticks to a single narrow line of analysis and ignores the historical record.

Thank you.

MR. BROOKMAN: Karim?

MR. AMRANE: Karim Amrane, AHRI. I guess I have to disagree with you on this point. I guess if you just look back at what happened the last rulemaking on central air conditioners, you find out that it was the opposite, that DOE and the industry underestimated the incremental costs, significantly underestimated the incremental costs.

I mean, we've seen, and I think everybody has seen it as well, that the cost of air conditioners today are significantly more expensive than the $230 that DOE estimated to be incremental costs compared to

a 10 CU unit.

I mean, we are talking about a $700 to $800 incremental cost today compared to the $230. So I guess it goes both ways.

MR. SACHS: Excuse me. This is Harvey Sachs, and our comments on the CAC proceeding demonstrated, I thought fairly well, using data from RD that the observed price increase in baseline units was 46 percent. The department had forecast 48 percent.

During the interval between the NOPR and the emergence of the products, the adoption of the effective date of the standard, we had a doubling in the price of the steel and aluminum that comprised 75 percent of the value of the product, according to DOE, quadrupling the copper, and once one makes the adjustments for that, the increase in price is washed out and, indeed, the table that I introduced at the hearing strongly suggested that with their redesign of the products, the manufacturers were able to achieve substantial economies relative to forecast.

I can’t state that that would be the case for this product. I can -- this class of products. I can assert, based on the example brought forward by my colleague Karim, that the DOE’s analysis and ignoring history is effective.

MR. BROOKMAN: Andrew?

MR. deLASKI: Let me make a suggestion. There's a really nice notion of tunneling through the cost barrier and that's partly what Harvey's talking about. Sometimes when you add up all the different ways of making it more efficient without losing a lot of costs, but when you redesign the process, you often find that you tunnel through that cost barrier and that costs were lower than you would have expected.

What we've suggested previously is that -- and this is a cross-proceeding and we need to get back on this proceeding, but a cross-proceeding, that some retrospective analysis by the department or by a third party of the department's record on how it's done estimating costs would be useful for helping the department to true up, to evaluate how good is this model working at predicting costs, addressing both Karim's point and Harvey's point, how do we disentangle things happening in the market anyway.

If the department could do that type of analysis and find time within its busy schedule and its limited budget, I think it would be a valuable thing that would help inform a lot of rulemakings going forward. How close has this been?

We've done a bunch of rules now that have

gone into effect over the last few years. We really should have an opportunity to go back and say, well, how good are these estimates?

MR. BROOKMAN: As is always the case, I'm certain the department really welcomes your analyses, your retrospective analyses, your price points, your looking at what is that there that's easily accessible so that they've got information that you wish to have them see.

Gary.

MR. SACHS: Harvey Sachs again. I'm aware of at least three peer-reviewed papers that will support my point.

MR. BROOKMAN: Okay. Thank you. Other comments here on the purpose statement and in fact moving on as well from Slide 13 to Slide 14, Equipment Class Operating Temperature Ranges?

(No response.)

MR. BROOKMAN: Okay. Thank you.

MR. MILLARD: Okay. Our next issue deals with offset factors, based on some comments that were brought up at the ANOPR meeting.

We realize that the standards that we were setting intersecting the origin of the calculated daily energy consumption versus total display area were too

restrictive towards smaller units and so looking at our various design options and looking at the equipment, we developed offset factors to bring that intersect up higher, so that we could account for certain end effects dealing with conduction through the ends of the equipment and various lighting loads that are going to exist, even with very small equipment and so we'd like some input on whether anybody has comments on our offset factors or the methodology used to calculate them.

MR. BROOKMAN: Harvey Sachs.

MR. SACHS: Harvey Sachs. Please remind us if you showed any kind of calibration of these offset factors in the TSD against equipment available today. The concept certainly looks quite appropriate.

MR. MILLARD: In Chapter 5 of the TSD, it discusses our methodology used for calculating the various offset factors for all equipment classes.

MR. SACHS: Did you calculate -- did you demonstrate the validity against baseline equipment by size in the market today?

MR. BROOKMAN: Aris Marantan.

MR. MARANTAN: Yes, Aris Marantan, Navigant. To answer your question, no, we did not, but what we used to create the estimate was the Engineering

Analysis from the ANOPR portion of the rulemaking and the values that are in the Engineering Analysis were also updated for the NOPR. So we used the Engineering Analysis tool.

MR. SACHS: Thank you.

MR. BROOKMAN: Thank you. Other comments with respect to offset factors and the methodology?

(No response.)

MR. MILLARD: Okay. Our next issue, as I mentioned earlier, we analyzed 15 of the 38 equipment classes that we're setting standards for and as a result, we had to develop a methodology to extend the standards for those 15 classes to the other 23 and so in looking -- using the Engineering Analysis, DOE developed various extension factors, based on similarities between equipment classes, and we'd like some feedback on our methodology used and the values that we've used for those extension factors.

MR. BROOKMAN: So you can seethe detail there in Slide 16. Questions, comments? Yes, please. Your name again.

MR. NESHAN: Massoud Neshan, Southern State Fixtures. The question here is, well, what type of environment these numbers are applicable to? These are Type 1 case or Type 2 display cases, as defined by the

industry?

MR. BROOKMAN: Aris, please.

MR. MARANTAN: Aris, Navigant. Could you explain the Type 1 and Type 2? I'm unfamiliar with that.

MR. NESHAN: I believe it is in NSF and also ARI Standards that defines the Type 1 being in an environment that's 75 degrees ambient, 55 percent relative humidity.

MR. MARANTAN: Okay. Yes, I can tell you that the analysis is solely based on the 75/55 condition that's specified in ARI 1200 and ASHRAE 72.

MR. NESHAN: So basically all the equipment that's sold to convenience stores and semi-air conditioned stores, this would not be applicable then?

MR. MARANTAN: Well, Aris again, I can tell you that for the Engineering Analysis where we're evaluating the cost of design options, we're solely looking at the conditions specified in the test procedure. However, there's a separate analysis that we can get into that describes the performance of the equipment in real world conditions. It's the Energy Use Characterization Analysis.

I believe Dave Winiarski can describe that in more detail and answer your question.

MR. BROOKMAN: Do you want further elaboration on this?

MR. NESHAN: If I may just say, it's very important because the other factor of 2.51, for example, the very first one for self-contained, usually self-containeds are used in a more hostile environment. Consequently, those factors become extremely important.

So I want to know how you derive that number because that would have a major impact on the overall efficiency and the standard of what this case has to comply with.

MR. BROOKMAN: So will we cover this in detail later?

MR. MARANTAN: We will, but I can answer the 2.5 question.

MR. BROOKMAN: Why don't you answer that now? Then we'll cover it later with Dave. Go ahead.

MR. MARANTAN: Okay.

MR. BROOKMAN: Aris.

MR. MARANTAN: So just looking at the first bullet here on this slide, it's a comparison between open remote-condensing equipment and open self-contained equipment. The factor there, 2.51, is what we're estimating as a multiplier on the remote-condensing equipment to get the self-contained energy

use.

The 2.51, you know, that is a large number. We realize that. That's based on the fact that a lot of self-contained units have to have a condensate pan heater to address defrost melt water. So that is a large portion of a self-contained energy consumption.

In addition, that number is even greater when you consider that these cases are open. You know, it's not just remote-condensing versus self-contained. It's open remote-condensing versus open self-contained. So you have a lot of, you know, infiltration into the case and energy use is just exacerbated.

So 2.51 is a very large number. It has mostly to do with the condensate pan heater.

MR. BROOKMAN: Follow-on, please.

MR. NESHAN: I just want to add, I understand that, but I want to say that number is undersized, is not large enough --

MR. MARANTAN: No, not large enough.

MR. NESHAN: -- because you're working in more humid environment.

MR. MARANTAN: Well, keep in mind this is for the steady state conditions specified in the test procedure, the ARI 1200 and ASHRAE 70.

MR. NESHAN: But the ARI Standard also says

there's Type 2 display cases which means higher ambient, higher humidity, which adds to more condensate water, which adds more to btu carbon, and compressor run times is longer, on and on and on. So that number might not be large enough.

MR. BROOKMAN: And might you suggest how -- what it should be?

MR. NESHAN: No, I do not know. I don't know how this was calculated. We have actual numbers for self-contained case.

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: I don't know. Frankly, I don't know the details of the analysis. So let me ask a question that might be helpful.

When you perform the test on your Type 2 equipment, do you perform the testing for the rating under the same conditions as you would the Type 1 equipment?

MR. NESHAN: Oh, no, no, no.

MR. RIVEST: No?

MR. NESHAN: That's a whole -- the difference is how you test the case.

MR. BROOKMAN: Please use the microphone again. I'm sorry. Please do.

MR. NESHAN: The major difference is the

ambient conditions.

MR. RIVEST: Right. But I'm trying --

MR. NESHAN: Which is how the case operates.

MR. RIVEST: So I'm trying to separate out, Karim, the --

MR. BROOKMAN: Karim Amrane.

MR. AMRANE: I guess to clarify the issue, the ARI 1200 Standard, there is only the Type 1 condition, so it's not part of the test procedure. I don't know how DOE is going to address that, but I think that it went through the standard and this is what the standard says.

MR. NESHAN: I know, but the standard, however, doesn't apply to the Type 2 equipment that is being manufactured and being used today.

MR. BROOKMAN: I see Dave Winiarski. Please. Find a microphone up here, Dave.

MR. WINIARSKI: Hi. Dave Winiarski, Pacific Northwest Laboratory. I think I'm trying to follow up on this, if I'm understanding, maybe to clarify the issue because it's been brought up early on.

The analysis, as was mentioned, the analysis here all reflects energy use based on the ARI 1200 test which has ambient conditions that are fixed and they're for a Type 1 case, but a Type 2 case could be, I think,

tested under those same conditions.

Now whether it is or is not, that I don't know, but I think it could be tested under those conditions and that's what DOE has as its test procedure. That may not tell a manufacturer what the performance would be in a worse set of ambient conditions.

So given that or given that assumption, that's where the analysis went. I guess one of the things I would ask the manufacturers of Type 2 cases is whether or not the design of those cases is such that when tested under the ARI 1200, they would use more energy.

I heard a little bit earlier, I think from Bruce, regarding the anti-condensate heaters and maybe if those heaters are not controlled or something, they're on full time, they would result in a higher energy use and maybe there are other things, but I think some specifics as to why the Type 2 case might use more energy under -- when tested under the ARI rating condition is probably useful information to be submitted to the department.

MR. BROOKMAN: Ron Lewis?

MR. LEWIS: Yeah. I'd just like clarification. I think you would state that the Type 2

was in the ARI Standard and I thought I heard somebody else saying it's not. So I want to clarify. I think we got two different answers.

MR. BROOKMAN: Well, let's go back to Neshan first. Is it Neshan?

MR. NESHAN: Yes, it is.

MR. BROOKMAN: Please.

MR. NESHAN: I do not believe it's in Standard 1200, but this was originally discussed and it is in the FD and the NSF requirement, that we design our equipment to that -- those two standards, Type 1 and Type 2.

MR. BROOKMAN: Okay. Larry.

MR. HOWINGTON: This is Larry Howington, Hill Phoenix. To clarify, Type 1 and Type 2 equipment is defined in the NSF, National Standards Foundation, Standard 7, ANSI Standard 7, and it defines a different temperature and I believe humidity operating environment and the reason for that was, within the sanitation standard, because it gets it more into a food prep kind of area, but really any area that is not a standard grocery store-type environment which was what the standard environment is what ARI Standard 1200 addresses and it does not address Type 2.

So if you want to see the definition and you

can go to the NSF ANSI Standard 7.

MR. BROOKMAN: Yes, please.

MR. HON: Charlie Hon, TRUE Manufacturing. A quick one for you because basically we're trying to compare two different pieces. Any unit that's built to an NSF Class 2 is designed with much more capabilities and much more capacity, heat rejection capacity than a unit built for Class 1.

That means it has an efficiency window. Unfortunately, the efficiency windows of Class 2 are much more severe condition. They're designed to have higher heat rejection. They're not designed for the lower temperatures.

Also, the heater elements are much more, shall we say, beefed up, so they're much stronger. They aren't usually controlled by volume in the pan, but they have a heat-up and cool-down cycle which consumes more power as well.

So we're trying to compare apples and oranges. It's like me driving a Viper down the street and claiming I'm going to get good mileage. It has far too much power for the standard street if it's got a 70 mile-an-hour speed limit on it. The same with Class 2 equipment. It has far too much power potential because it's planned for offroad conditions, outside kitchens

which are 80-90 degrees with high humidities because of all the steaming and all the frying going on in them, and it's designed differently. It is a problematic issue on that level.

MR. BROOKMAN: Yes, Dave Winiarski.

MR. WINIARSKI: Two questions, I guess. So for clarity, in a certification program, could you test -- recognizing there may be some differences in energy use, could you/would you test the Type 2 equipment under the ARI 1200 rating conditions?

MR. HON: It could be done. Charlie Hon, TRUE Manufacturing. It can be done, but it will give you a very distorted picture because it's not truly picking up the conditions that they work under.

MR. WINIARSKI: So it would give you a distorted picture in that the energy use that you would get when testing under ARI 1200 would be less than that in the actual operating conditions?

MR. HON: That is a correct statement, also, but -- this is Charlie Hon again. But it would also be much worse than a piece designed for that test condition.

MR. WINIARSKI: Okay. I guess the other question I would ask would be, you know, if you had to -- I understand that this is an issue and it's

important to that particular market, but if you had to state sort of what fraction of the markets maybe separately for remote-condenser equipment and for self-contained equipment would be Type 2 products, if there is a way you could estimate that?

MR. BROOKMAN: Charlie?

MR. HON: I'm trying to think of our applications for Type 2 equipment. Unfortunately, we have two different classifications. Number 1 is the market that it's being sold into. Number 2 is the locations it's being sold into.

We sell a lot of equipment to coastal regions. It has to be Class 2 to meet the humidity requirements. A lot of equipment at that level is sold into the travel vacation-type markets where the conditions are very, very stringent. The products quite often are milk products. So we have to be very cognizant of safety and then's when it gets very, very difficult because those pieces of equipment have more than double the btu capacity of a standard piece of equipment, plus they have a very large heater potential in them as well and that gets very questionable because I have yet to see a true definition of how we are to test this with all heaters on.

Some people have all heaters -- you know,

they run all the time. Other people have controls on their heaters. That's a point that I was going to bring up a little later because if we run all heaters on all the time, it becomes an energy hog at all times.

MR. WINIARSKI: Sure.

MR. BROOKMAN: So you have lots of variability here, depending on both the conditions and the operators practices?

MR. HON: Yes, and there's also the issue of is it allowable to turn certain units off.

MR. BROOKMAN: Harvey Sachs.

MR. SACHS: I guess -- Harvey Sachs, ACEEE. I would beg the luxury of being able to think aloud and I certainly am impressed with the potential of this question of Type 1 versus Type 2 and as I think out loud, one of the question is whether the shipments of Type 2 are virtually all self-contained units.

MR. BROOKMAN: Charlie.

MR. HON: I do not get into the others in the market nearly enough to make that statement. The self-contained units are something I'm very familiar with. The remotes at this level, I have very, very limited knowledge.

MR. BROOKMAN: Neshan.

MR. NESHAN: No. The answer is no, no self-

contained cases are Type 2.

MR. SACHS: Is the preponderance of these self-contained -- is the preponderance of the Type 2 markets self-contained?

MR. NESHAN: No.

MR. SACHS: There's a lot of remote condenser Type 2 equipment?

MR. NESHAN: Absolutely.

MR. SACHS: Harvey Sachs again. My next question would be whether, given what I'm hearing, it is feasible to label equipment as certified Type 2 versus certified Type 1, assuming that 1200 is extended, et. cetera, et. cetera. Is it possible to consider these as two different classes?

MR. BROOKMAN: I'm looking over at this side of the room here. Karim.

MR. AMRANE: Frankly, I don't know what the plan is within the HRI, Commercial Refrigeration Section, as to whether they want to extend the standard to Type 2. I don't know. Maybe, Larry, you can tackle that. I don't know what the -- it has not been discussed.

MR. SACHS: And again, I'm thinking out loud because of the time pressures that are on all of us and I'm not -- Harvey Sachs again. I'm explicitly not

making a proposal on behalf of the community.

But were we able to separate certification by Class 1 versus Class 2, then what would happen is that the allowable applications of what is perhaps appropriate devolved to building code-type issues, that a state building code could state Type 1 equipment shall be required in all air conditioned applications, Type 2 equipment shall be permissible in convenience stores.

This recognition of two separate categories would have that possible benefit and, as has been alluded to, would allow appropriate energy efficiency measures to be made for Class 2 equipment, Type 2 equipment, excuse me, in the applications for which it's intended.

It seems to me that if the manufacturing volumes are adequate to support the design and testing requirements, that this might be an appropriate path. Again, I'm thinking out loud and looking for reactions.

MR. BROOKMAN: Yeah. Larry, please.

MR. HOWINGTON: Yeah. Larry Howington with Hill Phoenix. I believe that, in general, and, of course, anyone will correct me if I misspeak, for NSF purposes, you're required to label your equipment as Type 1 or Type 2, based on how you test it, and also

the -- I chair the Commercial Refrigerator Manufacturers Division of HRI, and we would be more than willing to add Type 2 equipment to the standard. That would not be a problem and so I would believe then that if you wanted to have a distinction on Type 1 and Type 2 equipment, it would be very reasonable to do so since the equipment is mandated to be labeled as such.

MR. BROOKMAN: Okay. Thank you. Ron Lewis.

MR. LEWIS: Can I just ask for clarification from what I've heard thus far? It sounds like the ARI 1200 and the testing and hence the certification that's going on right now is only for the Type 1 or Class 1.

So by default, that's all that we're looking at right now. So it's a matter of extension. There should not be confusion. They're all being tested to Type 1 testing at this point. So everything's being certified as being certified right now to Type 1 only, is that correct?

MR. HOWINGTON: That's correct.

MR. BROOKMAN: Larry, thank you. Neshan.

MR. NESHAN: One comment or addition. As was stated, NSF does require manufacturers to label their cases as Type 1 or Type 2 and we have to test our equipment to make sure they comply with the requirement of Type 1 and Type 2 of NSF 7.

The test procedure that we use is the same as Type 1. I mean that is ASHRAE Standard that we use for testing. It's just a matter of product temperature that we are making -- ensuring that the product temperature is appropriate and meets the NSF requirements. So that is being done. It's not true for ARI because the certification has not started yet. Under the old ARI or CRMB part of ARI, we do test those cases to those conditions.

MR. BROOKMAN: Do you want to follow on?

MR. WINIARSKI: Well, yeah. Given that this is an issue that I don't think came up in the ANOPR and so the department really hasn't prepared its analysis for this type of issue, I guess I'm asking, you know, maybe what solutions or stakeholders might have for the issue.

For instance, should we be looking at trying to provide offset factors for Type 2 for this rulemaking? Are we postponing the Type 2 equipment for now, you know, given some of the issues with the mandates by Congress?

MR. BROOKMAN: Charlie.

MR. HON: Charlie Hon, TRUE Manufacturing. We have no database because the equipment has never been tested under ASHRAE test standard to NSF

conditions. We have no test base whatsoever to give you data because that's a much different condition than what we've provided and stabilization of an open air curtain unit is very difficult and very costly to test.

Normally, we will stabilize for two to three days on a glass-doored unit or a solid door unit and get good stabilization. We quite often end up two weeks getting stabilized on an air curtain because to get the conditions where you're going to get maximum energy efficiency, you're not going to risk overflowing the drain pans. You've got to have your heaters correct. You've got to have everything correct. You've got to have your air flow correct. It's a lot more complicated test.

So for us to get data would be very time-consuming and since we have no standard to test against, we're sort of up in a quandary at that level.

MR. BROOKMAN: I hear the department asking what could be done about this.

MR. AMRANE: Karim Amrane, AHRI. I see two possible options here. I mean either exempt those products just temporarily until we build up the database and we know what we're doing and maybe later on address those products separately or ask manufacturers to apply for waivers if they cannot meet

the requirements.

MR. BROOKMAN: Andrew.

MR. deLASKI: So I have a lot of concern about exemptions. Exemption, we have to be very careful about the scope of the standard because then we have to be concerned about suddenly the huge migration of the marketplace to the exempt product. Suddenly, we see equipment designed for that Type 2 showing up in air conditioned spaces.

I don't think we're going to see building codes adjusted in time to adjust -- that we have a problem with the market -- a problem that has to be thought through very carefully, you know. Are we doing this right, not by any intention but by creating a market incentive to go around the standard?

So we need to be very careful about that. So I think Karim's first path that was suggested is not one that -- it needs to be approached with extreme caution.

The waiver exemption is something in existing law and available to manufacturers at any time and then I think Dave's asked the question and I think we've been dancing around this question, which is we just don't know to what extent this is truly a problem in the sense that we don't know -- in part, it depends on

what the final standard is. It depends in part on, you know, just what -- how does this equipment perform under whatever the final standard the department selects might be.

MR. BROOKMAN: Ron Lewis.

MR. LEWIS: There's been a reference a couple times to the units are presently -- the Type 2 units are presently being tested to the NSF 7, was it, and labeled accordingly.

Is that data the test data? ARI does not have a certification program yet, but is that data submitted anywhere to show that it qualifies, it's been tested to that standard that's in existence, that test procedure that's in existence, and it shows compliance with the test procedure which you say is the same test procedure that's being used in the ARI 1200? You say it's the same test procedure, but there's a different environmental factor, the temperature and humidity temperatures.

What -- where is that data, and for you to put that label on it, is there a test somewhere where somebody says you need to show that you meet that criteria presently?

MR. BROOKMAN: Neshan.

MR. NESHAN: It is a requirement when our

cases are tested, the industry cases are tested. There's a certification that's required and those tests are witness-tested by those agencies and those are not submitted to any organization. Those are inhouse data. We need to comply with the requirement to make sure and to certify that it works and that's the end of that.

MR. LEWIS: So let me just follow on that. If it's -- your statement that it's presently being tested to the same test procedure but with the -- a specific environmental change in temperature and humidity?

MR. NESHAN: That's correct.

MR. LEWIS: So it's the procedure is established, the stringency is established, it's just a change of the two parameters. So that data you're saying in order to comply with the labeling that you have that data -- already exists because you've had to show that in order to label it as such, is that correct?

MR. NESHAN: That is correct.

MR. LEWIS: Okay. So the data --

MR. NESHAN: I cannot speak for the other manufacturers.

MR. LEWIS: Okay. I'm looking for remedies. I'm looking for ways -- what is the knowledge base and

what are our options here? So in looking at how we could potentially look at these, if there was something that's in existence, there's something -- and you say it's been done by third party testing organizations, but you mentioned it's inhouse.

MR. NESHAN: They certify. They come in and witness the test. They certify the procedure and the result.

MR. LEWIS: Okay.

MR. BROOKMAN: Well, that was unclear. Were you saying that every time they do these tests, they test them to the same conditions?

MR. NESHAN: Well, we test it to the Type 2 requirement conditions and we test -- again, the purpose of the test is to ensure product temperature, not whether it's using two kilowatts per hour or five kilowatts per hour. The intent is to make sure the case performs at product temperature as well as the safety, health and safety concerns.

MR. BROOKMAN: Right. Charlie, go ahead.

MR. HON: It's basically -- there's two different things that are happening here, one of which is that the test conditions are very similar. Unfortunately, most of us who have been at this for awhile know how we can run a piece of equipment to get

the best possible numbers, so we run them on the warm side of the test standard, and when we run NSF tests, we run them on the cold end of the standard because you get better test results for NSF on the cold end because you have certain safety requirements. They're more worried about the temperature of the containers inside the cooler than the ambient temperatures. So the numbers would be skewed slightly, probably five to seven percent.

MR. LEWIS: But there's a relationship or something that's constant.

MR. HON: It's not constant but there's a relationship. You can come up with probably less than a 10 percent error factor, I think.

MR. BROOKMAN: Dave Winiarski.

MR. WINIARSKI: And for clarity again, I may just be confused here, but when you run that test, that's essentially the ASHRAE 72 test. So people are taking the same data in terms of refrigerant loads on the case and power consumption and everything else.

MR. HON: Yes, that is true for remote case. That is not necessarily true for the commercial -- I mean, excuse me, it's true for a self-contained case but a remote case, that's not necessarily true because they don't do -- do not do all the -- they don't always

do all the refrigerant flow characteristics required.

MR. BROOKMAN: Larry.

MR. HOWINGTON: The NSF Standard is a different standard in sanitation and so it doesn't require the energy consumption data to be recorded, only that you run it at these set points under these environmental conditions.

MR. WINIARSKI: But it could be recorded.

MR. HOWINGTON: It could be, yes. Some people may record it and others may not. That's not really the purpose of the test. It's more to show that you get the product temperature under those environmental conditions.

MR. WINIARSKI: So I guess my thought here is whether or not -- Ron is speaking about what data is available out there and it sounds like there's a good possibility that the energy data that would be needed to sort of run through the ARI 1200 process just simply may not be available from all manufacturers.

MR. HON: Charlie Hon, TRUE Manufacturing. I know that -- you know, that's dependent on who's running the test. Some people record it all and some people don't. You don't have to have a log meter on there for an NSF test. We have standardized testing procedures so that we know where we're coming from, but

I cannot speak for any other manufacturer.

MR. BROOKMAN: Yes, Ron Lewis.

MR. LEWIS: Just trying to explore one other possibility. If there is a universe of information that's out there and there's a relationship, it's a band that you're testing against. If we could have some kind of cloth, so that we don't leave things in a total void of being accepted or everybody have to come in for waivers on a piece of equipment, if there was some kind of tolerance factor that was available for units that are in this more severe environment, if it was based on the unit that's now being certified for Type 1/Class 1, and there was -- for the same dimensions, the same size but the more severe environment, if there was a factor that now could be used, possibly while we're collecting data and have some kind of initiative and action underway to get more knowledgeable and more precise before the next update on this.

Is there a possibility that we've got enough knowledge of the equipment right now that we could on that relational basis that you seem to indicate there's enough there to force -- first order of approximation, so we're not just saying everybody just -- you're exempted but trying to do the best we can with what

we've got, with the fact we've got a rulemaking that's due by the end of this year.

We don't have a lot of time to go out and test and gather information.

MR. HON: I will go back and -- Charlie Hon. I will go back to our data and see if I can find any information for you, and who should I submit it to?

MR. LEWIS: The e-mail address in the comment, if you'd send it there. It becomes part of the docket. Unless it's confidential information, then it has to be marked clearly that way, and we talk to you about how to handle that.

MR. HON: Okay. We may be able to come up with some numbers there, the 2.51 factor from our own data, but that does not include anyone else's data.

MR. BROOKMAN: What about the other manufacturers in the room?

MR. HON: I do not see many self-contained equipment manufacturers in this room, other than myself.

MR. LEWIS: Neshan brought --

MR. NESHAN: We have some information.

MR. BROOKMAN: Thank you, Neshan.

MR. NESHAN: We do have also some information that we can share.

MR. BROOKMAN: That would be helpful. Thank you. The submission procedure and for where you send it is all in this packet. Slide 49. Thank you.

Harvey.

MR. SACHS: Harvey Sachs, ACEEE. On a point that Andrew's made to me from the public policy perspective, it would be of enormous value to have a sense by equipment category of the fraction of units that are being NSF-rated Type 2 versus Type 1.

My guess is that the Type 2 units are concentrated in a relatively small fraction of the equipment categories, but I have no way of knowing that, and it may be that this is an issue that can be handled much more easily in terms of the energy savings at stake if the industry is able to work together to aggregate the data to the extent possible while protecting manufacturer confidentiality.

This is something that AHRI's predecessors have done for a number of classes of equipment in the past. It's not new ground, but this would be by category of equipment, including the question of whether it's remote condenser or self-contained.

MR. LEWIS: To follow on, --

MR. BROOKMAN: Ron Lewis.

MR. LEWIS: -- is there any recording that's

going on now, like to the Bureau of Census, is there any reporting that shows what Class 2 or even to NSF, is there anything that would show any kind of quantities or shipments that would be a first look at that?

MR. BROOKMAN: Andrew.

MR. deLASKI: Does the industry today --

MR. BROOKMAN: So, Charlie, your response to Ron's question is?

MR. HON: My response to Ron's question is no.

MR. BROOKMAN: Thank you. I saw you shaking your head.

Andrew deLaski.

MR. deLASKI: Those of you in the industry, do you have a sense of what that ballpark might be or range of what portion of the equipment is Type 2 versus Type 1, either by unit sales or by linear feet?

MR. BROOKMAN: Charlie again.

MR. HON: I only know one of the Ns of that question as far as the self-contained. I do not wish to make any opinions on the linear feet of the remotes, but I would say probably 25 percent of the equipment in self-contained market is Type 2 equipment.

MR. deLASKI: By unit sales?

MR. HON: By unit sales, yes.

MR. deLASKI: By linear feet size, it's smaller than that probably?

MR. HON: It's -- that's -- I don't want to -- linear feet is traditionally in the remote system.

MR. BROOKMAN: So since we're on this subject, let's just open it up a little further, if we could.

Does anybody else have any ideas about how this kind of data might be obtained, this kind of distinction separation in shipments, some sort of thing like that?

Dave Winiarski.

MR. WINIARSKI: I wanted to follow up on that, and if possible, if you could identify specific classes of equipment where this might be of concern, whether it's a concern with open cases versus closed cases would be useful as well.

MR. BROOKMAN: Okay. Thank you. Charlie.

MR. HON: Charlie Hon. Unfortunately, they cross bounds quite often, but I know for a fact that the self-containeds are quite often thrown into these conditions because of the tourist industry.

MR. BROOKMAN: Karim.

MR. AMRANE: Karim Amrane, AHRI. We will go

back to our members and see whether we can you some sort of percentage.

MR. BROOKMAN: Yeah. Okay. Thank you, Karim. Bruce, I haven't heard from you in awhile. Please.

MR. HIERLMEIER: Bruce Hierlmeier, Zero Zone. The one area earlier I talked about stores that are off conditions. We manufacture a lot of door cases and don't list them as a Type 2 door or Type 2 case but they'll operate in poor conditions. I think some of our competitors do a similar matter.

So if all of a sudden, you started looking at we would have Type 2 that would allow for poor conditions, we might rate some of our cases, as you point out, we might rate some of them into that area that would use more energy because they would be designed in an application where they would need the energy to keep water off the floor.

Again, we're looking at that our cases perform under a variety of temperatures, perform under a variety of conditions. It's the outside condensation where you start seeing some issues. So the products still have good integrity, but when you have water on the floor, that's a bad situation and that would be a new area of changes we'd start seeing in the industry.

MR. BROOKMAN: Okay. Dave Winiarski.

MR. WINIARSKI: I just wanted to add one more maybe clarification question. There's some current legislation on the books for the self-contained equipment with doors and that doesn't address this issue of Class 1/Class 2. I don't know if it's an issue with those products already or not.

MR. HON: Charlie Hon, TRUE Manufacturing. It has always been an issue. We see some vast differences in the product. You will see that Class 1 items will traditionally be the more efficient units and you will see those showing up as Energy Star, RCEEE Tier 2 units, compared to the harder condition-type equipment which meet that standard, and we can try to drive them that way, but traditionally we can't make it happen.

So it's one of those energy efficiency balancing acts that we -- there's no perfect answer for it because there are certain things that just go on in the industry and certain economic cut points on compressor sizes and different things.

MR. WINIARSKI: So basically, the Class 2 equipment in those doored self-contained products, it meets the current legislation but it just doesn't get up to the Energy Star levels typically.

MR. HON: That's correct, yes.

MR. BROOKMAN: So I think we've covered that sufficiently at this time. Ron Lewis.

MR. LEWIS: Just one more. Talking out loud, like the precedent has already been set, thinking out loud, I'm just a bit amazed that this is such a big issue and there's such a difference in operating.

Here we are proposing a level. We've had a Framework Document meeting. We've had an ANOPR published and a public meeting. Why this hasn't come up before? Here we are with a severe time problem. We're under order to have this out by a certain time and we're just hearing this huge issue with no data and I'm just a little bit startled by that.

Is there -- there's no way I can ask the question that it's going to entice an answer that's going to be helpful, I don't think. So I'll just --

MR. BROOKMAN: Andrew.

MR. deLASKI: I just want to ask a question about this 25 percent. Were you talking -- is that about -- I mean, again, you reminded me that, you know, this -- we already have a standard by Congress for closed cases and this was just in terms of the package equipment. It's just the open cases. Is it the same for closed versus open?

MR. HON: This is Charlie Hon, TRUE Manufacturing. The conditions, the high humidity conditions do not nearly impact the test standards so much in a closed case as they do an open case. So the difference is far, far less between the energy efficiency levels there and we've always worked with that condition because we've been dealing with energy regulations from California since 2000 and that's been part of the database. No one's ever questioned it. We just went on and dealt with it because it wasn't that big a difference.

We are seeing open cases grow in popularity and there's an ASHRAE test going on right now to verify market sales through that open case versus closed case. It's a study being done right now by ASHRAE and that's something that's going to drive some of our customers because if they show us again previous data which was that sales increased from an open case versus a doored case, we will have continued marketing pressures from our customers to have open cases.

MR. deLASKI: This is Andrew again. I understand that, you know, the market trend towards open cases is a trend that's resulting in higher energy consumption for the nation. So there is -- how this rule interacts with the rule already on the books set

by Congress, I mean that's something we have to pay attention to, is how are we shifting market share? How are we -- we don't want to -- we want to be careful about encouraging the trend towards higher energy consumption. We don't want to shift even more of the market to open cases by leaving a portion of it outside our regulation where the closed have to be more efficient. So let's not penalize the equipment that is inherently more efficient.

MR. BROOKMAN: Harvey Sachs.

MR. SACHS: At the risk of -- Harvey Sachs, ACEEE. At the risk of pouring salt into a wound and then rubbing, I have found myself thinking back to the rejection by General Counsel of a boiler consensus reached by the boiler manufacturers and the environmental advocates a couple of years ago and that consensus proposed a performance level and a couple of prescriptive requirements.

General Counsel proposed a novel reading that said they could not do both prescriptive requirements and performance levels.

In the present instance, I'm learning about this Type 2 equipment for the first time and I'm hearing in part that we have an issue with much larger refrigeration engines and in part that we have electric

heaters to handle the condensate.

Now, again I'm not a specialist in this equipment, but a prescriptive requirement is nothing more than a float valve in that condensate pan to turn off and on the electric heater would go a long way toward minimizing the use of electricity to evaporate that condensate.

An IPOV on the refrigeration cycle would go a long way toward helping to balance the need for a large capacity with the need for efficient operation, and I must admit some concern that this Administration's General Counsel has taken away what seems to be a potentially important regulatory tool that would be beneficial to manufacturers in some categories as was indicated by consent, that consensus agreement.

At that point, I better stop before I get thrown out of the room.

MR. BROOKMAN: Gary.

MR. FERNSTROM: Gary Fernstrom, PG&E. I just would like to echo Ron Lewis's comment. I'm astonished that we would be at this point in the rulemaking and find that there's this class of equipment that hasn't been considered yet, and I'd like to just suggest what might be the case if the tables were turned and the residential air conditioning were seriously wanting to

consider regionality and the Department of Energy and others involved in that process have said that's going to be very, very difficult because new test standards will have to be considered and so on.

Here we are in this case with this and I just find it equally hard to understand how we can accommodate a big issue like this at the last minute.

MR. BROOKMAN: Yes, Neshan.

I guess answering to what Harvey brought up, a float valve is extremely common in this application.

MR. SACHS: But not required.

MR. NESHAN: No, it is not required, but I have yet to see at least a couple manufacturers who manufacture this type of equipment, who would ship a case without the float valve in the pan. So it's a very common thing to do.

MR. BROOKMAN: Okay. Thank you. Yes, Harvey, go ahead.

MR. SACHS: Follow-up? Thank you very much. That's very helpful. My point is only that a manufacturer wishing to save a nickel could avoid that where a simple prescriptive requirement would set a floor and level the playing field.

MR. BROOKMAN: Bruce.

MR. HIERLMEIER: Bruce Hierlmeier, Arizona.

I just want to clarify when I discuss anti-condensate, I'm talking about the heat applied to the surface of the material which you'll see in the store versus sometimes anti-condensate is also for the drain water, so there's two different things.

MR. BROOKMAN: Andrew, perhaps a final comment before moving on. Go ahead. Okay. So thank you for that discussion.

Now we're going to proceed. I guess not.

MR. RIVEST: One consideration all the time about, you know, either waivers or exempting products is the possible migration towards the lower cost product, is a Type 2 piece of equipment, is significantly more expensive than a Type 1?

MR. BROOKMAN: Neshan.

MR. NESHAN: It's very difficult to say. It is more expensive, but I can't tell you is it five percent more or 20 percent more. It all depends on the type of the display case.

MR. BROOKMAN: And within the distribution of different types, it's consistently, you would say, a little more expensive?

MR. NESHAN: Oh, yes. Oh, yes. You do need a larger condensing unit, compressor unit, because your environment is different than the Type 1. Higher

ambient temperature, hence higher btu requirement for the display case means larger condensing unit or compressor unit, as well as electrical requirements as well.

MR. BROOKMAN: Thank you. Charlie.

MR. HON: Charlie Hon, TRUE Manufacturing. There is an obvious difference because it does require a larger compressor, condenser, evaporator coils. It also requires electric heater elements, higher wattage, and different control circuits because of the increased load of electricity, but to say that it is a huge incremental cost is, I think, a misnomer because you're going usually one step up in compressor, slightly larger coils.

Are you going to add 10 percent of the cost of the equipment? Very easily. Are you going to add 50 percent increase? No chance.

MR. NESHAN: Thank you.

MR. BROOKMAN: Thank you. So let's move on now.

MR. MILLARD: I'm done. I think we're ready for a break.

MR. BROOKMAN: I think we're ready for a break. It's now -- by my watch, it's 10:45. Let's see if we can do this in 15 minutes. We'll resume at 11.

(Recess.)

MR. BROOKMAN: Let's start again here. Dave Winiarski.

Energy Use Analysis and Life-Cycle Cost Analysis

MR. WINIARSKI: Okay. Can everyone hear me? Okay. Well, as we talked about, the start of the work here is to update the ANOPR Analysis. We spoke about the Engineering. The next part -- portions that we'll talk about is the Life-Cycle Cost and Payback Period Analysis and the portions that go into that and then the National Impact Analysis.

I'll try to do the Life-Cycle Cost and Payback Period Analysis before lunch. That's the agenda.

The Life-Cycle Cost Analysis is really characterized by three different analyses. The first is the Energy Use Characterization of the equipment. As was mentioned earlier, typically DOE does an Energy Use Characterization to try to reflect the energy use in the field for the equipment as opposed to simply the energy use from the test procedure and also to determine the energy savings for going to higher TSLs from the baseline.

In this work, for those who were here at the ANORP, we also tried to validate the energy use that

was coming out of the Engineering Analysis with some whole building modeling of the energy use for refrigeration equipment.

I got a little nervous earlier because people were talking about whether this would address the Type 2 equipment. We don't really address that type of ambient conditions when we did this modeling, so just be aware of that.

We also produce analysis. We develop mark-ups, the distribution chain mark-ups that take us from the manufacturer selling price of the equipment to the customer purchase price of the equipment and to do that, we have to characterize how the equipment flows from the manufacturer through the different distribution channels to get to that end use customer, and we combine those two pieces together in the Life-Cycle Cost and Payback Period Analysis portion which really deals with just the accounting for the energy use and energy costs and first costs of the equipment.

Okay. So for the Energy Use Characterization, DOE resolved that due to the complexities of this product and all the different types of equipment that it initially planned to use the Engineering Estimates of Energy Consumption that were coming from the test procedure.

The test procedure, ARI 1200, accounts for two types of energy use equipment, what we call the direct energy consumption which is lights, fans, and in self-contained equipment the compressors, the anti-condensate heaters that are on the equipment, everything that's really tied to the specific piece of equipment being tested.

ARI 1200 also tries to deal with the indirect energy consumption for remote cases and this is the energy coming out of the compressor rack, basically to cool down and to liquefy the refrigerant that's traveling to the remote cases.

While it accounts for that, DOE wanted to explore exactly how close the ARI 1200 test procedure results would be from the energy savings standpoint as compared to doing some measurements using -- not measurements but some simulations, whole building annual simulation programs that dealt with both the refrigeration system as well as the whole building interactions, the heating-cooling loads in the building, and so I'll talk a little briefly.

Again, this was presented for the ANORP. The results were then updated based on the NOPR Analysis.

These are the distribution channels that DOE arrived at for the equipment. Basically, there's a

channel, what we call a national account, which is where the products are sold directly from the manufacturer to the final customer. That's the majority of shipments for the remote-condensing cases.

There's a channel where it goes from the manufacturer through some type of wholesaler who then resells the equipment to the end user and in some cases, there are some products that are sold from a wholesaler through a mechanical contractor or refrigeration contractor who then resells to the end user.

The shipment fractions that are shown here are those used for the NOPR Analysis. They're slightly different than what was proposed from the ANOPR, based on some comments that DOE received.

In addition, for the ANOPR, I believe that the national account shipment fractions were something like 86 percent of all shipments were assumed to be national accounts.

Comments received were that a much higher -- a much lower fraction went to national accounts for the self-contained product, but these tend to be resold in other markets and so we broke out the relative shipment fractions for each distribution channel by the self-contained and the remote-condensing products.

We then go through the process to, once we got those distribution channels figured out, we go through the process to try and determine the equipment price mark-ups through those distribution channels. To do that, we look at firm balance sheets from the various participants in the distribution channel, those wholesalers, mechanical contractors, and to some extent general contractors.

We also looked at a split between the new construction and replacement market. Originally, we calculated sort of a rough estimate of what that split was. It did not actually come into play in terms of developing the mark-ups.

The end results of applying those changes to the distribution channels were changes in the baseline and the incremental mark-ups that were developed. The baseline mark-ups are essentially the calculated mark-up factor for a baseline piece of equipment. That represents sort of what the industry average is today.

The incremental mark-ups are the additional mark-ups that would be applied to the incremental costs a manufacturer faces to design higher-efficiency equipment.

Let’s see here. The mark-ups here are a little bit higher, as I said, than what was presented

in the ANOPR in both cases. I think that the ANOPR mark-ups were more on the order of 1.4 roughly for remote-condensing products and for self-contained products. The self-contained mark-ups are really the ones that increased quite a bit in the ANORP Analysis.

We used those mark-ups to come up with sort of customer prices for each type of equipment or class of equipment, and then we can use those customer prices and the energy use numbers to -- as portions of the Life-Cycle Cost Analysis.

Life-Cycle Cost represents the customer price, plus the sum of all the annual operating costs associated with the given piece of equipment, discounted down to a base unit, in this case 2012, the effective date of the rule.

The economic evaluation that's done here is based on the customer's perspective. Those are his prices that he's paying for the product and the energy savings also accrue to him. The analysis is implemented in Excel spreadsheets that are available online at the CRE website that DOE has set up and they can be reviewed online.

The results for the analysis are expressed in terms of life-cycle cost savings; that is, the life-cycle cost of the baseline product minus the life-cycle

cost for the standard level, so that where you see positive life-cycle cost savings that's beneficial to the customers.

In addition, we calculate simple payback for each efficiency level that's analyzed, again from the customer's perspective.

One of the key portions of the Life-Cycle Cost Analysis is in fact the energy costs that are paid, the electricity costs in this case that are paid by the customer. All the LCC Analysis was based on the use of state by state average electricity prices paid by four different business types. Those types were large grocery stores, convenience stores, convenience stores and small groceries with convenience.

Convenience stores without gasoline pumps and with gasoline pumps were broke out separately because that changes sort of how much electricity is used by those and the total cost for electricity that's used by those different building types.

It also looked at what we call multiline stores, those would be the Walmarts, the Super Targets, that use refrigeration equipment but also have a lot of other base electrical uses in the building.

The start of the process was to develop essentially ratios of the electricity price paid for

these specific building types compared to the average commercial sector electricity prices using the 2003 EIA Commercial Building Energy Consumption Survey, CBECS. Then we applied those ratios to the state by state average commercial sector electricity prices from EIA data for 2006, that's updated from the ANOPR where we used earlier data, and that allowed us to get average state by state electricity prices for each of these four business types.

We then used the ADA 2007 to project what those electricity prices would likely be in 2012, the start date of the rule, and for the future. The LCC Analysis basically starts in 2012 and extends out to sort of one full life cycle of the equipment.

DOE plans to update the Life-Cycle Cost Analysis using ADA or 2008 forecast data for the final rule.

Other inputs to the Life-Cycle Cost Analysis include installation costs. Those costs were actually updated from those presented in the ANOPR based on industry comments for typical installation costs for self-contained and for remote-condensing equipment. They are still held constant with higher-efficiency levels, also based on industry input.

DOE has to discount the energy savings,

energy price savings back to the present value. It uses discount rates that it deems appropriate for each business type independently. Those come from an online website called Damodaran. It's a business website where it has average costs of capital or you can calculate average costs of capital for each of the business types that DOE was looking at. Again that was updated data.

DOE also made modification to its analysis with regards to equipment lifetime. The equipment lifetime that was used for the ANOPR was 10 years for all products. We got a number of comments that suggested that in particular smaller businesses might use -- might be more likely to keep the equipment longer, I think numbers on the order of 12 to 18 years that have been discussed or even longer than that.

So one change to the analysis that DOE made was that for these convenience stores in this, which basically is convenience store and small grocery, they raised the lifetime from a 10-year to a 15-year. That represents about 20 percent of the markets. So you have work out that that results in, I think, an average of about 11-year life instead of the 10-year life for all products.

DOE also modified how it was handling repair

costs. For the ANOPR, the repair costs were sort of broken out into -- well, I'll have to be clear on this. The repair costs here talk about unanticipated repairs to the equipment, a fan goes out, the compressor breaks, something like that. For the ANOPR, DOE had assumed had a constant repair cost.

We had some comments on that as a function of efficiency level. So we tried to gather some data with regard to the relative frequency and types of repairs that might occur in the different types of cases and updated using that frequency of repair information and the engineering costs for, say, higher-efficiency fans and other things, we tried to -- result in an increasing repair cost now as a function of the efficiency level. The details for that are presented in the Life-Cycle Cost Chapter.

Maintenance costs. They came from RS Means Cost Works Data. Maintenance costs, preventive maintenance costs are held constant with the efficiency level. However, because of the change in lighting technology, we tried to calculate lighting replacement cost separately, depending on whether we were using fluorescent technologies or LED-type technologies.

This is just an example of a typical life-cycle cost curve. This is complete life-cycle cost for

vertical open medium temperature equipment. What you see in this example here is that the life-cycle cost decline through the different efficiency levels that were examined, in this case down to about Levels 5 and 6 which were about the same, and then there was a sudden increase in life-cycle cost at Level 7 due, in this case, to the use of LED lighting.

This particular example is for a multiline retailer and the energy costs and discount rates that are appropriate to that business type.

This is an example of the different-looking life-cycle cost curve. This was for a vertical closed transparent product, a remote-condenser product. The design options here resulted in the last four levels having nearly identical life-cycle costs. Again, LED technologies were brought in at Level 7 but they did not result in the increased life-cycle costs that we saw for the medium temperature open product.

Let me drop back here. I'd also like to mention that some other additions in the NOPR Analysis were that DOE tried to examine through a sensitivity analysis what might be the impact of changes in LED lighting costs in the future. That's documented in the Chapter 8, end of Chapter 8, and you can examine that.

In general, DOE found that it could -- let me

see -- that the projected LED lighting costs could significantly impact the life-cycle cost curves for those products at the tail end of these curves, particularly for the open medium temperature products that were examined, and we'll talk a little more about that when we talk about the National Energy Savings Analysis as well.

So any questions?

MR. BROOKMAN: Or comments on this series of slides. Yes, Harvey.

MR. SACHS: Harvey Sachs, ACEEE. With respect to Slide 24, a minor technical question. On the second bullet from the bottom, I don't remember that the EIA Analysis takes into account the roll-in of lagged price increases due to changes in electricity regulation and that's a very profound effect in a number of states, 60 to 70 percent, for example, in Maryland over a two-year period, and I would ask that we check that EIA forecasts are not just passing along fuel forecasts but that they're also looking at the fairly well-documented regulatory changes in prices due to catch-up on regulatory freezes that have been imposed in the past.

MR. BROOKMAN: Thank you. Other comments on these slides?

MR. SACHS: On Slides -- Harvey Sachs. On Slide 20, and this is a question, but as I went through the TSD and not in the detail that I expect others have, I found no analyses at all that looked at secondary refrigerant as one of the options for remote-condensing units as is increasingly common in Europe and certainly have been installed on a number of supermarkets in this country, and I gather was judged to be experimental from DOE's analysis?

MR. WINIARSKI: I think secondary refrigeration equipment was not -- was basically not included in this particular rulemaking.

Ron or Francine, I don't know if you want to comment on that a little bit.

MR. BROOKMAN: Yes, Aris.

MR. MARANTAN: Aris Marantan, Navigant Consulting. Yes, Dave's right. The secondary coolant applications were addressed in the Advanced Notice of Proposed Rulemaking, the ANOPR. In that Notice, DOE stated that, based on the definition of commercial refrigeration equipment that was contained in the Energy Policy Act of 2005, their interpretation of that definition does not include secondary coolant applications.

Commercial refrigeration equipment has seven

items in the definition and one of the items is that it has to be connected to either a self-contained refrigeration system, the compressor and the condenser, or a remote system and so DOE interpreted that to mean that it has to be directly connected.

Secondary coolant applications. DOE stated that it doesn't meet the definitions. So it's not included in this rulemaking.

MR. BROOKMAN: Harvey.

MR. SACHS: I find myself marveling at the ability to exclude technology options that may become extremely important in the time frame of interest, given changes in refrigerants, given the alternatives that will drive owners to try to control leakage rates by perhaps adopting this. It may be water under the dam now, but it's just amazing how the department's able to use narrow readings of the applications to exclude important technology classes. I find myself surprised.

Thank you.

MR. BROOKMAN: Comments about this series of slides before we move on? Yes, Tim.

MR. BALLO: Tim Ballo with EarthJustice. It isn't necessarily a comment on this series of slides, but I can't think of a better time to raise it.

The statute requires DOE consider the rebuttal presumption payback period and it appears from the Federal Register Notice that several classes of these products satisfy the rebuttal presumption payback period at the highest TSL level the DOE studied.

DOE, in the Federal Register Notice, does not provide any sort of rationale for why it did not specifically use or does not plan to use the rebuttal presumption payback period analysis to set the trial standard level for these products.

It looks as though DOE just sort of prefers its own analysis and maybe there's some reason for that, but Congress has specifically provided that once this rebuttal presumption payback period is satisfied, it takes the trial standard level out of the seven-factor analysis that DOE normally uses and rebuttal presumption is a word or is a phrase that sort of has been determined to have a specific meaning.

I'll be submitting more detailed written comments on that, but I just wanted to flag this issue because DOE is sort of treating the rebuttal presumption payback period as if it really has no meaning in the statute and Congress has very clearly provided that it does have a very significant meaning for this analysis.

MR. BROOKMAN: Thank you. Those written comments will be helpful. Harvey Sachs.

MR. SACHS: Harvey Sachs. With respect to Slide 25, question. Bullet 3 gives a 10-year average lifetime for large grocery and multiline retailers.

Is it the assumption of the department that the equipment is scrapped at the end of 10 years or enters the secondary market?

MR. WINIARSKI: The analysis assumption is that the equipment is effectively scrapped and has no salvage value at the end of that time. In fact, conversations with industry people involved in that secondary market have generally said that the salvage value is often very low for the cases that are removed, I think primarily because a lot of these cases are in line-ups of cases that are for -- you know, particularly when you're talking about the large grocery sector of the market and it's often difficult to find exactly how you would incorporate that particular style of line-up into a new store.

MR. SACHS: The secondary market -- Harvey Sachs again -- could refer to a number of different things, such as export to other countries.

Again, I ask this as a question whether the department did analysis to see if there was a robust

secondary market related to alternatives to scrappage.

MR. BROOKMAN: Neshan, did you have a comment? You looked like you did. I don't mean to provoke you.

MR. NESHAN: Neshan. No, I've never heard of the equipment being removed and being exported to another country. I mean, this is the first time I'm hearing such a comment. I'm not aware of any.

MR. BROOKMAN: Thank you. Thank you.

MR. WINIARSKI: I believe this is when we stop for lunch but I'll just keep going.

MR. BROOKMAN: Keep going.

National Impact Analysis

MR. WINIARSKI: Okay. The next part of the revision for the ANOPR Analysis is to revise DOE's National Impact Analysis.

The National Impact Analysis is actually composed of two parts. The first part is to estimate CRE or Commercial Refrigeration Equipment shipments out into the future. DOE uses the time frame of 30 years from the 2012 start date of the rule out to 2042 and so we project shipments out over that time period.

The second part, once the shipments are out, it takes data that's developed in the Life-Cycle Cost Analysis to try to estimate both the national energy

savings impact from all those shipments over time as well as the national economic impact. The economic impact is expressed in terms of a national net present value for different energy conservation standards.

Briefly, the shipments forecasts are based on looking both at existing historical shipment data as well as the lifetimes of the products, so we know when those products need to be replaced over time, as well as looking at the projected growth and floor space for the different building types that might use commercial refrigeration equipment.

In addition, although it’s not part of the actual shipments discussion in the TSD, DOE tries to make estimates of the mix of efficiency levels that are in the market. DOE recognizes that there will be some mix of efficiency levels and that not every equipment sold is going to be at the baseline efficiency level for this analysis.

DOE then has to track the shipments and the stock that’s in the entire U.S. in terms of the vintage of the product, when it was first sold into the market, whether it’s a new piece of equipment that’s going into sort of a new building versus simply a replacement for an existing product, and it has to do that by the different equipment classes.

In general, the basic approach here was similar to that used in the ANOPR. One exception that was brought up earlier is that DOE tried to make an estimate of the shipments for the vertical open remote-condensing low temperature cases. That was something that DOE did not have a number for in the ANOPR.

Based on consultation with manufacturers, DOE made an estimate that the shipments for that product class were roughly five percent of what they were for the similar medium temperature-type product, again following those shipments but we did want to account for it.

This slide shows the growth, the estimated growth, in shipments of products over time. You'll see the graph itself has a little issue here in that at the first four years, it looks like there's a jump there. Essentially, there's no jump there. You should be really looking at the shipments from about 2005 or 2006 onward.

What we're trying to trace through here is the two lower bars basically represent replacements for equipment that was in the total refrigeration equipment stock in the year 2000. We then track also sales into large buildings, what we consider to be the large grocery and the multiline retailers, separately from

the convenience stores and small grocery applications, primarily because those have a different life, so we have to track them separately.

Also in here, we've broken out sort of the shipments that are replacing the existing stock that was in place in the year 2000 as opposed to that that's going into the new construction. The new construction happens to be the -- let's see here -- purple and yellow, the two intermediate colors, and the -- pardon me. Yeah. Purple and large yellow, and then the -- on top of that are replacements for shipments that go into new construction.

So all together, that gives you a sense of how the department foresees total shipments of CRE increasing over time. This is in terms of thousands of linear feet of all product categories.

Based on the shipments and the energy use of the equipment, DOE calculates the national energy savings for the period from 2012 to 2042. Because some of the equipment has been put into place in 2042 and will continue to receive economic benefits over time, DOE actually calculates the national net present value over a longer time period, going out to 2062, until virtually all of the equipment that was put in place in 2042 has gone away from the market.

As I said, DOE develops a distribution of efficiencies. DOE requested data on what efficiencies might be sold into the market. DOE actually has very little data on that. So it developed an economic approach similar to what's used in the EIA's National Energy Modeling System to look at consumer choice, consumer preference, in terms of the individual customer's risk for purchasing higher- and higher-efficiency equipment and using the cost data for that equipment from the Engineering Analysis and developed typical distributions of shipped efficiency products at the different levels, efficiency levels that DOE was analyzing.

This is an example. The first table is an example of that for the VOPRCM product.

Then as standards, different standards were coming into place, DOE looked at a roll-up analysis where essentially it assumed that all shipments for all efficiency levels below the standard were rolled up to the standard level. It was then assumed that higher-efficiency -- individuals who were purchasing equipment at higher efficiencies than the standard level would essentially be unaffected by the standard level.

Over time, as old equipment goes out of the inventory, it's then replaced with equipment at the

standard level and then using data on the customer purchase cost of the equipment, the annual energy use for that higher-efficiency equipment and the associated other expenditures, such as repair and maintenance costs, all coming out of the LCC, DOE develops total streams of energy savings and total streams of energy and other costs associated with all the equipment that's going into the U.S. market over those periods outlined earlier.

It then discounts all those costs back to present value to determine the national net present value for each efficiency level.

This brings up one of the early issues that DOE has to deal with. Because DOE was developing these market distributions based on an economic analysis, DOE used current and that economic analysis was based on the costs that were in the Life-Cycle Cost Analysis. The efficiency trends over time are static.

In other words, the distribution of efficiencies is assumed to be the same throughout the time. DOE does not have any information in order to project how those trends might change in the future. DOE does -- as we heard earlier, LED costs are dropping and there may be greater use of LEDs in the future because of the lower costs for them and that could in

fact affect shipments for products incorporating LEDs out in the future in a way that's not captured in DOE's model and so they welcome any kind of comments from the industry on how that might affect the shipments at each efficiency level in the baseline.

MR. BROOKMAN: So comments, both specifically about the LED costs and other costs perhaps. Harvey Sachs.

MR. SACHS: Harvey Sachs, ACEEE. Again, this is a question. As I read through, and perhaps not as carefully as I might have, the implied assumption was that we would have LEDs as an alternative installed much in the way that fluorescents are today; that is, with the diode and its heat sink within the refrigerated case.

An alternative that takes advantage of the intrinsic near-point source characteristics is to use inexpensive plastic fiber to give a vastly better distribution of the light with less space required in the cabinet and the heat sink and almost all heat dissipation external to the cabinet, and it's not clear to me, and I would just request clarification from the department, whether the assumption was that the LED light source would be within the refrigerated cabinet of the space.

MR. BROOKMAN: Who would like to respond? Aris.

MR. MARANTAN: Aris Marantan, Navigant Consulting. Yes, to answer your question, the LED strip that makes up the lighting for, you know, LED systems is -- it includes the driver as well as the light source itself within the refrigerated space. So all of it is included in the space.

MR. SACHS: So by driver, you mean the power supply?

MR. MARANTAN: The circuitry and the power supply, yes.

MR. SACHS: I can't imagine any basis for that, but given that that leaves that entire heat dissipation of the LED within the refrigerated space, and again I'm not a refrigeration cabinet designer, but in terms of having a fairly steady environment, there's an awful lot of that and for reasons of space and flexibility and a lot of other things, I can imagine a number of reasons that my product might be much more attractive to my customer. Much that happens to be heat load actually external to the cabinet.

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: Mike Rivest, Navigant. We simply modeled products that are currently on the

market today and I understand that there could be new products that take advantage of that, of those features in the future, but that hasn't been taken into account.

MR. SACHS: Thank you, Mike. This is Harvey Sachs again. The net effect works for all standard for to be adopted would be to open up an entire category of innovation and we relax the necessity of improved efficiency identified by the department as cost effective through changes in other energy-dissipating components and allows significant part of the energy efficiency to be met by adoption of the LEDs, perhaps with the remoted heat-driving components which we really need and the reason to bring it up at this time is that between now and 2012, one would expect the creativity of manufacturers to be dedicated to product innovations that will have long life in the market, so they will not have to redesign yet again and some of these things look like, for whatever reasons, were taken out of the bounds of the system envelope to be analyzed by the department in this proceeding.

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: Harvey, and I'm looking to Aris to correct me, but I believe that at TSL-4, there are LEDs being used in several of the display cases and from my recollection, TSL-4 represents a standard level

where display cases with doors have LEDs as the design option.

So the difference between 4 and 5 is that 5 makes use of LEDs in open cases. So I would think -- so 4 is not LED-less.

MR. SACHS: Thank you, Mike. That's helpful and it leads then to a process question. Harvey Sachs again. Is the department considering the option of Trial Standard 4 for some product categories and Trial Standard 5 or above for others?

MR. RIVEST: I think the construction of 4 is that is a combination of 3 and 5. So 4 in fact was constructed to achieve -- you know, to bring in LEDs where it was cost effective based on today's pricing.

MR. SACHS: Mike, I'm sorry, I must be very dense, I'm recovering from an illness. Does that mean that the department would adopt what its analysis calls Trial Standard 4 for certain -- 5 for certain product classes, such as closed products?

MR. RIVEST: The requirement on 5 is the same as 4 on several products.

MR. BROOKMAN: Andrew.

MR. deLASKI: I think the department actually specifically answered Harvey's question in the Notice.

MR. SACHS: Thank you.

MR. deLASKI: It says at the very end, on Page 50128, “DOE also requests comments on whether to adopt TSL-5 for all or some of the classes.” So it does strike me the department’s already opened the door to doing a final TSL which could be a combination of 4 and 5.

MR. BROOKMAN: But, Mike, restate again.

MR. RIVEST: 4 is already a combination that includes some of the efficiency levels that are in 5. So a redefined 4 or a 4-A could include more of TSL-5 levels within 4. So it’s not like 5 is one series of numbers and 4 is an entirely different series of numbers. Does that make any sense?

MR. SACHS: I think we’ll have to -- I’m obviously very dense and will have to carry this offline. Thank you.

MR. BROOKMAN: Okay. Thank you, Harvey. So the question still remains. Other comments with respect to cost projections for LED use, how they might drop, and other cost factors as featured in Slide 33.

MR. SACHS: Mr. Brookman, Harvey Sachs again. The question was not only cost projections for LEDs but the engineering aspects of LED application in terms of the expected heat dissipation required within the refrigerated volume.

Thank you.

MR. BROOKMAN: Neshan.

MR. NESHAN: Yes, I'd like to make a comment regarding that last statement, in that do you want us to distinguish between an open case and a closed case, one with a transparent door on it? In the transparent glass door, it is very common to have the ballast or, in this case, the power module included in the refrigerated zone because they rely on the heat dissipated from that unit to help the anti-condensation requirement of the door that is the light being applied to.

For the remote -- for an open display case, however, it's quite different. Just about every manufacturer, I can't say all, uses the fluorescent bulb currently with a remote ballast. The remote ballast is not in the refrigerator zone. So one has to distinguish between a reach-in door or a case with a door and an open case.

It is recommended -- one would -- should recommend to use a remote power module for LED light in an open display case to be not part of the light fixture and be a remote application, whereas for a door case, it is recommended to use -- would be recommended to use the power module as part of the light fixture

within the refrigerated zone.

MR. BROOKMAN: Okay. Thank you. Other comments? Andrew.

MR. deLASKI: You're looking for comments on LED price projections now in part?

MR. BROOKMAN: Yes.

MR. deLASKI: I have a couple other comments on some of the preceding slides, but I'll take that one first.

So I wonder if the department could just take a moment and just tell us what did you project for LED prices?

MR. WINIARSKI: In terms of the sensitivity studies? The base analysis --

MR. deLASKI: In terms of what you proposed in the rule, yes.

MR. WINIARSKI: The base analysis that was done by the department uses current prices for LED fixtures for its analysis and that leads to effectively the proposed level, the TSL-4 that's being proposed.

DOE did some sensitivity analysis, looking at projected reductions in LED lighting, fixture lighting, fixture cost, both in terms of what those costs may be reduced by 2012 as well as a separate analysis that looked at reducing those costs for the first

replacement of LEDs out in essentially 50,000 hours later or 2018, and those are in the -- they're in the Chapter 8 or the TSD with regards to the discussion for Life-Cycle Cost Analysis and they are in Chapter 11, I think, with regards to the Net Present Value Analysis.

I can go into a little detail on those, if you'd like, but the TSL-4 levels are based on current prices.

MR. deLASKI: Current. If I remember, it was 2007 prices, so not --

MR. WINIARSKI: It changes quickly. Yes, it's 2007.

MR. deLASKI: Okay. I think your point is well taken that LED prices are changing very quickly. They're dropping. I think I've heard the notion that Morris Law may apply to the prices and you could say the prices are dropping precipitously.

I don't think the prices will not drop at all between now and 2012. That's for sure. Certainly the analysis period you're looking at here, the notion that prices will stay the same as 2007 is just wrong and I think that may be a sensitivity analysis, but that certainly shouldn't be the main analysis. The main analysis strikes me as it needs to be based on the realistic projection of what LED prices are going to do

over this analysis period, which you pointed out, is 2012 to 2060 something.

So it is -- you know, LED prices are dropping through the floor. We've seen that happen on red LEDs and now it's happening with white LEDs. We certainly will address this in our written comments in more detail, but I think the department also is investing, I think, tens of millions of dollars in developing solid state lighting. It's an important initiative for the department and you have your own projections for what's going to happen to the prices in the marketplace and you have very helpfully provided them here in the rule.

I think it's an 80 percent reduction within the time frame between now and when the rule will go into effect. It's big reductions the department has already projected internally to this -- in this building here as to what's happening in the marketplace.

So I think that zero percent reduction, no, that's got to go, that's not right. Is it 80 percent? Is it a 160 percent? It's a very large reduction and we'll be addressing that in our written comments. I think you -- bounding it at zero, though, is not appropriate.

MR. BROOKMAN: Thank you. Yes, Karim.

MR. AMRANE: Karim Amrane, AHRI. I guess if we try to project the price in the future, then are you doing the same thing for other components in this system? There are some indication that the refrigerant that's being used today might quadruple two years or three years from now. Is it being taken into account in the analysis as well?

MR. WINIARSKI: No. No, the only sensitivity was done on LED lighting because of -- I think the concern that those prices are known to be changing and DOE has its own program, but certainly there -- you know, other prices potentially could change in the future. DOE has just used its fixed costs for the --

MR. AMRANE: Then my follow-up question would be if indeed DOE is thinking of looking at projection of LEDs and how the costs may change in the future, then you should do it for everything else and do a real sensitivity analysis because the refrigerant, you know, might go out in the other direction and so I think that would be our recommendation.

MR. BROOKMAN: Yes, Andrew.

MR. deLASKI: Andrew deLaski. We're certainly in favor of taking into account developments in the marketplace that are going to be important for influencing what will be the right answer in the

rulemaking and if refrigerant prices are going to be increasing, we would agree that that should be taken into account in the rulemaking.

I think the department has to answer the threshold question, though, and you've done a nice job in the proposal of teasing that on the LED, which is does it matter? Okay. We can tease out what's going to happen to all sorts of different prices in the Engineering Analysis, but, you know, are the impacts going to be on the scale that's going to influence the decisionmaking the department has to make and if refrigerant prices are changing dramatically, I would certainly work at taking those into account in the analysis as well.

The department, I must say, you know, routinely makes estimates of things that are uncertain in the future. That's what this exercise is all about. Electricity prices. There's electricity price forecasts in the analysis. The department relies on those developed by EIA and so it's part of the analysis. I don't think this is something that's brand new to the analysis.

MR. BROOKMAN: Charlie, and then over to Gary, and then to Lane.

MR. HON: Charlie Hon, TRUE Manufacturing.

There's several different areas that have to be considered here. Number 1 is that there's a lot of research on LED lights, but, unfortunately, for some of our market, we don't know where we're going with it because the frequencies of light that we need in our cabinetry are not necessary the leading ones that some of them because we take -- the traditional in the market. We have different colored lights available to us, depending on the market.

If you want a meat market, you want a slightly red tint light to make the meat look fresher. Those aren't readily -- we do not know the timeline of development of those products. The white lights are looking very good. There's no question there.

We also have some very significant changes in the market on value, especially in such things as copper. There's significant research right now to replace a lot of the high-efficiency heat transfer devices that have copper with aluminum which is not as efficient a heat transfer device because of cost, depending on the cost of aluminum and the cost of copper.

Again, a variable cost which does make an impact on the consumption of equipment but it's not been considered here.

MR. BROOKMAN: Larry.

MR. HOWINGTON: Well, I think the prior speaker just answered my question. Thank you, Doug.

MR. BROOKMAN: Thank you. Lane.

MR. BURT: I just wanted to build on what Andrew said -- Lane Burt, NRDC -- and point out that the sensitivity analysis for the projections are very important because it's the department's job to look ahead and set a policy that drives us into the future and that can apply to LEDs which we have very strong indications are going to draw the prices somewhere between zero and 50 percent for the total system by the department's own projections.

We also have refrigerant sensitivity analysis which should be done and then we also have a coming -- another cost that's coming online and that's the cost of carbon that we see with greater and greater certainty that's going to become an issue from California adopting a Climate Program and the Regional Greenhouse Gas Initiative in the Northeast.

So all these issues the department needs to take into account when looking ahead to set a standard and just to get back to the question at hand with LEDs, there's so many indicators that these costs are coming down and the department has done a very good job of

checking publicly-available data against their own projections and checking the red light projections and we would just like to fully support the department using its own projections in the analysis to set the appropriate standard level.

MR. BROOKMAN: Any other comments -- yes, Andrew.

MR. deLASKI: This is another aspect of the LED question but not a cost aspect. How is it incorporated into the energy use portion of the analysis?

It's my understanding, and I've heard that LEDs are more susceptible, they perform well, if you turn them off at night when the store's closed and that some stores that have shipped LED lighting find that they can turn the lights off whereas the fluorescent they couldn't, and I'm wondering whether DOE has tried to incorporate that element of the energy savings into the Energy Savings Analysis.

MR. WINIARSKI: No, DOE has not. We did do a sensitivity analysis in the Life-Cycle Cost Section with regards to the equipment operating -- lighting operating hours and I believe that looked at the impact of lighting operating hours on the -- pardon me. I said that -- misspoke. That was in the Energy Use

Section.

But certainly if you were in the case where the LEDs were turned off more frequently than the fluorescent lights they might be replacing, there would be some additional benefits that are not captured in the department's analysis.

MR. RIVEST: Mike Rivest. I believe I went into a store where there's actually dimmers. You walk down the aisle and the LEDs light intensity goes up.

Now, of course, we did not capture those benefits nor have we costed the cost of the control circuitry.

MR. BROOKMAN: Tim.

MR. BALLO: Tim Ballo, EarthJustice. Just following up on Andrew and Lane's comments earlier, EPCA provides a standard for DOE's determinations. They must be based on substantial evidence.

I haven't reviewed the record or the TSD carefully, but if the only evidence in the record on the future cost of LEDs is DOE's own study that says it's going to come down significantly, if that's the only evidence in the record, I don't think DOE has substantial evidence that supports the decision that LED costs are not going to be decrease.

MR. BROOKMAN: Gary.

MR. FERNSTROM: Gary Fernstrom from PG&E. Well, if I could comment on how multiple market studies in the LED business that show market trends toward reduced costs, so I'm sure there are other references that could be cited here.

MR. BROOKMAN: Lane.

MR. BURT: I just want to bring up the point that it's not just an energy issue with the LEDs. The department's analysis of the value to the nation of this standard, Standard Level 5, with assuming the current prices which is wrong, is negative 200 million. The value at six percent is the breakeven point. Somewhere between six and 50 percent, we see a huge amount of value to the nation, all the way up to the department's own projection of 50 percent for the system, decreasing by 2012 to 1.62 billion.

So this is really an important decision for the general public and it shouldn't be made lightly.

MR. BROOKMAN: Thank you. Other -- yes, please, Neshan.

MR. NESHAN: On the cost effective, I'd like to make the following comment in that, as stated earlier, there are certain display cases that do require different K value for the LED light. For the reach-in case or freezer case, a general lighting LED

is well accepted and is used.

However, for applications, such as meat, dairy, deli, produce and so on, these LEDs have to have a special color and a special color index that makes these LEDs expensive. These have to be hand sorted in order to put them together. So the cost is not the manufacture of LED but it is in the labor used to sort them. They have to be tested and sorted to make sure they fall within certain temperature rating for this application.

MR. BROOKMAN: Thank you.

MR. NESHAN: So those prices are not coming down as rapidly as the others.

MR. BROOKMAN: Do you wish to characterize how much of the market, how much of the penetration of LEDs depends on that color segmentation, Larry?

MR. HOWINGTON: This is Larry Howington. Basically, I think you could divide it between the low temperature of the frozen cases and the medium temperature cases. Almost all of the medium temperature cases have product in it that is from fresh product to meats and dairy packages and so on that is going to require the higher-quality LEDs.

On the low temperature side, which people refer to as the colder LED, on the low temperature

side, they're cold cases, and it's been some -- it's starting to be accepted in the marketplace for low temperature, but for medium temperature, there's a very exacting standard and what we have found so far, even when we find the color that meets the customer's requirement, getting the repeatability on the color, even with the current binning standards, binning being the way they sort the LEDs, you have to go to sub-binning to actually get the repeatability so that when you put two in a case, they don't look different.

MR. BROOKMAN: Right.

MR. HOWINGTON: And there are four levels of each bin.

MR. BROOKMAN: Gary, go ahead.

MR. FERNSTROM: Gary Fernstrom, PG&E. Let's not suggest for a moment that the price of premium sorted bin LEDs is not coming down commensurate with the cost of all LEDs.

If the price of manufacturing LEDs comes down in general, there's a premium, of course, associated with binning and sub-binning, but that premium is at a constant. So if the baseline at which the premium applies comes down, the opportunity for reduction in price accrues across the market.

MR. BROOKMAN: Charlie.

MR. HON: There's a couple of comments in there that I disagree with. Number 1 is that in the market in general, there's two different, completely different sectors. The remote market tends to be grocery store and relies more on colored product than certain of the glass door merchandisers. Glass door merchandisers are fairly loose in their nature as far as the bottled products, your Cokes, your Pepsis, your different major consumer products which are sold refrigerated. The product itself is so recognized that slight differences would not make that big a difference, but in a grocery store business, the food products are truly from an endpoint.

MR. BROOKMAN: Thank you. Harvey.

MR. SACHS: Harvey Sachs, ACEEE. My comments are general and perhaps will not apply in detail. They're meant to give some context.

One of them is that just like price scale, the product attributes are scale dependent. As manufacturing comes up in scale, reproducibility also comes up. The initial LCD screens offered in the market at 90 percent scrappage rates, scaling-up manufacturers about reducing the variance of the product.

We also see that the difficult challenge, the

Holy Grail, has been the white LED, not the colored, that the red ones are reasonably common in our consumer experience, what we stop in traffic, not that tint, but the beginning problems are the question, I believe, of manufacturing scale that has in its solution the demand for the product.

I could be desperately wrong, but certainly the experience of so many other solid state products suggest that I'm probably sniffing up the right tree for that particular posture.

MR. BROOKMAN: Okay. Charlie, do you have additional comments? No other comments.

So this has been a useful discussion. Additional thoughts on LEDs and pricing and other issues that are related? Andrew.

MR. SACHS: I am looking for a monochromatic white LED.

MR. BROOKMAN: So is the Department of Energy.

MR. SACHS: Thank you.

MR. BROOKMAN: And for a much lower cost than -- how many lumens per watt?

MR. deLASKI: My comments are on LED price, among other things.

MR. FERNSTROM: 100.

MR. BROOKMAN: Thank you. 100 lumens per watt. Thank you.

MR. deLASKI: I'm on LEDs.

MR. BROOKMAN: Please do. Keep going.

MR. deLASKI: If you'd go back a slide, please, I have a question about shipments, and is this an appropriate time to ask about shipments?

MR. WINIARSKI: Sure.

MR. deLASKI: In the second bullet here, base case for penetration of higher efficiency CREs, what you've shown here is, correct me if I'm wrong, but is a distribution of efficiency by efficiency level for that particular product.

MR. WINIARSKI: Right.

MR. deLASKI: Right?

MR. WINIARSKI: And sort of DOE's baseline analysis for the first table, yes.

MR. deLASKI: Right. Help me reconcile something that I found in the record with this. What I found in the record is what the manufacturers have explained to DOE which is that they have a single product line and I think this probably applies -- I'm not sure if it applies to both remote-condensing and to the packaged equipment, but I assume it does. That's my understanding from what I read.

If a single product line -- yet, I look at this and I see a distribution of efficiency. So is that telling me that, you know, okay, that's one manufacturer at that Level 1 and it's a different manufacturer at Level 2 and a different manufacturer at Level 3? What's going on?

MR. WINIARSKI: Let me --

MR. deLASKI: What's the efficiency in the marketplace?

MR. WINIARSKI: Right. Let me speak to that, both in terms of what was done to the analysis and my understanding of the market and the industry can come back if they have other statements to that.

DOE used an economic model to sort of predict what it expects the distribution of efficiencies to look like in -- over the time period of the rule, based on the incremental costs to get to higher-efficiency levels and based on a perception of customer risk for purchasing higher-efficiency equipment. Okay?

So this is essentially an econometric model and it really isn't based in available data with regard to the market efficiencies. That's because DOE simply doesn't have that. Data certification programs have only recently been put in place and still aren't -- there's not a lot of data out there on what's readily

available for the equipment.

That said, my understanding of the products in the industry is that a large fraction of -- certainly for the remote products, is that the purchasers can ask for customized options which affect the efficiency level of the product that's sold into the marketplace and so I suspect that if you could look, you would see a fairly wide distribution.

We know that some people purchase products that have older fluorescent lights and some people are purchasing LEDs today and I don't know, maybe the industry can comment a little more on that.

MR. deLASKI: Correct me because I'm about to characterize it. Manufacturer X has a single product line but, you know, a customer comes and they say I want to have these efficiency enhancements. They're going to give them those efficiency enhancements.

MR. WINIARSKI: That is my understanding.

MR. BROOKMAN: I see Bruce.

MR. HIERLMEIER: Bruce Hierlmeier, Zero Zone. That's correct. We have options and they can select them, depending on what their design preferences are, what they like. Some will pick some high-energy or high-energy saving options, yet leave others behind, based on their own individual experiences. We, as

manufacturers, can't always understand why they make some of those decisions because they seem inconsistent but the customers pick what they want.

MR. deLASKI: So that gives us a distribution efficiency in the marketplace today, even though we don't have -- are now offering good, better, best, in the sort of traditional sense.

MR. BROOKMAN: Andrew for follow-on, and now Charlie.

MR. HON: This is Charlie Hon. That can also be driven on aesthetics and market product appearance because we have customers who want much more lighting on the product than other customers. We have customers who want a very aesthetically-pleasing unit which may not be quite as energy efficient.

When you have a product line with 8 or 900 products and you have deviations from those, you can get some pretty big variation patterns in energy levels.

MR. BROOKMAN: Yes, Aris.

MR. MARANTAN: Yes. In Chapter 3 of the TSD, we went through the exercise of characterizing the range of efficiencies by product classes that we've analyzed. So they're shown there in Chapter 3.

We also presented it at the Advanced Notice

of Proposed Rulemaking Public Meeting. So we have a couple of slides if you're interested in seeing the actual ranges that we've estimated.

MR. BROOKMAN: Larry.

MR. HOWINGTON: Just to give an example, we have 13 assembly lines. We produce over 200 different product models. We took one of those assembly lines and we did a variability study and on the one line, we looked at the -- I think it was five different options, not all of the options and not all of those five represented different energy levels, although some of them did. We had others that went beyond that.

We had two million combinations on five options that the customer could select to build an order. So there's a wide variability and many of those things that are aesthetic, just as Charlie said, affects energy. The higher the front, the treatment on the front sill of the case, the shelves, the depth of the shelves, if they're angled or not, all of those things affect energy.

MR. deLASKI: So then a follow-up, which is that in your next bullet, in the analysis that you're saying that as you have each efficiency level, I'm not sure I characterize this correctly, that all of the equipment is then, you know, just meeting that

efficiency level. It did meet it before and you were above it and were going to keep on being above it.

MR. WINIARSKI: Right, right. The assumption is a purchaser who's made an economic decision to purchase at a higher efficiency level is just basically unaffected by the standard.

MR. deLASKI: And that if he went as far as TSL or in this case the highest level, Level 7, I guess, for example, at that point, nothing in the market would be more efficient than this product?

MR. WINIARSKI: Right. The assumption here is, again going back to the Engineering Analysis, is that this was a max tech level. You know, there's probably -- because there can -- somebody could actually purchase something, for instance, that didn't have any lights for whatever reason. There may have been other, you know, more efficient products out there, but in this simplified analysis, that's the approach.

MR. deLASKI: It strikes me as being perhaps wrong for the following reason, that there's a test method. The test method captures certain aspects of energy performance but not all aspects of energy performance. So that a customer, call them Walmart or call them, you know, any other big customer out there,

who wants other energy efficiency enhancements that are off-test method, so it strikes me that you still are going to see a distribution of efficiency above this max tech level of performance, we'll call it. It may not show up on the test method, but it's going to be a -- there are performance enhancements that are off-test method that could show up.

MR. BROOKMAN: Charlie.

MR. HON: Quick question for you. There's -- we have certain legal requirements on our testing if we're going to have a product and due to the regulations of the Federal Government, regulations of a possible product, we will traditionally test for the severe case where we put all the options on it and test to that level and in reality, quite often, the units are shipped out to less than that, but that actually increases the efficiency, but from a testing standpoint, we cannot afford to test every iteration.

So we go to the most severe so that we can beat the standard. We don't want to be adding the others on there after the fact. We want to be able to say, okay, worst case scenario, this piece of equipment with all the options on it will get you this efficiency.

MR. BROOKMAN: Karim, did you want to add on

to that?

MR. AMRANE: I guess -- Karim Amrane, AHRI. I want some clarification from Andrew. What do you mean, what is it that the test procedure doesn't count? What are the energy efficiency improvements?

MR. deLASKI: Steady state test, right? Dave can probably answer it better than I can.

MR. AMRANE: Yes, but if the case has all those features, it could be tested that way. So I guess I'm confused. It should be counted as a test procedure. If we test equipment, if it has those features, it's there. It should count.

MR. deLASKI: We've found that test methods don't always capture every element, every aspect that applies to energy consumption or there are some aspects of energy consumption that may be -- just aren't captured by the test method. Test methods aren't perfect.

MR. AMRANE: You're talking about lighting, talking about all those kinds of things are counted.

MR. deLASKI: Okay.

MR. BROOKMAN: Gary. No, okay. So I think we're just about ready to go to lunch. That's where I think we are.

Final comments on 33. We're not quite

through the National Impact Analysis slides. Do you want to go through a few more slides, then go to lunch, Dave?

MR. WINIARSKI: The next portion -- I can probably do that.

The next portion of the analysis, after DOE has completed its revisit of the ANOPR Analysis, DOE goes through the process of trying to select trial standard levels which is the second chevron up here.

The trial standard levels are effectively the potential standards that DOE is really going to consider for the remainder of the rulemaking and in order to do that, DOE has some sort of a standard set of conditions that it wants to look at in terms of the Life-Cycle Cost Analysis and the NPV Analysis in order to select specific levels that it's going to be interested in. Those are shown here on the slide.

DOE looks at the most efficient energy level that's going to carry that through the remainder of its analysis. It looks at the efficiency levels that have the lowest life-cycle cost. Traditionally, DOE has considered that. DOE looks at efficiency levels that have shown a payback of three years or less. I think that was brought up earlier as sort of similar to the rebuttable presumption, and DOE has sort of options to

look at, particular technologies, that might be noteworthy and that it wants to consider in the remainder of its NOPR Analysis stage.

DOE also can select the efficiency levels that try to fill in gaps between these other levels or in these levels and the base case. DOE wants to be able to present a suite of possible levels that it's going to analyze for its NOPR Analysis.

Each trial standard level is examined with respect to these options in terms of its selection and then DOE has gone through and tried to assess which particular trial standard levels it wants to carry on. The trial standard levels are also generally picked along a consistent theme. For instance, all products -- one trial standard level may be all products at the max tech. Another one is all products at the minimum life-cycle cost level.

In some cases, and it turned out the way DOE selected a trial standard level but mixed those results for the different classes of products, so there's a trial standard level but the theme is not perfectly consistent.

In particular, as the trial standard levels are shown here expressed in terms of the equations for the different products, these are in terms of kilowatt

hours per day of energy consumption, either calculated by daily energy consumption which is the term that ARI 1200 uses for remote-condenser products where the actual energy consumption of the condensing unit is estimated, as well as the total daily energy consumption which is what it uses for self-contained equipment where the actual total energy consumption can be measured in the test.

We had a detailed discussion earlier, thanks to Harvey, with regard to the trial standard levels, so I'm going to try to explain these real quickly.

Trial Standard 5 represents the max tech level, the maximum energy efficiency level that was considered from the Engineering Analysis. Trial Standard Level 3 represents the maximum life-cycle cost level, again assuming the present day LED costs. Trial Standard Levels 1 and 2 were actually selected. They happen to be somewhat lower than the life-cycle cost level. There really wasn't a lot of difference between TSL-3 and TSL-5 in terms of intermediate efficiency levels, but we did want to make sure that we had some other levels to look back in case we had to revise the analysis. So TSL-1 and 2 are in this mix as well.

TSL-4 was basically produced by looking at some of the preliminary Life-Cycle Cost and NPV

Analyses which suggested, as was brought up earlier, that the low temperature products, the LEDs, generally were very, very cost effective, but they appeared to be less cost effective and in some cases not cost effective based on current LED costs for the medium temperature products, at least on a national level.

So TSL-4 basically represents TSL-3 for those five medium temperature products that are discussed in the rule and TSL-5 for the remaining equipment classes that are discussed in the rule.

The five equipment classes that TSL-3 was used in TSL-4 are the vertical open remote-condensing medium case, the vertical open self-contained medium case, the semi-vertical open remote-condensing medium case, and the semi-vertical open self-contained medium temperature case, as well as the service over-counter medium remote-condensing products.

As I guess one quick note, just a minor correction that’s in the NOPR, again these are in terms of kilowatt hours per day. I think the first table in the NOPR that shows the selected standard levels doesn’t actually have the units on it but for clarity, they are in kilowatt hours per day based on the appropriate test procedure.

MR. BROOKMAN: Okay. Yes, Karim.

MR. AMRANE: Karim Amrane, AHRI. I guess I have a question. You said the TSL-3 were the levels for which you had to match the savings, right?

MR. WINIARSKI: Right.

MR. AMRANE: So I guess, I mean, on the comment standpoint, those were the most cost-effective levels?

MR. WINIARSKI: Right. In the analysis, yes.

MR. AMRANE: So why did you then take -- for the ROTAM cases, what did you pick to max tech?

MR. WINIARSKI: Well, --

MR. AMRANE: It did not show the maximum life-cycle cost.

MR. WINIARSKI: For clarity, we analyzed TSL -- each product was analyzed separately across all the different TSL products. TSL-3 was the ones that showed that they were most cost effective -- pardon me. TSL-3 was most cost effective from the Life-Cycle Cost Analysis standpoint.

TSL-5, however, was not necessarily the most cost effective. I think it actually is in some of the categories. So it’s the same level from TSL-3, 4 and 5 for certain categories. However, when looking at the National Net Present Value Analyses, for many of the categories, some of the assumptions in that analysis

are different than the LCC Analysis and the Net Present Values were still positive or nearly at the same level as they were in TSL-3 at -- for those particular product classes and so for that reason, TSL-4 looked at those max tech levels for those classes and looked at the TSL-3 levels, the life-cycle cost levels, for those five product classes that we talked about.

Does that help explain?

DOE typically aggregates the results by TSL. Again, most TSLs are sort of under a consistent theme. So this slide basically shows the aggregate net present value for the product classes analyzed at each TSL level. TSL-3 showed approximately $1.2 billion over the analysis time frame for selection of that TSL.

TSL-5, when considering all the products, was minus $200 billion -- I'm sorry. That's a mistake. Minus 200 million. That's a correction in the slides. No, the slide is correct. I'm incorrect. Sorry. $.2 billion. But it is negative and this slide shows negative because of those five medium temperature products all show negative NPVs. The other products, even at TSL-5, all showed positive NPVs.

TSL-4, as you can see here, where we've allowed the efficiency levels for those five products to drop back to effectively what was in TSL-3, showed

aggregate NPV of 1.1 billion, again very, very slow to what the max tech level -- not max tech but the maximum LCC level projected.

MR. AMRANE: Karim Amrane again. But again, we'll be looking at this. The maximum NPV was at TSL-3.

MR. WINIARSKI: Yes.

MR. AMRANE: This is important because of what, the energy savings? Does it show energy savings?

MR. WINIARSKI: Yes.

MR. RIVEST: Yes.

MR. BROOKMAN: Thank you, Mike Rivest.

MR. AMRANE: Purely economic basis, TSL-3 is really the one that's most cost effective.

MR. WINIARSKI: Based on the analysis, right. Based on the analysis that was done.

MR. BROOKMAN: Mike Rivest, go ahead.

MR. RIVEST: There are many components in the analysis. So, you know, cost effectiveness here in the more holistic view, you know, is not based strictly on the LCC.

MR. BROOKMAN: Andrew deLaski.

MR. deLASKI: A couple of comments. I think both the DOE does a nice job, I think, in the Notice citing back to the statute here and it's very

subjective and it's very clear to achieve the maximum improvement in energy efficiency, it has to be economically justified. That's a very different thing than saying the maximum of the standards should be most cost effective. It's just not in the law. So the law is about saving energy in --

MR. AMRANE: In a cost-effective way.

MR. deLASKI: -- a cost-effective way. Yeah. I want to make a couple comments. One is that I think the department is leaning too heavily on the seven percent discount rate. OMB guidance has DOE looking at both the three percent and seven percent discount rate.

We believe that DOE should be giving primacy to the lower discount rate which is the societal discount rate than to reflect the society -- the time value of the society as a whole. It's a social decision. The appropriate discount rate should be given primacy in my opinion, in our view, should be the three percent discount rate.

I'm struck by your slide. Why isn't the three percent number up there? Why is there this decision to give primacy to seven percent? I think that's an inappropriate focus on the seven percent. I think it would benefit this audience to see both the seven percent and three percent.

MR. WINIARSKI: Note to self, put three percent on slide.

MR. deLASKI: Thanks. That's it. Could you go back one slide? Oh, and on this, I think another concern here and this relates back to the same point, I think here, DOE has to construct a TSL around the seven percent discount rate, but there's no TSL constructed around three percent discount rate. Again, showing the primacy the department's given the seven percent which to me strikes me as just pulling a number out of the hat.

When you've got two numbers, OMB gives you guidance to use. You've chosen seven percent with no explanation as to why you're leaning on that particular rate.

The other thing that strikes me is that it would have been, I think, very instructive for the department to consider a TSL which was constructed at the maximum level cost effective for the customer. Using the LCC Analysis, you chose to give the minimum LCC but you don't have a TSL that's constructed around the level that would maximize energy savings and be cost effective for the customer and that strikes me as being a very useful TSL to have analyzed on this and other rulemakings.

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: That's essentially what TSL-4 is.

MR. deLASKI: How is that, Mike?

MR. RIVEST: What I mean is the -- if you look at this as -- how many product lines are there? 15? I think there were only five that had negative LCC at TSL-5 and those are the ones that were brought down. So in effect, TSL-3 is maximum LCC savings. TSL-4 is maximum energy savings with positive LCC and TSL-5 is max tech. So I think, you know, --

MR. deLASKI: Is that right or is it positive NPV? These are two different analyses.

MR. RIVEST: Well, because there's not -- there's such a step function between the LED or no LED, there's no distinction here. There's a big jump between the 1.2 billion down to --

MR. deLASKI: You're saying the same numbers. I'm saying it would be the same numbers.

MR. RIVEST: Yes.

MR. deLASKI: All right. I'll take it offline with you as well. I understand that.

MR. BROOKMAN: Gary.

MR. FERNSTROM: I do this energy efficiency

advocacy for PG&E both here and in California and when I sit in the California Energy Commission workshops, it's a three percent discount rate and so I'd just like to support Andrew's perspective.

MR. WINIARSKI: And, I believe, to add to that, I believe that the results at a three percent discount rate, although I don't present them here, show that TSL-5 is a positive aggregate net present value. I think you still have this same issue, that when you look at individual products, I think those five products may not be cost effective.

MR. BROOKMAN: Mike.

MR. RIVEST: I think TSL-4 is not -- its construction is not affected with the three or the seven percent, but the absolute NPV does change.

MR. WINIARSKI: Right.

MR. BROOKMAN: Okay. Harvey.

MR. SACHS: Again, the boundaries around this model as constructed from a zero decline from 2007 posted prices for LEDs and a zero change in the relative prices for refrigerants. These are just boundaries of the model as posited.

Thank you. Some of us would feel that these are rather critical deviations from the overwhelming likelihood in the marketplace.

MR. BROOKMAN: Charlie.

MR. HON: I mean, over a 12-month period, July to July last year, we saw 78 percent increase in the copper values, things like that. So aluminum was up 34 percent. Those are critical components to us.

MR. SACHS: We agree.

MR. HON: Absolutely.

MR. BROOKMAN: So additional comments on Slide 37 and 38?

(No response.)

MR. BROOKMAN: I think it’s time for lunch. It’s now 12:40.

(Whereupon, at 12:40 p.m., the meeting was recessed for lunch, to reconvene this same day at 1:50 p.m.)

A F T E R N O O N S E S S I O N

1:50 p.m.

MR. BROOKMAN: Dave's up, and he's already posted, you can see here on the screen, the issue.

MR. WINIARSKI: Actually, this is essentially what we had for the Impacts Analysis. There was one more slide. I don't think I'll belabor it too much, but these were the results or some of the results of the National Impact Sensitivity Analysis. Andrew, I think, actually mentioned some of these before.

We looked at both six and a 50 percent LED lighting cost assumptions, a six percent lighting cost assumption, resulted in TSL-5 showing a positive NPV in aggregate, but again for the five equipment classes we mentioned earlier, medium temperature classes. They individually showed negative NPVs under a seven percent discount rate. Again, under a three percent discount rate, that would still be positive NPV at that TSL-5.

I take that back. It would be positive in aggregate. At a 50 percent LED lighting cost reduction, which was consistent with sort of DOE's solid state lighting program estimates, TSL-5 would have resulted in a positive NPV for all the product

classes when taken individually and so DOE again requests more information or comments that can be provided with regard to the LED lighting cost reductions or projections as well as DOE is interested in not just the eventual reduction in LED prices that might occur but when those pricings might occur, if any information could be presented, and again they seek information on sort of what would be the impact of the baseline analysis as LED costs are reduced into the future. How would that affect the assumptions that are used in the baseline analysis and how it could incorporate that in the rule?

MR. SACHS: Harvey Sachs, ACEEE. My sense, and again this may reflect careless reading, is the LED analysis was based on dollars per fixture, is that correct, for LED unit of lighting?

MR. WINIARSKI: The sensitivity studies?

MR. SACHS: Yes.

MR. WINIARSKI: Yes, the sensitivity studies, the six and the 50 percent cost reductions here, really refer to the change in cost of the entire LED lighting system, including the drivers and associated wiring and such.

MR. SACHS: The reason that I ask that --

this is Harvey again -- is that during lunch, the gentleman from Southern California Edison pointed out that concurrent with the decline in cost, which the department has not chosen to incorporate, has been an increase in efficacy, which Mike crudely referred to as lumens per watt. That has implications both for the cost of getting a certain light level as well as for the heat redemption.

MR. WINIARSKI: Let me address that. For clarity, the -- and one of the Navigant folks may be able to correct me or elaborate a little on this, but for clarity, the lighting costs reductions are, I think, in terms of dollars per lumen outputs.

They incorporate both the effect of efficacy improvements as well as sort of the dollars per just the fixture, the driver and stuff.

MR. SACHS: I appreciate that clarification.

MR. BROOKMAN: Aris, yes.

MR. MARANTAN: Aris Marantan, Navigant. The projections that were used in the sensitivity analysis only included the cost reduction projection and so I don't believe that we included the efficacy aspect. It was just the cost for --

MR. WINIARSKI: I see what you're saying. So the costs are, correct me if I'm wrong, the costs

that -- the reduction that's incorporated is effectively the cost to provide the lumens necessary to illuminate the case, but the energy analysis portion does not incorporate a change in the effect -- reduced heat load from those products. I believe that's the case.

MR. BROOKMAN: Gary.

MR. FERNSTROM: Gary Fernstrom, PG&E. Two things are going on here. The cost of LED products and lighting systems, including heat sinks and drivers, is going down, and the watts required to provide acceptable light in the cases is going down, too.

So it's not just the heat load but it's the electrical power demand and the cost.

MR. BROOKMAN: Okay. So several specific questions that are here on Slide 39, some of which we've covered already. The last thing that Dave asked about was kind of the when of this sequencing of this, I guess, if you had any thoughts on how it would turn out.

Harvey.

MR. SACHS: I guess -- Harvey Sachs. I'm going to put this one starkly. I guess, given that the department has been unable to accept the

forecasts of the department on projected LED costs, what would the department do in order to actually include this, not in the sensitivity analysis but in the LCCs and NPVs?

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: Harvey, perhaps it's necessary to differentiate the word "forecast" from "program goals." You know, I don't -- I believe that the better description of DOE's solid state lighting program, the figures that they publish are program goals.

So, you know, now these are meant to be realistic goals, based on, you know, the knowledge of industry experts and also consistent with the history and, you know, red LEDs, for example. So these are not pie in the sky goals, but I do want to highlight that these, you know, are the products of research.

MR. SACHS: I very much appreciate that, Mike, and again this is Harvey. The question still is for those of us who would comment upon the DOE's analyses at this stage and who wish to have the -- some consideration given to the overwhelming likelihood of declining costs for these products, what burden are we facing to have such accepted by

the department?

We've had the unfortunate circumstance of some things that we thought, together with industry, were likely to be accepted and there are a number of things we could do, such as directly contacting manufacturers, seeing how rigorously they're willing to commit. There are lots of things we could try to do, but if there ain't nothing we can do that's going to move the department, then I'd like to know that today.

Now maybe I should be careful about what I'm asking for.

MR. RIVEST: Very generally, Harvey, you know, there's a lot of information that's been presented that you could provide your own assessment of its relevance and if you can identify alternative sources of information that would either support or contradict those forecasts, that would also be helpful, and we do have obviously manufacturers stepping up and, you know, commenting to the docket. I think those are all, you know, things that typically are weighting the decision, but I don't think there's a threshold issue here that we can discuss.

MR. SACHS: I couldn't hear the last point.

MR. BROOKMAN: He didn't think there was a threshold issue here.

MR. RIVEST: Right. I mean, I don't think, you know, there's no definitive answer. You know, there's no definitive piece of evidence that I could even speculate on right now that would be definitive.

MR. BROOKMAN: Andrew, go ahead.

MR. deLASKI: I'll be good cop to Harvey's bad cop.

MR. BROOKMAN: I'll need both your badges.

MR. deLASKI: I don't think the department can sit here today and say if you told me X, then I would do Y. We know you can't say that. So, you know, I don't expect you to answer that question in sort of definitive way.

As the department, I again want to kind of get -- you laid out that this is the critical element of the analysis and I think we made points earlier today that this is going to be coming up with a credible estimate and it's critical that we have the right answer of this rulemaking to meet the statutory criteria and that that answer can't be zero but that it's going to be some -- maybe it's going to be some particular value or some estimate

of values. We'll comment on that in more detail in our written comments.

MR. BROOKMAN: Thank you. Charlie.

MR. HON: I think we need to slow down a little bit because we're focusing so much on one point. The project here is to get the total power requirements of the complete equipment, whether it be the compressor manufacturers giving us more efficient compressors, lighting more efficient.

The objective here is the Department of Energy wants to get the most efficient theoretical unit out there, and I can argue just as vehemently on different types of compressor designs that are in the works right now being considered that don't fit our market at this time. Variable speed scrolls and a lot of other things that should probably have more impact on energy consumption than LED lighting but they're not on the table at this moment because we don't have a good cost estimate as to where they're going to land. They're just a few -- couple years further down the line than what this is.

Isn't the objective to make this as viable as possible? I think that the Department of Energy's done a reasonable estimate here. We know that it's coming down. Do we know the timeline? No, we don't

know that. Do we know the actual efficiencies of these bulbs? Not until they're there. We know that there's been a pattern so far that way, but it may be the law of diminishing returns.

MR. BROOKMAN: Harvey. Harvey, let's let this gentleman speak.

MR. SACHS: Sure.

MR. BROOKMAN: Please state your name for the record.

MR. BOWMAN: Hi. I'm Jeff Bowman from Continental Refrigerators. I was going to hold my comments for the input later but just a couple of things.

I think we've talked about the LEDs and we've talked about light quality and things. We're all expecting the cost of LEDs to come down, but as we get into particularly low temperature applications for LCDs, there's a lot of issues in light quality because the color of the LEDs will degrade because of the temperature applications, too.

So this technology still has to be developed. So it may not just be a sorting issue, it can be other issues because of the application. So I think, you know, these are the type of issues -- these things may not be set in stone for 30 years.

It's going to be reviewed in five years. So I think that's part of the issue I wanted to raise, and the other thing, as Charlie said, you know, there's copper and layered foam. There are issues of new foams that are being regulated and costs are going up on those and also we've got insulation is worse, not better.

I mean, we'd all love to have four-inch insulation in cases and things, but the quality of the foams that we can get now with the price are going down and a lot of the foams aren't even available. So I just wanted to add those, also.

MR. BROOKMAN: Thank you. Harvey.

MR. SACHS: I only wanted to comment on Charlie's point about the compressors and similar technologies which were excluded from the analysis because the relevant ASHRAE and AHRI rating methods, test methods, are steady state and do not allow us to take credit for the benefits of arc load and we would welcome the opportunity to work with you on the next generation of rating methods that would allow us to incorporate these important energy saving technologies.

MR. BROOKMAN: Thank you. So we're about to move on to the next slide. So if you would, look at

these questions here and see if you have any additional thoughts and responses.

Yes, Larry.

MR. HOWINGTON: Well, at least for the last bullet relative to whether we would adopt LED technology for the design of our equipment, we most certainly would. I mean that's what we do, is we try to find innovative solutions to bring energy efficient products to our customers and our customers are receptive to that and, of course, they look at and expect that over a reasonable amount of time, you know, they will see those benefits and just we would love to be able to say in three years, we can economically provide in these five classes of cases which happen to be open medium temp cases LED lighting, but there's not a great amount of evidence right now that we can.

As a matter of fact, as an example, we're shipping LEDs in doored cases for low temp applications every day. We have yet to sell one open medium temp case with LEDs in it. We've given some away but no one's bought one.

MR. BROOKMAN: Okay. Thanks. Dave.

Trial Standard Levels and Manufacturer Impact Analysis

MR. WINIARSKI: All right. So let's see. We've talked about -- forget where I am here. Basically, within the body of that, we've looked at Trial Standard Levels. We actually do an SEC subgroup analysis and in that analysis, DOE tries to identify subgroups that might be impacted in a manner that's different than the general user population for the equipment.

So we asked for -- during the ANOPR, we asked for input on what might be possible subgroups. The one thing that I think came back is that we should be looking at the impacts on small businesses. So what DOE did was to try to do a subgroup analysis or an LCC Analysis that really focuses on the impacts to small businesses.

There are some limitations to that. We tried to use the base framework that was developed in the LCC Analysis. The DOE tried to identify who might be considered small businesses and in this case, we used the Small Business Association definitions, SBA-defined small businesses for supermarkets and grocery stores as largely businesses with less than $25 million in sales, business firms, not individual stores. For specialty stores and convenience stores, -- actually, for convenience stores and

specialty stores, like meat markets and bakeries, that number is -- I think the threshold is 6.5 million.

Okay. It's still a fair amount of sales and what we did is there's Census data out there looking at individual firms that fit within these definitions where they've done surveys and they've looked sort of at the total sales per the firm, the size of the firm in terms of number of employees, and you could go through and identify within these categories of businesses what really gets classified under small businesses.

What you find out is that a lot of firms in all categories, a lot of individual firms in all categories fit the small business definition, but that when you look at the large grocery and the multiline retailers, as a whole, the shipments to those retailers are almost -- you know, by far and away the majority of the shipments to those retailers don't fit into the classification of shipments to small businesses.

When you start looking at convenience stores and small grocery stores, that's not the case, and a large portion of the shipments, I think something like 80 percent of these shipments to convenience

stores, were classified as shipments to small businesses.

So DOE decided to look at convenience stores as sort of a proxy subgroup for small businesses in general. Again two classes of convenience stores were looked at, those with and without gas stations, because of the different electricity prices that were developed for those different business types.

The -- let's see here. The assumptions that are -- were used in the general LCC Analysis to describe those subgroups were largely the same assumptions that were used for the subgroup analysis; i.e., they had the same discount rates that we associated with small business or with the convenience stores. They had the same equipment life that was associated with convenience stores.

We did make one assumption which is that, in general, since we knew we were looking at small businesses, we modified the shipments through the difference distribution channels, such that we assumed that these very small businesses would not have access to national accounts and that their shipments would be equally split between sales from wholesalers and sales through mechanical contractors. Again that results in a higher overall

mark-up for those businesses.

DOE processed that data through the LCC spreadsheet, looking only at those business types. In general, the results were that the life-cycle cost impacts on the fraction of the population of users who would benefit from those standards was at roughly the same level or maybe even slightly higher than those for the general population. I think that's largely the result of some of the assumptions with regard to equipment life, but that was the general result of the subgroup analysis.

So if there's any questions.

(No response.)

MR. WINIARSKI: Aris. I'll pass this on to Aris Marantan who will talk about the Manufacturer Impact portion of the analysis.

MR. MARANTAN: Thank you, Dave. The Manufacturer Impact Analysis is another analysis we conduct for the NOPR phase.

Basically, the purpose of this analysis is to assess the impact of standards on commercial refrigeration equipment manufacturers and to do this, we analyze certain key parameters in the analysis.

We analyze the costs of complying with the

standard. So everything that the manufacturer has to do in order to comply with the standard and the associated costs are included. We analyze things, such as our capital conversion costs, product conversion costs, the costs needed for research and development to comply with standards, and the two things that we have as outputs to the analysis include the cash flow, the industry cash flow analysis and also the industry net present value.

The second purpose for the Manufacturer Impact Analysis is to identify and estimate impacts on manufacturer subgroups. This is separate from the subgroup analysis for the LCC that Dave spoke about previously in that this is just manufacturer subgroups and so we're not talking about the purchaser subgroups which were the convenience stores he mentioned.

The subgroups that we analyzed in this analysis include small manufacturers and the Small Business Administration classifies small manufacturing in this case as a manufacturing company that has 750 employees or less.

So we reached out to those subgroups -- small manufacturers, and we conducted interviews with them as well to find out if they're more severely

impacted then, for example, larger manufacturing companies.

Before one is to examine the impact of cumulative regulatory burdens on the industry, in this analysis we look at such things as manufacturers who produce equipment -- Gary.

MR. FERNSTROM: Gary Fernstrom, PG&E. Could I go back and ask a question about the industry cost impact?

We had some discussions in the meeting earlier about the impact of the increase in the price of components, such as copper and aluminum. So how do you differentiate between the effect of the standard and the effect of changes in costs that are going on in the industry otherwise, apart from the effect of the standard?

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: Well, the cash flow analysis is performed for a base case, just as the energy modeling, and then for standards case. So in the base case, it incorporates the product costs, assuming certain levels of commodity prices, for example, and those are held constant, both in the base case and in the standards case.

So the only thing that changes in the product

cost between the two scenarios is those standards-induced costs which might result in larger heat exchangers, more cost to compressors, things like that. So if you will, those effects of changes in commodity prices are netted out.

MR. FERNSTROM: Okay. Thank you.

MR. MARANTAN: Okay. I think I was on the third bullet here. To examine the impact of cumulative regulatory burdens on the industry.

We looked at several items that fall under this category of cumulative regulatory burden. We asked manufacturers during our interviews, you know, what types of cumulative burdens would they experience and one of them, for example, is if a manufacturer produces several types of equipment, one of them being commercial refrigeration, one of them might be HVAC equipment, well, HVAC equipment might also be subject to standards at the federal level and so we want to analyze any cumulative effects of having to comply with standards for several different products.

Another one, for example, is the ROHS or the Restrictions on Hazardous Substances Directive. It's another example and also for commercial refrigeration, we also analyzed the effect of

complying with refrigerant phase-outs in the industry.

For method, we have two things that we present as an output to this analysis. One is the, as I mentioned, industry cash flow analysis and the other is the industry net present value and these are both analyzed with the Government Regulatory Impact Model.

Next, we also have the interview process that we use to determine the items I mention here.

The next slide shows an illustration of what we do for the Manufacturer Impact Analysis. Phase I is conducted prior to the ANOPR where we analyze the industry in terms of publicly-available data. This can include things such as SEC 10-K reports and annual reports from manufacturers, if they're available, and a complete market and industry analysis.

Phase II and Phase III happen right after the ANOPR where we actually develop a strawman government regulatory impact model, the interview guide which we use during the interview process, and Phase III, as a whole, is conducted right before the NOPR itself and so we've conducted this in the last year. I think we visited manufacturers in 2007 and

so all of this was considered in MIA.

Are there any questions about the Manufacturer Impact Analysis?

(No response.)

MR. MARANTAN: Thank you.

MR. BROOKMAN: All right.

MR. MARANTAN: Yes, Andrew.

MR. deLASKI: So are you going to describe the results from the analysis or are you just describing the process?

MR. MARANTAN: Just describing the -- yes, this is it. We're just describing the process. Our results are in the TSD. I can highlight some of the key issues.

MR. deLASKI: One point I want to raise that caught my eye in reading it. This is a comment, not so much a question to the department or to you. A comment, which is that my understanding of the reading of -- I was going to characterize how I read the NOPR is that you have essentially looking at five TSLs. At the lower TSLs, you run two scenarios for MIA.

One MIA scenario shows a pretty modest impact on manufacturers and the other shows pretty -- a much larger impact on manufacturers and at the lower

levels of the analysis, the lower TSLs, the department says that it tends to think that the lower impacts would occur, but at the higher TSL levels, the ANOPR says that the department tends to think that the higher impacts would occur, and I have looked through the ANOPR to look for why that is and all I can find is because the manufacturers told us so.

Now I know that this is a difficult rulemaking to move through because you haven't had a rulemaking before on this equipment. So you have to go to the manufacturers for information and you have a diversity of manufacturers who I suspect gave you a lot of different answers. I think that when you see a range of impacts like this, that it's incumbent on the department to be able to assess, you know, what are, you know, the reasonable estimates, moving aside from the -- just the data provided to you by a highly-interested party; that is, the regulated industry.

At this point, I think that one of the challenges will be to -- you put down two -- you characterize in this bounds and it strikes me as that those bounds have gone too high and I suspect they've gone high because you're looking at the

worst case scenario laid out to you by the manufacturers of the worst case scenario.

Again, I don't have a lot to go because all it says in the rule is that you interviewed manufacturers and they said they think the impact's going to be this big. So that's just a comment more than it is a question.

MR. BROOKMAN: Mike Rivest.

MR. RIVEST: What would be helpful to receive comment on and that's why we put it very clearly in the TSD and the Notice even is the magnitude of the capital investments that are required to change the production facilities, so the magnitude and the nature of those investments, because they're a key driver as well as the product conversion costs.

So because of the magnitude of the products that need certification, because these products have not been tested in the past, so there's not a lot of knowledge base, you know, the magnitude of the R&D and the product testing costs are very high and they're presented here. So if, you know, we could receive comment on those that would be very helpful.

The other area of significant uncertainty is how consumers will respond to these increases in product costs and to what extent you'll be able to

pass them along in price increases and I know that in the transformer industry, we had, similar to your industry, significant changes in the price of copper and steel and because of the nature of their contracts, which are -- have escalation clauses, you know, the industry was able to recuperate a lot of those increased product costs.

So, you know, we'd be looking for anything on the record, you know, relative to those issues that would allow us to, you know, improve on our estimate or at least close the gap between the lower and higher bounds of expectations.

MR. BROOKMAN: Okay. Thank you. Yes.

MR. deLASKI: Mike, do you have any sources of data for this, other than what the manufacturers tell you?

MR. RIVEST: For -- the capital costs are essentially our estimates. These are not, you know, strictly off of manufacturers --

MR. deLASKI: Am I confusing then capital and conversion costs as two different things?

MR. RIVEST: Those are two different things. One, the product costs, the product conversion costs are the costs of product redesign and testing and certification, whereas the capital conversion costs

would be the costs of new tooling and equipment within the facilities. So, you know, those are not -- these are estimates that we prepare, that we vet, but because we did a design option and we did some reverse engineering on some of the products, we were able to develop some of our own estimates and these are key drivers in the results.

MR. BROOKMAN: Other questions on Phase I, II and III for the Manufacturer Impact Analysis?

MR. AMRANE: One question. I mean, since you are looking through the years down the road, have you looked at the Regulatory Impact Analysis from the manufacturers, have you looked at potential capital rate program on what this would do to the industry, things like that?

MR. MARANTAN: Not as part of the MIA.

MR. RIVEST: No. If you look at the definition of regulatory burden as part of the process, the process rule, it's fairly explicit that the intent was primarily to look at the impact of other federal regulations on this product within the three-year window of the implementation date or the impact of other federal regulations of appliance efficiency standards on other products made by the same manufacturers.

So that type of impact, while it would -- you know, we would certainly gather information and qualitatively prescribe it, it's not something that typically we've taken into account in our analysis.

MR. AMRANE: I know, but we know it's coming, we know it's going to happen, you know, within the next, I don't know, three-four years.

MR. RIVEST: Perhaps to the extent that those would change the product costs, like I know that there was potential regulation on refrigerants, for example. So those would translate into increased prices of refrigerants. I think those would be analogous to the LED forecasts. Is that what you had in mind?

MR. AMRANE: Oh, yes.

MR. RIVEST: All right. I thought you were talking more about global climate change policy.

MR. AMRANE: But that would be impact on a lot of things, not just the equipment. I mean, it would be on electricity, be on --

MR. BROOKMAN: Final comments on this.

(No response.)

MR. BROOKMAN: So then we're moving on to Utility Impact Analysis.

Utility Impact Analysis, Employment Impact Analysis, Environmental Assessment, Regulatory Impact Analysis

MR. WINIARSKI: Okay. DOE, as part of its NOPR Analyses, performs an analysis of the impact of different trial standard levels on utilities, both in terms of energy production by fuel type and in terms of total installed capacity.

It does this using EIA's National Energy Modeling System or NEMS. For this rulemaking, DOE refers to it as NEMS-BT because they actually modify the NEMS model slightly to perform the work.

The output of DOE's analysis are the change in electricity sales and price. The data is actually available by EIA's Census regions, although I think in the rule it's actually shown in terms of national impacts, also in the mix of electrical generation from the different types of generation sources and the change in installs capacity for each of those generation sources.

Basically, the results are shown both in the NOPR and in the TSD. In general, what we see is significant reductions in both coal and nuclear plant installations over time. That makes sense as this is largely a base load for most utilities and

therefore it can be served by these sort of base load plants.

Example of the savings. By 2030, the total reduction in generation capacity is approximately .4 gigawatts for TSL-4. I think, as Andrew, you commented earlier, it's about 50 percent higher, .586 at TSL-5.

DOE, because NEMS-BT model only runs to 2030, DOE extrapolates based on the last five years of the model. DOE extrapolates out what those impacts would be out to 2042 and those results are shown in the Utility Impact Analysis Section.

In addition, DOE performs an analysis on National Employment Impact. Basically, they're trying to report net jobs created or eliminated nationally as a consequence of new standard levels or, in this case, new standard levels at different TSLs.

To be clear here, the employment impacts that are discussed in this section are what we call indirect employment impacts. These are not the employment impacts that are occur for the manufacturers of these products. Those impacts are dealt with in the MIA Section. These are -- in this section, we deal with the impacts on the remainder

of the economy.

To do that, DOE uses a model called ImSET for Impact of Sector Energy Technologies that was developed for the Building Energy Program, I think, originally. It looks at -- I forget. There's a number of sectors of the economy on the order of hundreds that it looks at and then looks at the change in flows, both the first cost and energy costs to each of those sectors and then tries to estimate the impact on the national economy.

What generally happens here is that as you reduce energy expenditures, you free up resources that can be put to other use within the economy and one of those uses is employment. So in this case, what you see is that the analysis predicts that by 2012, when the rule goes in place, there is an initial drop in national employment, that then by 2020 has picked up significantly and then by 2042 there's a corresponding continual increase in the level of employment in the country as a result of those freed-up resources.

Those results are all shown in Chapter 15. I think those, depending on the TSL looked at, I think at the higher end, as much as in 2020, I think 3,000 jobs might be created as a result of the TSL-5,

again not in the manufacturing sector for these products but in the rest of the economy.

MR. deLASKI: Doug, are you going to ask for comments on this?

MR. BROOKMAN: Yes, go right ahead.

MR. deLASKI: So I think I have just a correction, Dave. For TSL-5, it's 5,187 jobs that we estimated. For TSL-4, it's 4,434 jobs.

MR. WINIARSKI: Yeah. I think it's --

MR. deLASKI: You're looking at different years.

MR. WINIARSKI: I'm looking at the year 20 -- I think it's 2020 or 2022.

MR. deLASKI: You're doing it over 10-year increments from 2012.

MR. WINIARSKI: Right, right. Well, if you look at the sheet below that, how those numbers change, basically it's a big jump by 2022 and then a slightly smaller jump as you get out to 2042.

MR. deLASKI: Right. So my comment on this is again an observation more than it is a clarification, which is that, you know, 5,000 jobs is a significant number.

The department -- right above the table in ANORP, it says the following, says, "The net

increase in jobs is so small that it would be imperceptible in the National Labor Statistics and might be offset by other unanticipated effects on employment." This has sort of been a pattern in these rulemakings.

The department does the analysis but then says we don't believe it. So, you know, I don't know quite what to make of this. It's sort of how we've been dealing with jobs for a number of years. I think it's important to keep doing the analysis. The ImSET Model is a recognized model. Input/output models are used to estimate job impacts on the economy and econometric modeling is a recognized field, though imprecise, but it is a valid field and it's appropriate that we're doing the modeling.

You know, many folks up at the other end of Pennsylvania Avenue talk about 5,000 jobs, they'd be pretty happy about that, and if you were to look at all the rulemaking this department's doing right now, the impact is perceptible. Okay. It is perceptible when you talk about the 25 or so standards to be set in the next four years. You're talking probably, you know, numbers that are going to exceed a 100,000 jobs, if not 200,000 jobs, across this whole set of rulemakings that are being

undertaken.

So for the department to do the analysis and just do on the back of your hand, I think this is something that should weigh into your decisionmaking and how you set standards. Jobs are important, you know. It's important in terms of manufacturing sectors, in terms of the indirect impacts, and I just would encourage the department going forward to give this analysis greater weight in its factoring of its decisionmaking.

MR. BROOKMAN: Thank you. Yes, Bruce.

MR. HIERLMEIER: I just had a question. Those are U.S. jobs? Those aren't jobs in China to make the LEDs and India when we move offshore for lower-cost components? I mean that's a fact of life. We've been buying LEDs from other countries. So a lot of those things will be lost as American jobs, not necessarily I don't see gains.

MR. BROOKMAN: Dave, you want to comment on that?

MR. WINIARSKI: I can comment, and I'm by no means an expert on this particular model, but it's an input/output model of the United States economy. So in theory, those are jobs that would be created, I think, within the borders of the United States.

That said, you make some points about very specific industrial changes and the model is at a fairly gross level in terms of it sees flows in the economy of dollars from one sector of the economy to the other occurring but it does not get into the specifics of, you know, yes, those are LEDs and those LEDs are made somewhere else. So it just can't address that.

MR. BROOKMAN: Karim.

MR. AMRANE: Karim Amrane, AHRI. So you said that the jobs creation is outside of the industry. What's the impact on the industry?

MR. WINIARSKI: Those are discussed in the Manufacturer Impact. I don't have those numbers off my head.

MR. BROOKMAN: Could you repeat the question, Karim?

MR. AMRANE: The question is what Dave said about job creation outside of the industry, and I'm asking what's the impact on the industry.

MR. BROOKMAN: So Aris is searching here.

MR. RIVEST: I believe it is in the ANOPR. Here's my understanding of the ImSET Model and how it works. Essentially, we're reducing the amount of expenditures to electricity and generation of

electricity has certain labor intensity associated with it and it's probably a fairly low labor intensity.

So that money, which is no longer spent on electricity, is freed up to be spent on other things and on average, those other things that will hire labor intensity than energy, so that's why we're saying plus jobs. So it recognizes that part of that freed-up investment, freed-up dollars is going to go to China, for example, to purchase LCD screens, but, you know, that's the level of aggregation this model is operating on, whereas when we're looking at the industry impacts, typically in more expensive product, it's more -- it has more labor content than least costly product.

So unless there are decisions about, you know, moving facilities outside of the country, more costly product results in positive industry impacts in terms of job growth. So the hard part in doing these analyses is trying to separate out, you know, job migration to other countries which, you know, very frequently is happening. It's a true ongoing trend but separate out the effect of the standards from the natural or, you know, the market-driven trends and ultimately that's probably what that TSD

says.

MR. BROOKMAN: So in response to Karim's question, Aris.

MR. MARANTAN: Yes, the numbers we have for the employment impacts for the CRE industry themselves at TSL-5, we have 587 production employees in 2012, for TSL-4 it's 231. So it's about a tenth of what Dave stated for --

MR. deLASKI: You mean this is an increase, you're saying?

MR. MARANTAN: Yes.

MR. deLASKI: So you're showing an increase and it's probably an increase that's proportionate to, you know, the price of the product, for example.

MR. BROOKMAN: Tim.

MR. BALLO: Tim Ballo with EarthJustice. Seeing as we've recognized that the direct and indirect employment impacts are both positive, it calls into question something that DOE includes in the NOPR. On Page 5108, DOE concludes that "the proposed commercial refrigeration equipment standards are only likely to produce employment benefits that are sufficient to fully offset any adverse impacts on employment in the commercial refrigeration equipment industry."

You have a benefit and a benefit and you're saying they cancel each other out and that just doesn't make any sense to me. That's just a comment I'd make.

MR. BROOKMAN: Okay.

MR. deLASKI: I do want to comment on something Mike said.

MR. BROOKMAN: Andrew, go ahead.

MR. deLASKI: So my understanding of the ImSET Model at this point is it's a model of the U.S. economy and what Dave said is it's a model of the employment in the U.S. economy.

MR. WINIARSKI: It's an input/output model which includes employment as well as other -- as an output.

MR. deLASKI: But it's U.S. employment, just to clarify this point.

MR. WINIARSKI: My understanding is that it is U.S. employment, yes.

MR. deLASKI: Okay.

MR. BROOKMAN: Thank you, Aris.

MR. WINIARSKI: DOE also does an assessment of the environmental impacts of different TSLs. In this case, the environmental impact is primarily the result of changes in power plant emissions.

So DOE used the results from the Utility Analysis, the modeling of the utility sector with NEMs and those changes in generation by fuel type, to generate -- well, within NEMS, it actually generates the resulting emissions impacts in terms of carbon dioxide, nitrous oxides, and mercury. It also generates impacts on CO2 or SO2. Pardon me.

DOE reports those impacts by TSL for the rule. The SO2 emission changes are actually assumed. Because SO2 has a firm cap nationwide on the allowances, DOE assumes that any reductions that occur due to the standards, effective of the standards on reduced energy consumption are made up. Somebody basically purchases that allowance and they use it to generate allowances that might have -- it continually -- the cap is continually being met within the analysis.

Basically, throughout late 2007 and 2008, regulatory changes with regards to NOX and mercury, we had two rules that were in place or that were set to be in place for those particular emissions. NOX was regulated under the Clean Air Interstate Rule which would have set a cap on the emissions in 28 Eastern states and the Clean Air Mercury Rule which was also in place at the time would have set a

national cap on mercury emissions. Those caps are built into the NEMS-BT Model, both for the AEO 2007 version and for the AEO 2008 version, and so DOE generated emissions -- there were some emissions results that came out of the modeling for those particular pollutants.

DOE reports the results of that modeling and also reports -- well, first, it reports the results of that modeling but it recognizes that there's a large amount of uncertainty in those results due to, you know, these sort of regulatory changes that are happening.

However, once it did report the results that are coming from the modeling, it also monetized the results of the emissions in CO2, nitrous oxides and mercury. For each of those pollutants DOE used a range of costs, based on available literature, and applied that to the changes in emissions to result in sort of a monetized value for the emissions and those were, I believe, discounted back to get sort of a discounted rate that would be consistent with how it looks at other impacts or the other net present value of the equipment.

The ranges for economic values were developed for NOX and mercury based on damage estimates that

were in the literature and the range of costs for CO2 was based on worldwide impact studies that have been done for CO2 and obviously there are some issues with what should be the appropriate number. That is still something that the department is kind of wrestling with, but these are what was reported for the NOPR and so we invite any kind of comment on those.

MR. BROOKMAN: Comments on the Environmental Assessment? Yes, Tim.

MR. BALLO: Tim Ballo with EarthJustice. One question on the model. Does it have a module that would allow you to calculate particulate matter emissions reductions?

MR. WINIARSKI: You know, I can't recall. I don't believe so, but I would have to actually look at some of the reported values for particulates.

MR. BALLO: I know this issue has been raised in prior rulemakings and DOE has asserted that it would be too complex to calculate the impacts on it. I just would like to know if the model used actually would produce some sort of a number.

MR. WINIARSKI: It may, but I would have to actually look at that. I know that there are some issues with particulates in terms of interaction

effects, once they're released what happens, that complicate the analysis.

MR. BALLO: And then a follow-up question. On the figures for NOX and mercury, those, in terms of pollutants, were derived as output from the model under the assumption that CARE would apply, for instance, so that the NOX emissions, those are only for the 22 states that were not part of CARE or that's calculated for the whole country and the CARE emissions, the CARE states were deducted from that?

MR. WINIARSKI: I believe that what we've got in here is essentially assuming that the emissions that were shown in the model did actually apply nationwide but in some cases, they correspond more to the generation of allowance credits that might occur, I think, in the Eastern states.

Now, of course, with CARE being vacated, you know, it's a little hard to say what they would apply to. So, you know, DOE is going to continually look at this issue as it moves into the final rule and see if there's a better way to sort of describe what these emissions impacts might be.

MR. BROOKMAN: Yes, Andrew.

MR. deLASKI: A comment on the carbon evaluations. I made a comment on this in my opening

remarks this morning.

It's important that the department is beginning to put some numbers down and I think we'll comment in our written remarks on what appropriate values should be for this analysis going forward.

But even the analysis published today makes no good sense of why this is important. You look at the numbers and this is on Page 5125 of the NOPR where DOE assumed values of zero to $14, the value at a -- for TSL-4 for a seven percent discount rate is zero to $253 million and a three percent discount rate up to $551 million and at TSL-5, using the $14 value, the high end evaluated for the rule, $368 million, this is real money.

The department -- you know, this is part of the reason why it's been so important for the department to wrap its arms around this issue because this is a significant economic benefit that is deriving from this rule, that up until this NOPR and the NOPR on PTACS, we didn't have this number, any sort of numbers, and as a result of not having numbers, my sense is that it wasn't factored into the analysis in a way that the decisionmaking, in a way that our numbers can help this, can be factored into the decisionmaking.

So thank you for this progress and we'll have other comments to the NOPR on this.

MR. BROOKMAN: Other comments on the Environmental Assessment segment? Karim.

MR. AMRANE: Karim Amrane, AHRI. I guess we believe that DOE has no statutory obligation to account, to monetize the CO2, but if DOE decides to go in that direction, then we need to account for CO2 emission that will result from producing more efficient products, for example, and that we have to account for the additional copper from the mining, from the time we mine the copper until the finished product, and so on.

I think that's -- if we want to go in that direction, we need to do a full analysis of CO2 emissions.

MR. BROOKMAN: Andrew.

MR. deLASKI: I think part of what has come out of this result so far is, you know, the result that these numbers matter and I think we have to -- I think the government can appreciate that with a congressional deadline of December 31st this year, that paralysis by analysis isn't an option at this point in this rulemaking. So we need to move the department. It has an obligation to get the

standard done and, you know, we can -- we need to -- I think one of the things incumbent on us is to show, you know, if we start analyzing additional elements, does it matter, and I think to say we analyze everything all the time isn't really going to get us very far, but it does show that there's changes that need to be analyzed that actually would help us get to an answer that helps achieve the obligations and then we'll support seeing what those pieces might be.

MR. BROOKMAN: Harvey.

MR. SACHS: Harvey Sachs, ACEEE. I guess, Karim, what you're asking for is the impact of the incremental amount of metal and you would, of course, be wanting to consider that in the context of the large-scale recycling so that we're not working from the opposite side of large fractions of these metals. We're not working from the ore.

MR. AMRANE: No.

MR. SACHS: And we have as a rough guideline, not from this class of equipment or equipment in general, for buildings and the equipment in them and everything associated with them the energy use during the operating life of roughly 85 percent or so of the total energy involved over the total life

cycle, so that just with the points I think we're creating upon the incremental energy of a largely-recycled metals stock is likely to be very small swing at this analysis relative to some of this.

MR. BROOKMAN: Charlie.

MR. HON: When we started looking at total impact on the environment, the biggest impact on the environment was welding agents and refrigerants. You can discount everything else when you start running the numbers.

When you have GWPs at 1,300, 1,500, 3,800, you're talking impacts that are astronomically higher than other impacts that we face. That's where our true focus is.

MR. SACHS: Thank you. Thank you very much.

MR. BROOKMAN: Okay. Dave.

MR. WINIARSKI: DOE also performs what we call a Regulatory Impact Analysis. The term, I think, is a bit misleading but it's what the department has used for years now and in effect what we're looking at here are really regulatory alternatives to the rule and the impacts of -- as best we can guess of what those alternatives might be.

For -- there's a number of things DOE could

look at in the rule. DOE actually looked at effectively the first three. I see it's shown up here as the first four, but primarily it looked at, you know, what's the impact, you know, what's the world going to look like with no new regulatory action, what might be the world look like if there were some sort of national rebate program for the high-efficiency equipment.

It based its assessment there on looking at existing rebate programs for utilities. What -- essentially if you think about what a rebate program is, it's a money transfer. You're taking money from somebody that's a utility program or a national program paying into a pot of money and transferring that to purchasers of the equipment. It's the same total amount of money for the equipment that's being purchased but it incentivizes the purchaser of the equipment maybe to look at buying more efficient products.

Similarly, DOE looked at customer tax credits that might be available for the purchase of higher-efficiency equipment in line with some of the tax credits that have been used for other products and that were in the Energy Policy Act of 2005.

The process to look at those is to make some

assessment on what would be the values in terms of rebates or tax credits that might be applied to equipment at higher efficiency levels and then to use those to look at how it might influence customer purchase decisions. Again because we used an econometric model to developed assessments of customer purchase decisions, that was a fairly straightforward process. We reduce the cost of higher-efficiency equipment compared to lower-efficiency equipment and you move some of the market to make that purchase for the higher-efficiency equipment.

It looked at those impacts on shipments by efficiency level and then ran that through the National Energy Savings Model.

DOE reports those results in Chapter 17 of the TSD in detail. What it came up with, it reports in a number of different ways, but typically our assessment of customer rates resulted in on the order of .1 quads of energy savings in general for all product categories. Tax credits provided similar levels of potential energy savings.

There's actually -- in the TSD -- in the NOPR, we talk about setting tax credits at five percent of the purchase cost for certain classes of

equipment at TSL-3. DOE also did an analysis at TSL-5 and 10 percent of the purchase cost and there's some discussion in the TSD as to why those five and 10 percent levels were arrived at, 10 percent tax credits were arrived at, but in general, the savings was on the order of less than a tenth of a quad from those programs as opposed to nearly a factor of about a .8 quads for the proposed TSL-4 level.

Okay. With that, that concludes essentially DOE's discussion of the Impact Analyses. I'm going to come back to this slide here which talks about the issues, particular issues which DOE has identified and seeks comment. We're looking at comments and stakeholder input on LED costs. Obviously we've talked about that and base case trends and efficiency that DOE could use to improve the analysis, the operating temperature ranges, the use of the offset factors that were new in the ANOPR rulemaking, the extension of the Engineering Analysis results to the secondary or 23 secondary equipment classes.

We've already talked a little about inputs on hybrid cases and wedges, and also just general input on how DOE should consider TSL-5 based on the results of its analysis.

MR. BROOKMAN: Charles.

MR. LLENZA: Charles Llenza, Department of Energy. Also to that list, we'll add the consideration of NSF-7, Type 1 and Type 2 cases in the analysis. We want some comments on that specifically.

MR. BROOKMAN: So as you look at this listing there on Slide 48 that Dave just went through, if there are any additional and final comments, my own sense of it is we've at least taken a first good shot at all of them, I think, already, but if there are additional comments now would be the time to have them.

Yes, Andrew.

MR. deLASKI: Charles, could you just repeat your last point, please?

MR. LLENZA: Yes. Well, we wanted to add to that list a Number 8 item, which is what we found out today about the consideration of NSF's 7, Type 1 versus Type 2 cases in the analysis, and we're going to -- we'd like to have more information on that and whatever is available.

MR. BROOKMAN: So additional comments on that?

(No response.)

MR. BROOKMAN: Okay. So I want to provide another opportunity for anybody that wishes to do so to make final comments, to emphasize a point or two, to summarize their thought processes after this day of discussion.

(No response.)

MR. BROOKMAN: No other issues to be raised at this time?

(No response.)

MR. BROOKMAN: I'll turn it back to Charles.

MR. LLENZA: Okay. Well, I appreciate you all coming to the meeting today. This concludes our session. This final slide here is again how to submit your comments back to the department. A reminder. It's October 24th is the deadline for the submittal of comments in either written form or via e-mail or electronic.

So that concludes our session today. Thank you for coming in.

(Whereupon, at 3 o'clock p.m., the meeting was concluded.)

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before:

UNITED STATES DEPARTMENT OF ENERGY

In the Matter of:

PUBLIC MEETING ON ENERGY CONSERVATION STANDARDS FOR COMMERCIAL REFRIGERATION EQUIPMENT

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: September 29, 2008