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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of,	)	
	)	
2011 Rulemaking on Appliance	)	Docket No. 09-AAER-2
Efficiency Regulations,	)	
California Code of Regulations,	)	
Title 20, Sections 1601 through 1608	)	

Efficiency Committee Workshop on 2011 Rulemaking Proceedings Phase II on Appliance Efficiency Regulations

CALIFORNIA ENERGY COMMISSION
HEARING ROOM B
1516 NINTH STREET
SACRAMENTO, CALIFORNIA

THURSDAY, MAY 19, 2011
10:00 A.M.

Commissioner Karen Douglas, Presiding Member

Reported by:
Michael Connolly

STAFF

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Dennis Beck, Jr., Senior Staff Counsel
Ken Rider, Appliances and Process Energy Office

ALSO PRESENT (* Via WebEx)

Andrew Vourlos, Underwriters Laboratory *
Suzanne Foster Porter, ECOS
Christopher Paul, Motorola Solutions
Dan Jakl, Motorola Solutions
Larry Albert, Stanley Black & Decker *
Pierre Delforge, NRDC
Gary Fernstrom, PG&E
Rick Habben, Wahl Clipper Corporation
Ric Erdheim, Philips Electronics
Jennifer Cleary, AHAM
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Mark Sharp, Panasonic
Jeff Hailey, Dell *
Katt Fretwell, Tektronix *

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P R O C E E D I N G S

MAY 19, 2011 10:08 A.M.

MR. LEAON: I think we are about ready to get started here. I apologize for the delay. For the record, my name is Michael Leaon, Manager of the Appliance and Process Energy Office here at the California Energy Commission. Welcome to the Efficiency Committee Workshop. Today we will be discussing proposed changes to the battery charger regulations, the draft regulations that were released at a March 3rd workshop. And this morning I will have a brief introductory presentation. Then I will be turning it over to Commissioner Karen Douglas for some opening remarks.

First, left me begin with some housekeeping announcements. Outside the double doors here to your right there are restrooms. When you leave the building make sure you leave through the main exit on the Ninth Street side. At the side exit the alarm will sound if you use that exit. There is a cafeteria on the second floor. If you go out the doors to your left and up the stairs and directly to your left under the white awning there is a cafeteria. There are restaurants nearby, straight down O Street at 11th and O there is a Mexican restaurant and there is a cafeteria in the Secretary of State office, also at 11th and O.

Regarding protocol for today, we do ask that if you want to speak that you fill out a blue card. We will provide those to you and we would ask that you bring those up to the table where the Commissioner is sitting and she will call on speakers throughout the workshop today. Also if you can provide a business card for the court reporter if you are going to make remarks during the workshop.

Okay, with that I would like to turn it over to Commissioner Karen Douglas for opening remarks.

COMMISSIONER DOUGLAS: Thank you. I am Commissioner Karen Douglas. I'm the presiding member of the Efficiency Committee. And I would like to welcome all of you to this committee workshop on the Energy Commission's proposed Title 20 standards for battery chargers. These standards when they are fully in effect as proposed would save 2100 gigawatt hours per year and nearly $300 million per year for California ratepayers. California has traditionally been a leader in setting appliance standards and we have the opportunity to do so again in setting the bar for battery chargers. And at the same time, as many stakeholders who have been engaged in other processes before the commission know, we want to hear from stakeholders. We have an open process, we will listen to you and work with you in terms of making sure that what we propose will work. And so we wanted to have – I want to have this workshop in

order to give stakeholders an opportunity to speak to the committee. And also to vet some proposed changes to the standards that we put forward recently with the notice for this workshop.

This is the third workshop on battery charger standards, although it's the first committee workshop. We held a workshop on October 11th to begin taking comments on the IOUs Codes and Standards Enhancement study. And then after receiving input, energy commission staff conducted additional analysis and developed a proposal, which was the subject of a second workshop on March 3, 2011. We put forward several proposed changes to the proposed regulations in response to industry concerns, including extending the compliance date for non-consumer chargers.

Today's committee workshop is being held to make sure that all stakeholders have an opportunity to speak to the committee about your views on the entire battery charger standards package and also on the changes that we have put forward in this iteration. So with that I would like to ask Mike Leaon to make a brief presentation and then we will get going with the presentations.

MR. LEAON: Thank you, Commissioner Douglas. And I will be very brief. Again, if we could toggle through to the next line. Commissioner Douglas already provided a nice summary of where we are at in the process. I do want to

emphasize that we are still in a pre-rulemaking phase for this proceeding. Next slide, please.

Again, why are we pursuing standards for battery chargers? In the near term they offer the greatest potential for statewide energy savings. Other devices that we are contemplating in future rulemaking cycles for standards won't achieve as much savings as the battery chargers could achieve. So we think this is an important product that we achieve savings under. Next slide, please.

And you have seen this slide before. What we are trying to accomplish through these standards is to reduce the amount of energy that is being wasted after batteries have been fully recharged. Our objective is to try and reduce that amount of wasted energy by up to 40 percent, which we think is a very measured approach under the proposed standards. Next slide, please.

Regarding the agenda for today, we do have some presentations scheduled for this morning. We will hear from UL labs in regard to their program. We will also have a staff presentation that will summarize the changes to the standards from the March 3rd workshop. So Ken Rider will be walking us through all of those changes. We will also have a utility presentation. After lunch we will have open discussion. We do have requests from Motorola for a presentation. So whether that happens after lunch or before

lunch, I think, depends on how far we get this morning with the other presentations. We would like to ask that we hold questions until we get to the open discussion part of the workshop. We would like to get through all of the prepared presentations before we get into specific questions. Next slide, please.

Again, the purpose of the workshop is to take your comments today on the changes that we've made to the standards that were released last March. I know staff has been working very diligently with stakeholders to address stakeholder concerns about those standards and I think they've made significant progress. And I think these changes hopefully will have addressed the main concerns. I understand there are still some outstanding concerns and we certainly want to hear from stakeholders about the concerns that you still have in regard to the standards. Again, the scope today, we're focused just on the battery chargers. This rulemaking does include moving lighting control standards into Title 20. We haven't received any comment on that so we won't be addressing that portion of the rulemaking in today's workshop. Next slide, Ken.

As far as next steps, after the committee workshop today we will review all of the written comments we receive, we will review the testimony that's offered today, we will consider what additional changes we need to make to the

standards. And based on those changes at that point we will go back to the Efficiency Committee and ask for their direction on whether to begin the formal rulemaking phase under this proceeding. I think schedule-wise we are probably looking at the end of June to notice the formal 45 day review period for the proposed permanent regulations. And that concludes my introductory presentation.

I think our next presenter is UL.

MR. VOURLOS: Hi, everyone. I'm calling in from New York at our Underwriters Laboratory Melville location on Long Island. My name is Andrew Vourlos and I am with UL for now a little over eighteen years, just to give you a little bit of background on me. For the last thirteen of these years I've managed a few programs here, our anti-counterfeiting program. In 2010 I helped launch our new energy efficiency certification program. And recently I just became the Quality Manager for one of UL's business units called Verification Services. And that's what the VS is in my title.

I was asked by the California Energy Commission to just give a brief overview for those on the call and in the workshop that maybe weren't too familiar with Underwriters Laboratories, what we are about and what we do. So I just prepared a few slides today to walk everyone through it. So I'm not sure, whoever is running the slides if they can

click it to the next one that would be great. Thank you, my friend.

I'm just going to go over a few things today, what UL is in general. What we've been doing in the space of energy efficiency, there have been some questions that have come up about how UL when it certifies a product how does it maintain a certification of a product, whether it's for product safety or energy efficiency. And the last item I was going to talk a little bit about was laboratory accreditation, in particular what we've been doing with our labs in energy efficiency. I put a Q&A slide up but I know there will be Q&A at the open discussion, so we will probably just pass over that. Okay, next slide. Thank you so much.

Some of you probably already know but for those that don't, UL is a not-for-profit product safety testing company that was started in 1894. And our predominant business has been to certify products to safety standards, most of which we actually write ourselves. The way the process actually works is that samples of a product that represent what the manufacturer is going to ultimately want certified by UL are submitted to UL for evaluation. And if we determine that the product meets all the requirements of the standard that it's being submitted against we will actually certify that product and cover it in our certifications database.

If a product meets all the requirements that we've evaluated it to then we would authorize the use of a UL mark on the product and we would also, if the program permitted, issue a certificate that informs the client that the product is now covered by UL. The testing and evaluation of samples can either be done in our own laboratories, they can be done in third party laboratories, or we can actually do them at a manufacturer's laboratory under a data acceptance programs, which I will touch on after. Product certification can remain in effect as long as the product continues to comply with the requirements it was evaluated to. If those requirements, of course, change then in order for that product to maintain its certification we would have to re-evaluate it. If a manufacturer happens to make changes to a product that has already been covered by us then part of the agreement with UL and its manufacturers is that we need to evaluate that change before we can permit the certification to continue. Now, most of this has been centered around product safety but in the last few years now, especially with the revamp of the Energy Star Program, we are now offering certifications for energy efficiency to the Energy Star Program. Okay, next side, Ken.

We have actually been in the energy efficiency testing business for a number of years now, actually over a decade. Our program start when our good neighbor to the

north, Natural Resources Canada, had introduced its own energy efficiency regulations whereby they required third party certification of any product category that they regulated for energy efficiency. And, of course, in the US there is the Department of Energy Electric Motor Program, which allows for third party certification of electric motors to DOE efficiency requirements in addition to also being able to test electric motors and a lab that maintains Navlab accreditation. Also some of our laboratories in the US and abroad, for California's purposes, will register with the California Energy Commission when our customers ask us if we will test their product for efficiency so they could submit their report to California and be able to sell their products there.

Last year actually UL embarked on a new approach to energy efficiency certification. Historically in the first bullet I reference the EVS program. And that was our energy efficiency program for a select number of product categories, predominantly categories regulated by Natural Resources Canada. And that program tied product safety testing by UL to an energy efficiency evaluation. In 2010 we embarked on a new certification program that was predominantly driven by the requirements of the Energy Star Program, which went to a third party model. And in the EEC program we've opened up our evaluation capability to a host

of other product categories, most of which you can all find on the Energy Star website. And in doing so part of that program entails that we will provide certification services just for the energy efficiency portion. The product itself we don't necessarily have to evaluate for safety. And UL laboratories with specific energy efficiency testing capabilities are accredited to conduct the test message referenced by the Energy Star Program requirements. The Energy Star Program requirements, for those who maybe are now aware, require both the laboratory to be accredited and the certification body to be accredited. So we had to make an assessment of all our laboratories and determine which labs will do which type of testing for energy efficiency on products and then have all of their existing accreditation scopes expanded to include the energy efficiency test methods required by, for example, an Energy Star Program for battery chargers. Okay, Ken.

I wanted to just touch briefly on how does UL maintain the certifications that it grants? Well, basically there are three mechanisms. Factory inspections, also called Follow-Up Services or FUS for short, is where UL inspection representatives will actually visit a manufacturing location that is producing a product that we have certified. They are required to go into these factories at a minimum of once per quarter. And what they

will do is take a product off a production line that we have certified and they will compare the construction of that product to the report that we wrote for that product. And the report is – think of it as a description of all the items that make up that product's construction, including dimensions, materials and components. Any deviations from the authorized construction the UL representative would write up on a factory inspection report and he would turn that in to UL and we would evaluate the changes to the product and determine whether or not it still complies, if it doesn't comply, if it needs retesting. And then we work wit the manufacturer to make sure that the product is brought into compliance. The second item, market surveillance or verification testing, is where UL actually will go out into the market where the products are sold and actually purchase them and retest them. And the third thing is a file review, where UL re-evaluates products it has already certified when a standard that was used as the basis to evaluate that product has changed.

Now, I footnoted each of these items because for the first one, in factory inspections, that's the compliance mechanism we use for certifying products for product safety. It's very specific inspections that involve actually looking at all the components and construction features that make up that product from when it was originally evaluated. The

second item, verification testing, that is used for energy efficiency certifications whereby you don't actually have a descriptive report of all the details and ins and outs of how the product is made. The original certification report was based on testing to the standard or regulation for efficiency for that type of product. And what we will do is go out into the marketplace and buy that product and retest it in the same way. And the third item, file reviews, is actually used in both circumstances. When we are doing certification work, if it's for product safety more than likely it's to a UL safety standard.

And from time to time UL safety standards change. They change because new requirements may be introduced to a standard based on new technology or industry concerns that the UL holds standards technical panel meetings and decides what the new requirements will be with plenty of stakeholder input. And at some point when the new requirements are agreed upon we will put in an effective date. And then all products that are certified to the previous version of that standard would have to be re-evaluated in order to continue their certification. Up until the effective date of the change they can continue to mark the product with the UL mark but once the effective date for the change goes into effect, if a product no longer meets the current requirements then it would be decertified or delisted. And

the same would hold true with verification testing. If it's a standard or regulation, say an energy efficiency regulation, that's going to change and we have certified it to the previous specification then by the time the new specification goes into effect that product will either have to have been retested to know it complies with the new regulation or it will be delisted. Okay, Ken. Thanks, my friend.

I mentioned a little bit about laboratory accreditation earlier. UL's laboratories for the most part are all accredited to do some type of testing, whether it be product safety testing or energy efficiency testing or electromagnetic compatibility testing if the need is there. For energy efficiency the labs that we are doing energy efficiency testing work in all have to be accredited.

MR. RIDER: Andrew, could you step a little closer to your microphone or speak a little more directly into it. We are starting to lose your voice a little bit in here.

MR. VOURLOS: I've got it right to my head.

MR. RIDER: Great, that sounds much better.

MR. VOURLOS: Okay. For the laboratories that we've got covered for energy efficiency the requirements that they've been accredited to are predominantly for the Energy Star Program requirements. So if there are any standards that are referenced by Energy Star Program requirements,

let's say for battery chargers or computers or light fixtures, we're getting our laboratories' scopes updated to include all of the test methods covered by those programs. In particular, for battery chargers – since that is the topic of this workshop today – we have currently three laboratories that accredited to do the Energy Star testing for battery chargers and that is our lab in Germany which just recently became accredited to do that testing; our office in Japan, which got accredited last year; and our San Jose office, which was actually the first UL office to get accredited to do high tech products, battery chargers being just one of many product categories they've got covered.

I threw in a brief bullet on lighting controls but, as Michael says, is not going to be covered in this workshop.

And the last thing I wanted to bring up about laboratory accreditation is data acceptance. And although it's not accreditation, what data acceptance means in the world of UL or likely any third party certification body is when the certification body will go out to a manufacturer's laboratory and actually assess their capability to do testing to the requirements that they are looking to have their product certified to. It's like accreditation but it's not because UL is not an accreditation body. But what we do use is ISO 17025, which is the international standard

for testing and calibration laboratories. And we will take elements from 17025 and apply them directly to a manufacturer's lab. Provided the laboratory meets those requirements we can then enroll them in what is called a Data Acceptance Program. It usually makes things easier for a manufacturer because now we basically said we are confident that you can do the type of testing and produce the results that are going to show that the product complies with our requirements, or in the case of energy efficiency requirements set by a government regulatory body.

At that point we enroll these manufacturers in our DAP program, they will get audited every couple of years to make sure that they are continuing to comply with the requirements that we have said they need to, same as UL with its own accreditation bodies. When an accreditor comes to a UL lab he is performing basically the same thing, a little more strict because it's actually a formal accreditation. But they are holding us accountable for our compliance with our labs to ISO 17025. So in this case here we can have a manufacturer's product tested in either location, it can be in a UL lab or if the circumstances allow it could be in a manufacturer's lab. And then we would review their data when the submit a product to us for certification.

Okay, Ken, I think that was actually my wrap-up. So I guess questions will come at the end per Mike's

instructions. But I wanted to again thank everyone for allowing me the time here and the CEC to allow me some time here to just explain a little bit about what UL does in the world of certification and, in particular, energy efficiency. Thanks very much, Ken.

MR. RIDER: Thank you, Andrew.

So I think we are going to go on and move on to my presentation. Bear with me, I've never had to hold a mic and give a presentation at the same time. So if I get too quiet, shout at me or something. I'm going to be presenting the changes to the express terms that were noticed and a few others.

So, a brief history of how we got to where we are today. The proposal started out in a IOU CASE study. CASE stands for Codes and Standards Enhancement. That was back on October 11, 2010. And the staff released a report and kind of took the CASE study and put it in Title 20 language. That was released February 22nd and we had a workshop on that on March 3rd. And since then we have had a number of phone calls, meetings with stakeholders to work on issues that they have brought up in comment letters and in workshops to try to see if we could come up with language that can address the issues and still get the energy savings that we are interested in. And the most recent proposal was released on May 10th and that is what we will be talking

about today.

So first I would like to talk about the changes to the scope. The proposed regulations removed battery analyzers from the scope. That's because we felt that battery analyzers weren't used repeatedly to recharge the same battery, it's really to condition a battery one time or to test a battery. So we removed those from the scope. We removed illuminated exit signs but we are still keeping other emergency lighting other than illuminated exit signs. We have removed high input voltage products. That means products that would be hooked into like transmission lines or something other than a typical wall plug like 115 volts at 60 Hertz, because we didn't have a good grip on what those products were or what the feasibility of the standards was for those products.

We are also proposing – this isn't in the proposed regulations we released on the web, but after some discussions with industry we found out that electric toothbrushes were considered medical devices under the FDA and we have an exemption for FDA-approved medical devices. So to handle that we propose to exempt Class II and Class III medical devices and not Class I. And the distinction there is – and I pulled this definition directly from the FDA regulations – is a Class I medical device is one that is not life-supporting or life-sustaining or for a use which is

of substantial importance in preventing impairment of human health. So basically these are battery chargers that aren't going to result in death or...(unintelligible – wireless microphone is very noisy).

We have also added a few definitions. Basically when we say we are taking battery analyzers out of the scope we need to define what a battery analyzer is. And we have added definitions of terms throughout the standards just to add clarity so people can understand exactly what we are talking about.

There were several changes to the test procedure. The first thing I want to talk about is actually not a change that we made in the proposed regulations but one that we will certainly talk about today and I wanted to have as a topic of feedbacks. And that is, there is an issue – basically, battery chargers are many times just one part of a product and products can be a battery charger in a (unintelligible) and they are together. And we are covering that under the battery charger rulemaking. An issue that has been brought up in comments is, well, how do we get to the battery charger efficiency when there are additional features? And the test procedure already partially addresses this. It says that you should turn off all features other than the battery if they aren't related to battery charging during testing.

But the industry has claimed that there are some features which it just doesn’t make sense to have a switch for, for the consumer. And so part of what we want to talk about today is what are those features and should we address that by adding allowances, should we address it by altering the test procedure, or should we just continue on with the regulations as they are?

We have also altered the test procedure for large battery chargers. The original proposal had the large battery chargers tested several times under many different conditions. We felt that it made sense to just test the battery chargers in the worst case scenario and therefore if the charger met it in the worst case scenario it would meet it in all the remaining scenarios. And we did this primarily to reduce testing cost. We have also added updates to the safety language. The test procedure already includes a lot of good language on safety circuitry related to the charging of the battery. We have added a little bit of language discussing safety related to the discharge of the battery. Some products have safety circuitry for when you discharge the battery and we wanted to make sure that wasn’t removed during testing.

One thing that manufacturers brought up is that the battery charger test procedure contains specific battery voltages by battery chemistry. And industry brought up that

there are specialized batteries that have alternate battery voltages than the specified voltages. So the new proposal allows manufacturers to test batteries with the rated voltage of the battery manufacturer. So lithium ion might be 0.7 volts per cell, maybe there is one out there that is 0.9 volts per cell. And if that's the way it is, that's how it should be tested.

And we also added a requirement so that single phase battery chargers only need to be tested at 115 volts at 60 Hertz. The proposed battery charger test procedure is intended to be an international test procedure and therefore it has provisions to test to European transmission. We didn't feel that was necessary for testing in the United States. So to reduce test burden we are specifying that you only need test a single phase battery charger to the transmission of California and the United States.

We have also specified that single port battery chargers are required currently under the test procedure to test with associated batteries that are the highest capacity and the lowest capacity. However, reporting to the Energy Commission we are only going to want a single number reported. So we are proposing to report the highest maintenance, no battery, and 24-hour charge energy from those two tests.

We have changed the approach to multi-port chargers

fairly significantly. The test procedure has the multi-port chargers tested three times. We are proposing that it change that to one test with batteries in each of the ports. So if you have a four-port charger you would test it with all four ports filled with a battery. In addition, we have changed the approach of the regulations for multi-port chargers by treating them as a series of single-port chargers with increased power and energy allowances that are proportional to the number of ports. So a four-port charger is treated similar to four single-port chargers.

In addition, we have made some slight changes to the inductive charger proposal. It's the same in spirit as it was before. The concept is that an inductive charger never draws more than 1 watt in charge on average in charge maintenance and no battery mode. I also would like to point out that industry – well, industry has pointed out to me as well, as you see here this 24 watt-hours. The concept we put in the proposed regulations is that an inductive charger during the 24-hour test must use 24 watt-hours or less. And that is 1 watt over 24 hours, it's pretty straightforward. But industry has pointed out that sometimes it can take over 24 hours to charge an inductive charger. So we have proposed to change this so it is 1 watt per number of hours of the test.

Large charger standards, we have dropped Tier 1 of

the large charger standards. The concept now is that you have an additional year of not being regulated but then we go straight to Tier 2. So we don't lose any time getting to the Tier 2 savings but we drop the Tier 1. And in addition we have reduced the power factor requirements for large charger standards to 0.9 from 0.95.

Also with large charger standards, we altered the maintenance mode power to 20 watts from 10 watts in the released proposed language. We are also considering a scaling factor similar to what we have done with small battery chargers that would give a maintenance mode that is proportional to the size of the battery. And the equation we are thinking about is 10 + 0.0012 times the capacity of the battery. And the basis for that is we are replacing 2.5 percent of the battery energy at about 85 percent efficiency.

We have also altered the small charger standards. We have dropped power factor requirements altogether for small battery chargers. This harmonizes with the DOE because they are not considering power factor requirements. And therefore we won't have a requirement for the CEC that will then disappear when the DOE does their battery charger rulemaking and finalizes that. We added the scaling factor that we discussed in the March 3rd workshop. We proposed it then but it wasn't in the language and now we have added it

into the language.

We have also combined the maintenance mode and no-battery mode power requirements. And what this does is it allows for tradeoffs between the two. So before you had a fixed no-battery target of 0.3 and a fixed maintenance mode power requirement of 0.5. Now it's an overall target of the two added together. So that gives manufacturers design flexibility. If they are close on one end and a little bit better on the other they will comply and they can tradeoff between the two. It also better aligns with the DOE's single metric proposal. We are going from four metrics down to two metrics.

The new proposal also extends the compliance date for non-consumer battery chargers by one year. So instead of July 1, 2012 it would be July 1, 2013. And this is primarily because we felt that non-consumer battery chargers have longer design cycles, they are extremely specialized and they are low volume and we felt that those things justified the extension.

We have also proposed new 24-hour efficiency equations for larger battery capacities. These are things like golf carts. What this does is it improves the discontinuity between the large and small chargers. The former proposal had a jump in efficiency as it moved from a golf cart to a forklift. This kind of smoothes out that

boundary. In addition, when we looked at the DOE TSD we found that our regulation for small chargers of the golf cart size was worse than their baseline analysis. And so we have moved it. So now it is better aligned with the DOE analysis. We have proposed something that is between their "improved" golf cart and their "best in market" golf cart. In addition, I would like to bring up that the industry is interested in pursuing, like we are proposing here for large chargers, perhaps a slightly different approach to very, very small chargers. So we might consider something at the other end of the fringe of regulations as well for 24-hour energy charge.

A pretty significant change is that we are now proposing to require certification. We weren't in the past. We stated in the last workshop that we were not going to require certification. So this is typical of the majority of products that we regulate, we require certification, which is essentially just sending in the test result data that you have gathered when you test your products to confirm compliance.

We have also added special certification rules for large battery chargers. That is because the large battery test procedure is significantly more complex than the small battery charger test procedure. And to avoid some of the initial burden of testing a large number of existing

products to this very complex test procedure we are going to allow group certifications for large battery chargers for a short period of time. And then in the future for new products, they will need to be individually tested and certified. And the determination of a group, the language we released that groups were based on battery capacity, we are also considering basing that on technology such as SCR, high frequency charger and the maximum rated voltage of the large charger.

We have also made small changes to the labeling requirements. Here is an example, the circled BC is what we are applying at the moment. We are also considering the use of an additional I, II, III or IV mark that will follow that BC and that would indicate some predetermined level. And I believe the NRDC will speak on that later. And we also in our discussions with industry decided to allow labels on packaging for products with very small nameplates where the circled BC would be hard to fit. And so instead of putting it on the products, you would put it on the product packaging.

So I wanted to briefly go over the comment process. Comments are due May 31st, the last day of this month. You need to send both a hard copy to the dockets and a digital copy. And this is the address for the docket and this is the email for the docket. You should include the docket

number, which is 09-AAER-2. And it also helps if you cc: either myself or Harinder. And my email is at the beginning of this presentation. It just helps it get onto our website faster. We will be sharing all the comments that we get in the docket online. And so if you cc: us we can make sure that gets up there as soon as possible. And that concludes my presentation.

COMMISSIONER DOUGLAS: While we are holding questions until lunch, I guess I just wanted to ask one question. You have talked, Ken, about how these changes more nearly align what we would be proposing with the DOE proposals that we are expecting to see in some period of time. I wanted to ask if you have any more information that you can share with the stakeholders about where DOE is in its process and it timing.

MR. RIDER: Well, sure. The DOE has not released any formal proposed rule. They released their preliminary analysis. They were scheduled to release that proposed language a few months ago. They are obviously delayed and we will probably see that in the future, in a few months. But as of now it’s kind of an unknown.

MR. BECK: Commissioner, this is Dennis Beck from the Chief Counsel’s Office of the Energy Commission. I can just give you some more information about the DOE process and how that is kind of fit into what we are doing here.

When we were here in March for the last workshop I think there were a number of stakeholders who were under the impression that DOE would be meeting its statutory deadline to issue a final rule for standards for battery chargers and external power supplies by July 1, 2011. We anticipated that the final rule of the test procedure for battery chargers would come out in a short period of time the notice of proposed rulemaking would be issued shortly thereafter. Of course, now it is May 19th and DOE has not issued the final rule for the test procedure, which we understand would precede the issuing of the NOPR for the standard. And obviously they have not issued the NOPR.

By statute DOE is required to give commenters a 60-day period after the publication of the NOPR in the *Federal Register* before they can take action. And then further there is a statutory requirement that DOE have a 90-day period in between the time that the NOPR is published in the *Federal Register* - that the final rule it published in the *Federal Register,* I should say. So at this point we believe that it's legally impossible for DOE to meet its July 1, 2011 deadline for issuing a final rule on battery chargers. We have some indication that the docket in the test procedure rulemaking is going to remain open perhaps to the end of this month, which means that the test procedure final rule would not even come out until June.

So I think people were under the understanding that DOE would be issuing something in July with a federal standard for consumer products becoming effective sometime perhaps in the middle of 2013. So now that we know that DOE is substantially delayed in their process, the window of opportunity for, one, a California consumer standard for battery chargers would have a longer shelf life and therefore accrue greater benefits to energy savings and monetary savings to Californians; but it also puts us in a unique opportunity to be able to influence the DOE rule if we are able to publish language in advance even of the publication of the NOPR and certainly before a final rule is published.

So it becomes increasingly unlikely as the months go along that DOE would have their effective date of their standard for battery chargers would be 2013, I think it probably would be pushed back to 2014 or even 2015.

COMMISSIONER DOUGLAS: Thank you, Dennis and Ken. All stakeholders who have views or opinions or insight into this will have an opportunity to speak to it as well as we go through the day.

MR. RIDER: So I believe the next presentation is Suzanne. And you can try to use this mic here or you can use the one at the podium and I can run your slides, however you prefer to do it.

MS. PORTER: I will come up there.

MR. RIDER: Okay.

MR. LEAON: And if I can just interject at this point. We do have a request from Motorola for a presentation. Do we have a representative from Motorola?

(Positive response.)

Okay. At your direction, Commissioner, whether we do that after Suzanne's presentation or after lunch.

COMMISSIONER DOUGLAS: Well, I see that we have scheduled a twelve o'clock lunch break. So if there is time to fit Motorola's presentation in before lunch that would be better, that would keep us on track. But we will see. Since we are not taking questions I bet we will be able to do that.

MS. PORTER: Hello. I am Suzanne Foster Porter. I am with ECOS Consulting and I am a technical consultant to the IOU statewide team on codes and standards. And I am here to share some issues that we wanted to raise in response to the draft express terms that were released this month for battery charger systems.

Before I do that I'm going to just share a little bit of background about battery chargers in general. These are slides that are already on the docket and some of you have here have seen them before. They are not in the handouts that you will have in front of you, but those are

just the first few slides and then all the issues slides are documented in the handouts you have. And I will work with the CEC to get this typed version of the presentation posted publicly shortly after the workshop.

I wanted to acknowledge a number of institutions that have helped to support this research for standards. It doesn't only include the recent work to prepare the CASE report but also includes work that was funded by the California Energy Commission PIER Program, various labs including Southern California Edison and Applied Technology Services group at PG&E have submitted data and participated in the technical research, and EPRI prepared a lot of the technical foundation on which this was based. So there is a lot of fine work that has been done and I want to make sure that all of these folks get credit.

Battery chargers range very widely in battery size but they all have exactly the same function. They are designed to take wall current, wall alternating current that is provided to us by the utilities, to convert that into chemically stored energy in the battery for use when a product is not connected to the grid. So that can be a portable use like we have for laptop computers and portable power tools and toothbrushes. It can also be stationary uses that meant for emergency backup power like the under-desktop uninterruptible power supplies that meant for

desktop computers.

All of them have three primary elements: a power supply that converts alternating current to direct current needed to charge the battery, some element of charge control and regulation which ensures that the battery is charged appropriately, and a battery that stores energy. We have been talking about the modes and Ken referred to a number of modes during his presentation. This is an illustration of the three primary modes of a battery charger: active mode or charge mode when the product is getting the bulk amount of charge into the battery, the maintenance mode which is meant to trickle charge those chemistries which are appropriate to be trickle-charged because we need to counteract self-discharge in order to maintain full capacity, and then no-battery mode which is essentially a standby mode – and DOE calls this a standby mode – for this product. It's the battery removed from the product and all the function is turned off to represent the lowest possible power mode of the product.

There are two categories of products with different test procedures, different metrics and standards being considered here. There are the small battery chargers. These are both consumer and there are some non-consumer small battery chargers. Some examples include laptops, cell phones, power tools. The dominant charger technologies are

linear and switch mode. And the key efficiency metrics in the current draft express terms are two, the 24-hour efficiency and a low power mode metric. These products are very large in number in use in the state and they use quite a bit of energy. But each one uses a very small amount. So the savings that we get is by saving small amounts of energy for every product, many products that are installed.

For large battery chargers the primary product type we talk about is forklifts but there are also electric mining cars, mobile baggage that run on battery power. A slightly different technology is used for chargers, silicon-controlled rectifier, high frequency is also an emerging technology. And the key active mode metrics are a little bit different and more complicated. There are actually five metrics but the two that represent charge mode are power conversion efficiency and charge return factor. And the stock of these products is significantly lower than the small chargers. These are products that each use a significant amount of energy and we are going to save a small amount of that significant amount of energy. So the total usage is about the same but you see the savings is quite different.

Battery chargers are a key phase to a strategy to address plug load energy use. The Energy Commission led the world when it adopted the external power supply mandatory

standard. The philosophy in policy approach for improving the efficiency of the external power supplies was to try to address the energy use of hundreds of thousands of products in California that are difficult to regulate individually on their own because there are many of them and they are very diverse. And so we improved the efficiency of one building block of that system, which was the process of converting alternating current into low volt direct current needed to run many of the electronics products today. That has successfully turned into an international initiative and we have now a federal standard that was put into place by EISA 2007 that made the standards the same as California's.

Battery chargers are the second phase of the component strategy. Some battery chargers do use external power supplies but there are many battery chargers that have internal power supplies that haven't been addressed by any strategy, represented by this lower quadrant. In addition, having a more efficient power supply improves the efficiency of the battery charger. So for this region of products, these have already gotten a great first step to moving toward a very efficient battery charger system. The products represented down by the orange circle are not ones we are talking about today but they are larger internal power supply products like desktop computers, TVs and so forth that do make sense to address individually.

I would like to take the rest of the presentation to run through the issues that we wanted to raise related to this, some of the comments and concerns that have been raised by other stakeholders, as well as the express terms that were released this month.

First, I would like to address some concerns that were raised by manufacturers around the concept design that the IOUs put forth in the last workshop. There were some questions about BOM design and other things and I would like to just address those here to provide clarity. As a reminder, we did two detailed studies of low cost consumer products to demonstrate the cost effectiveness for one possible solution path to improving the efficiency of these low cost devices. There was the NiCd power tool as well as a nickel metal hydride beard trimmer. Many of the comments focused on the power tools so I will focus in on that for the purposes of this discussion today.

As a recap, this is a slide from March. We evaluated the product as shipped and the black is the levels that are proposed by the Codes and Standards Enhancement report. And then bottom row is how the product performed as shipped. We then made a number of changes to the product, including developing new charge control circuitry, which basically looked at the voltage of the battery and then depending on the voltage of the battery would put more

current to fill up essentially that battery gas tank and then shut off the current when the battery was full and trickle charge it instead. In addition, we placed a slightly higher efficiency power supply on the product and as a result were able to achieve the CASE-proposed levels or exceed the CASE-proposed levels with the green row that you see represented by the third row down there. And this is, again, a reprint of the slide from March.

There are questions that the concept design reduced the utility to the consumer. I just wanted to re-emphasize that the concept design that was created when we did the redesign enabled all the features of the product as shipped, including the charge LED. The charge control actually enabled a slightly faster charge time. We didn't significantly change the function. It was about 20 percent faster because we were able to increase the speed of the charge a little bit at the beginning because of the controls. More precise and expensive components are were required for the design than what were in the product as shipped. Many of these components and ICs are currently shipped in high tech consumer products and have been for many years and they are possible for appliance battery chargers as well. And the test that we performed of the concept design reliably returned full capacity to the battery even after it was subjected to a number of tests.

So we tested the battery and ensured that the battery was fully charged when we used the circuit to charge.

There were some questions about our incremental bill of materials cost so the methodology that we used was to add up all the costs of the various components and the board that was used, the new board that was needed in the concept design, and then apply mark-ups from the US Department of Energy preliminary analysis to estimate the total incremental cost to the consumer. It included all of the elements, we didn't omit any elements, and we used cost that was cost of the external power supply that came directly from DOE's preliminary analysis, which is the most recent public data available on incremental costs for external power supplies. We compounded the mark-ups just like DOE's analysis does. And we did not include power factor. There was a question, Did we include power factor correction in the bill of materials cost? We did not. This product is so low power that power factor correction has not been required under any proposal.

Something I would like to emphasize is that this concept design is just that. It is not a turnkey solution for every batter charger but it can be adjusted to accommodate market needs. One concern that was raised or question was, What if you are operating in a variable temperature condition? This particular solution would not

enable a full charge under very high temperature or low temperature conditions. It is easy to incorporate a thermal – I should say you can incorporate a thermal compensation network to enable that to happen. And the incremental BOM is about five cents. That would increase the total BOM to about a $1.30 with a payback of about 0.6 years. So because the cost to benefit ratio for this teardown is 10 to 1 there are a number of additional costs that can be implemented, tweaked, to really customize the design. And we are not trying to find every solution, we're just trying represent kind of a base solution that is one pathway to possible components.

There are a number of off-the-shelf" silicon solutions available for efficient management of nickel. So we used components where there wasn't one turnkey circuit that is all under one component. But those are available from a variety of manufacturers using a variety of methods to control the charge. We used a comparator-type circuit, as shown in the far left slide here. There are also negative changes in voltage, there are timers and so forth. So there are many methodologies that can be used to control charge. This is just one in the concept design.

The IOUs would like to encourage the Energy Commission to consider more stringent levels for both battery maintenance and no-battery mode as well as power

factor. I would like to walk through that recommendation next. The CEC staff proposal for the combination of no-battery mode and battery maintenance mode is shown here in blue. As a recap, the proposal that the IOUs originally put forward set two separate limits for battery maintenance and no-battery mode at 0.5 watts and 0.3 watts, respectively. The staff suggested that we combine those two in a sum and then compare it to this blue line that is shown here. We have plotted the data from the PG&E data set relative to this level and believe that there are greater opportunities to capture energy savings by lowering the proposal slightly to the red line, which is a slightly different equation than what is currently proposed in the express terms. It's worth about 20 to 50 gigawatt hours per year, which is equivalent to 3000 to 8000 household electricity use. So it's a pretty significant difference. And 44 percent of the products can meet this red line. So it's not particularly aggressive but it does get Californians more energy savings from these modes of operation.

Secondly, we would like to urge the Commission to reconsider active power factor correction requirements for small battery chargers. Specifically, we have done modeling that suggests that the incremental BOM cost is significantly lower than the energy savings we get associated with – I should say not the incremental BOM but the incremental BOM

plus markup is significantly lower than energy savings that we get associated with reducing the losses in wiring of buildings associated with more power factor. These are examples of four products that may be included in a greater than 100 watt active power factor correction proposal. And the payback times are relatively short and we do get some additional energy savings. So we encourage the Commission to retain power factor requirement as 0.9 or greater for products that are greater than 100 watts. This would be in alignment with the European Union's own power factor requirement and it's the equivalent of 20 to 60 gigawatt hours of savings, which again could be as high as nearly 10,000 homes.

I would also like to emphasize that there are silicon power factor correction solutions available from many vendors. Power factor correction has been an important component in Europe for a long time, recognizing the energy savings opportunity that is there. And so the market is ready for California to take a similar approach to battery chargers.

Next I would like to walk through some test procedure issues. There have been a number of manufacturers who submitted comments requesting physical alterations to products in order to perform the test procedure. We strongly suggest that the Energy Commission not proceed

along this path and would like to share some of our thoughts related to that. Specifically, when the test procedure was developed and adopted in 2008 there were three key guidelines that are sort of universal to test procedure development in general but are applicable in this case. As UL mentioned before, the test procedure, product and readily available manufacturer instructions, it is important that those are the only three things that are needed to perform a test procedure. And that is because if we are looking at compliance and going out to pull products off the shelves and test them for compliance, whether it's UL or the CEC or another manufacturer, we need to be able to do that without extra information that would need to be provided by the manufacturer. So we carefully crafted the test procedure to enable us to do that.

The second important guiding principle is that the test should mimic as closely as possible the actual use of the product in the field, balancing that, of course, with test burden. So we have to keep in mind we can't have a product test procedure that is excessively long or excessively burdensome. But to the extent possible we would like it to be as close as possible to the way California ratepayers actually will use the products in their homes and offices and industrial buildings.

Lastly, the test has to capture the accurate energy

use of all modes. So that includes active mode but it also includes maintenance mode and no-battery mode in the way that we would see it in a home or an office building. Making physical alterations to the product would jeopardize these three principles in total. And I would like a little bit about each.

As I mentioned before, making physical alterations to the product under test would make it very difficult for independent laboratories such as UL and other political bodies like the US Department of Energy, the US EPA Energy Star Program, to ensure that they are all taking the same approach to the test procedure. It's difficult to specify what circuits should be cut, what function should be removed in a general way. It's possibly even impossible to ensure that you're changing all of the same things with every test, making repeatability very challenging. The test procedure really should ensure that we are capturing the energy use of products as consumers and other ratepayers in California are going to see that energy use on their electricity bill. So that's a big concern if we start removing fixed losses that are part of these products.

About ten percent of the PG&E data set represents products that are significantly higher in their low power modes than other products. So here you can see I've highlighted in red some outlier examples of the combination

of battery maintenance and no-battery modes as high as 9 watts in each mode, 10 watts in each mode. And a lot of this is because of extra functions that are not power scaling down to scale their power functionality that they are providing the consumer. We think that if the test procedure is changed to allow changes to the product it could be as large as 300 gigawatt hours per year loss in savings. We think this could be higher as products move to more and more integration. This is the equivalent electricity use of 45,000 California homes.

Just to give you a kind of a tangible example of a product that represents one of those outliers, this is a power tool with an entertainment center. It has the ability to listen to music as well as charge the battery. We tested this product and it has 9 watts in no-battery power and 9 watts in maintenance power with the radio off, the screen off, all functions turned off. When this product is turned off and there is no value or function being provided to the consumer by the entertainment center the product continues to use 9 watts. And the energy use of this product would not change dramatically if the Energy Commission chooses to allow physical changes and alterations to the product. Because this type of essentially standby mode power would be – would enable to persist. And this is only one of a dozen examples of poor power scaling that we have seen in consumer

products.

Manufacturers have also raised concerns about indication of charge and fans associated with battery charging. Cooling fans and indicators, whether they are audio indicators – you know, beeps telling you that the charge is full – or light indicators are part of the charging function. They are not extraneous. They don't use significant amounts of energy. LEDs have gotten significantly more efficient year over year. Their brightnesses are increasing as their power is going down. LEDs for very bright ambient conditions that would probably be appropriate for indication are 10 to 60 milliwatts per LED. Which means tens of LEDs can be incorporated into devices to indicate charge, which is a significant number and probably more than most designers would prefer. In addition, audio indications do not persist for the entire length of a normal charge cycle under the test procedure. And so the audio is not continuous and therefore shouldn't represent significant energy use. It's just a short indication for battery status conditions.

We have observed in our data set some battery chargers that operate continuous fans regardless of whether or not there is a battery installed or if the battery is fully charged or partially charged. These fans can instead – their operation can be controlled with a timer or a

thermostat relative to the charging cycle so that the batteries can be properly cooled when needed but it's not running continuously regardless of the function needed for cooling batteries.

Next I would like to address timing. The CEC staff have made significant efforts to increase the flexibility for manufacturers for the standard, including combining battery maintenance and no-battery mode into one function and reducing the scope associated with power factor. And this is even more flexibility than what we saw in the proposal in the March workshop. So I think it even makes the 12 month compliance timeframe an easier goal to achieve. Our research suggests that the March proposal was achievable through the 12 month timeframe as well but this is even making it more achievable.

There are many improvements to battery chargers that can be made that affect both metrics. This includes improving the efficiency of the power supply as well as charge control affects both battery maintenance and the 24-hour efficiency metrics. So in some ways there are some elements that make compliance easier to achieve because you can make one improvement that affects both metrics.

The other thing I would like to emphasize is the kind of changes that we are suggesting be made do not require significant change to the size of the circuit board.

So one of the elements that can increase the length of time associated with redesign is that molding and housings have to be redone. Our research suggests that these are simply not the case. These control ICs that are needed to help with charge control are very, very small. They can fit on existing circuit boards. This is an example of the power tool that we did the teardown of earlier this year. And these components shown outlined in red would no longer be needed under the new design. And you can see that the type of circuit board that would be needed easily fits within that space.

There are many products for which similar circuit boards across a number of models already exist. Here is an example of two beard trimmers – this is a slide that we did show in March as well. The top is a NiMH battery, has a simple resistor charge control element. And then the bottom one has a lithium ion battery. It has a different form factor on the outside but on the inside the circuit board is exactly the same, the mounting is exactly the same, and the types of components and controls that could be needed here could easily fit here. In fact, they do on the same size just with a slightly different model. So these off-the-shelf packages allow the silicon-based charge control to fit in the existing printed circuit board space. And you can see, just for illustration on the bottom here, two of the

ICs relative to a US dime.

Consumer products are regularly redesigned to encourage consumer upgrades over time and new models help distinguish products in the market. These types of changes could be incorporated into a redesign cycle. As I mentioned before, changed to product molding are not required. And the markup on the extra components that we have employed in the analysis, which is approximately two times – but DOE even suggests that could be lower depending upon the type of product and so forth – covers the additional costs associated with doing the redesign. Full safety testing is not required if we are making small changes. And turnaround is weeks to a couple of months. And the cost is fairly low.

One other issue I would like to address is the CEC has proposed – moving on to the non-consumer products and away from the test procedure – the CEC has proposed to delay all non-consumer chargers for 24 months instead of 12. We wanted to encourage you to consider keeping non-consumer chargers that are other than mission critical chargers within the 12 month timeframe. Mission critical chargers are carried by public emergency personnel and we want to ensure that the state of the safety and the security systems of the State of California are protected. And therefore the 24 month compliance timeframe is justified for these products.

For all other non-consumer products which don't have the same emergency and safety issues, we strongly encourage the Commission to consider adopting one year earlier. The energy savings for the adoption 12 months earlier is the equivalent of 110 gigawatt hours in total. So that's a life cycle savings, not an annual savings. But it's the equivalent of 20,000 California homes in terms of electricity savings.

We would like to suggest two changes to the express terms for the large chargers. Number one, the staff has made a first step to moving toward large battery charger selection. We have a slightly different suggestion that we will detail in our written comments. We suggest that it focus on the charge algorithm or the method of charge more specifically rather than the number of models and still balance the test burden. Secondly, we recommend that Tier 1 be retained for large chargers. This is 15 gigawatt hours worth of life cycle savings for one year of sales, or 2000 California homes. So there is some savings opportunity there that we would like the California Energy Commission to consider.

In closing I would just like to set the stage for what the opportunity is here. There are small and large battery chargers. For small battery chargers we think we can save a substantial amount of current use, somewhere

between 55 and 65 percent. I think the CEC's calculations show 40 percent. But it's a substantial portion. For large battery charger energy savings, it's more around 8 percent of the total use. But this is the equivalent overall of almost one power plant, or 1 Rosenfeld of energy use that we can save by addressing the multitude of plug load products that use battery charger systems. The cost to benefit ratio for this measure is one to eight. And I want to emphasize the importance of the consumer chargers in the context of these savings.

There has been some discussion around whether consumer chargers – there have been some challenges about whether consumer chargers should be included with the DOE rulemaking going forward. One year of sales associated with consumer charges will deliver to the State of California $250 million, which is orders of magnitude greater than the cost of the regulation.

Thank you for the opportunity to share our thoughts and I look forward to responding to questions this afternoon.

MR. LEAON: Okay, it's 11:30 now. So I would suggest we go forward with Motorola's presentation. But first let's take a five minute break.

(Short break.)

Okay, folks, if we can get settled let's go ahead

and resume the workshop with Motorola's presentation.

MR. PAUL: Good morning, everybody. My name is Chris Paul. I am Director of Energy Products at Motorola Solutions. Some of you may not know that Motorola recently split into two companies. We are the business-industrial side, Motorola Solutions. And as you can see on the slide up there, we give a little bit of our curriculum vitae, some of the products that we produce. I won't read them out loud to you but we are generally involved in capturing critical information and providing communications to our customers in a number of venues. Ken, if you would move forward. Thank you.

I would like to acknowledge and thank the Commission for the opportunities they have been providing to us, especially over the past month or two, and our discussions in particular with Mr. Rider. I know that as a result we understand a lot more about what the Commission is looking for in terms of improving efficiency and what some of your concerns are. And I believe also that we have had the opportunity to better acquaint you with some of our concerns about how we are going to actively meet these requirements in a manner that improves battery efficiency and basically helps the consumer in the best way we can.

So why am I here today, why am I up before you making a presentation? Well, as alluded to earlier by the

presenter from ECOS, we have some concerns associated with a number of other features in our products that go beyond really battery charging. And you might ask the question, Well, why do we do this? Isn't this wasteful of energy? And from a general point of view it's actually quite the opposite. Our customers demand these functions. The question is, Are we going to provide it to them in a product that integrates both sets of needs or are we going to give them two separate products with two separate power supplies? Which is going to draw more power off the grid than if we gave them one combined feature. Now you might say, well, the customers will simply turn off the certain features when they don't need them. But the features that we provide are features that customers will not be turning off, as we will see as we go forward. So turning them off from a customers point of view is really not an option.

So not only will this approach by combining chargers and other functions provide greater energy efficiency overall, we believe, but when it comes time to decommission these products, as it inevitably will, and consign them hopefully to a proper use of E-waste, there is going to be less E-waste because we don't have two power supplies. And we would hope that any regulation that goes forward recognizes this fact and accommodates the energy saving possibilities of combining functions into a single unit.

Next slide, please.

The current proposal, I'm certain that many folks are familiar with here, does allow users to turn off unused features. But this is a problem in many cases. Because, as I said, many of the features the users will simply have no reason to turn off. Providing the ability to turn them off, especially for the user, adds cost because it adds switches. And adding switches, we are going to have to put them somewhere. We can't leave them hanging off the unit. We are going to have to change the molding to mount the switches in the products so that consumers can turn off features that they are never going to want to turn off so that we can meet the testing proposal.

What are some of these features that we provide? Well, we listed indicators, for instance, LEDs. And although I'm happy to say that we have no products at present or in the planning that employ ten LEDs per port, we do have some products that do use two indicators per port and some that use one indicator per port. Because our customers need to know when those batteries are charged, when those batteries are ready for use, not when the entire unit is ready.

ECOS provided an estimate of the amount of energy consumed by LEDs in use. And I think they are dead on. We're right in that range, toward the higher end of the

range but we are in that range. However, no consideration in that proposal was given to the energy consumed by delivering that energy to an LED. Now, let me give you a very simple example of how that is done. When you are powering an LED you need to make certain that you supply a certain repeatable amount of current to that LED so that you get an expected amount of illumination and that the LED will operate reliably over its life. The cheapest thing to do – and perhaps we're a bit focused too much on cheapness – is to take an existing voltage supply that is already in your unit, take your LED and add a resistor to it, connect it. It regulates the current very nicely. Inefficient, I will grant you. But this is the cheap way to do it. We have to consider that there is dissipation across that resistor in delivering power to the LED.

There is a more energy efficiency way of doing that and that involves taking that supply that you've already got and using something called switching power supply to take the voltage down to a lower level so that you're not wasting as much energy powering the LED. And that will improve your efficiency but it will not completely get rid of the energy to deliver the energy to the LED. And there is a cost associated with it, too. None of these things have been studied up until this point by us or anything I've seen presented in front of the Commission. So knowledge of the

trade-offs involved is not clear at this point. More studies would have to be done. So I urge us to consider that all of the power required for LED has really not been discussed or presented or investigated.

Now, communications functions, this is a biggie for us. We provide industrial hand-held mobile computers, we supply radios for emergency responders. These devices when they are charging afford an excellent opportunity to communicate directly with these devices with a computer network in a building, for gathering information, loading new information onto these things. And we make multiple use of existing equipment. We are going to charge the battery, let's use of that power, let's use some of that plastic, let's use some of the electronics to perform some other functions that our customers definitely are going to need. Ethernet, one of the big communications things that we do in our products is to promote and to support Ethernet links. Now, many of you are probably familiar with Ethernet. It's a technology that allows long haul high speed communications. Buildings for businesses, buildings for private companies are suffused with Ethernet networks running all over. You've seen these cables, you've seen these connectors yourself. And the power consumed by these connections is rather significant, it can be into the range of a watt or two under certain circumstances. There is a

wide range of Ethernet speeds, there are at least six or seven and we supply a number of them. So the amount of power consumed, of course, varies with the speed of the Ethernet link required. These are demands that our customers are making. If we were to divorce this equipment from battery chargers we would have another set of equipment sitting on the side with another power supply not regulated by this regulation and we would be pulling more energy off the grid.

Ethernet is not the only high speed communications we use. Ethernet takes up a lot of space, eats a lot of power, is not appropriate to build right into our hand-held devices. So what do we do? We use USB, Universal Serial Bus. You know, the memory sticks in your computers, the mice that you plug in sometimes, that's the USB link. Now, the advantage of USB is that it can match or come close to Ethernet speeds but it's for short haul communication. So it doesn't consume anywhere near as much power, it's physically smaller.

So now we've got our hand-held devices with USB, we've got our terminals and cradles with Ethernet, how do we get them to talk to one another? We use Ethernet to USB convertors, another piece of equipment consuming more power, different speeds as before, difficult to determine exactly how much energy is required here because of the variation in

speed. And then there are some cradles that we have that don't use Ethernet at all. We will have a multi-port unit, drop a bunch of terminals into that, put a USB hub inside the cradle, bring a single USB port out, and with that we are able to communicate to all the terminals at the same time. Efficient use of resources in that sense, but a different power requirement for different communications requirements.

And then, believe it or not, we still are selling dial-up modems. Now, there is no truth to the vicious rumor that our customers are still using America Online to communicate with them, but we still do make a number of sales of these units every year. And they have different power requirements from the Ethernet links and USB links. And if we were to provide these features that our customers ask for in physically separate units we would wind up drawing more power than if we combine the functions and features.

Fans. We have mentioned fans before. Many of our units do employ temperature and thermal control switches, not all I will admit. And that is an opportunity for improvement. But these are part of the requirements that some of our customers had. Our emergency responders demand that their units be recharged as quickly as possible when they come back to the station so that they are ready as soon

as can be. They demand that they are held in the highest possible state of readiness so that they are there when they need them. And the nickel technology that predominates in these radios, for reasons that my colleague will explain later, is a technology that creates heat during the charging process. There is also a requirement to put large numbers of these things in physically close proximities because there is limited room in certain areas where our customers have to store battery chargers. All of these things together concentrates a tremendous amount of heat into a certain area. And to deal with that the only solution is a fan. This is not something that we choose. We would rather not put fans in our units. But the demands of our customers for our products require them.

There are other things that are up here that are beyond what we are doing today. There are things that we don't even know about in the future that will require additional power, communications techniques, who knows? I'm sure that many of my colleagues from industry here have chargers that incorporate functions I haven't mentioned up here. So there is a lot that is unknown. Can we go to the next slide, Ken, please?

So how do we handle this? Well, one of the proposals that we've heard is under consideration by the Commission is to create a table or a matrix of non-charging

features and functions and to allocate a certain amount of energy to each of them. And, well, this will meet the issue of allowing energy consumption by non-charging functions. But there are a lot of problems with this approach. First of all, there is lot of research that will need to be done to determine what is an appropriate amount of energy for this kind of communication at that speed in this combination with that feature. This research simply hasn't been done. And with the time span that we have remaining to us before the regulations are released, I don't believe we have the time to put them together, to study them and have adequate comment on them.

Not only that, but as was noted before in the ECOS presentation, technology improves over time. We are going to be able to deliver some of these same services at lower powers in the future. So there would be a desire not only to assemble this matrix to begin with but to maintain it as new technologies come forward and as existing technologies become more energy efficiency. And what new technologies will be coming forward?

Finally, consider the situation when the new technology springs up. There is going to be a need to determine how much energy to allocate to it. Industry is going to be concerned about taking advantage of that new technology as quickly as possible. So we are going to have

two groups working and I can guarantee that what will happen – because we are all only human – is that industry will know about the new requirements not in time to include them into the first release of products. So that will delay product and feature introduction. So this approach overall we think is impractical.

Now, there was a proposal put forward today earlier by ECOS that we simply do nothing, that we do not disable all of these power consumption features, we do not try to account for them, we just live with them and they are part of the charger function. Again, I think the main argument against this approach is that you will force industry now to make two products where you had one, two power supplies where you had one. Because the features are not going to go away. I don't know honestly about the cordless drill boom box, if industry will now start creating entertainment centers separately. But I do know for the features that we at Motorola Solutions provide, these features are needed. So if we are not allowed to accommodate these features we will create two pieces of equipment with electronic waste and two power supplies, which are going to pull more power off. And right now we're not set up even to regulate the functions we're going to split off.

Also it was mentioned that one reason for not making changes was that there would be no instructions as to how to

make the changes, so that the test wouldn't be repeatable. And I think that's a very valid concern. But one of the things that's true now that wasn't true at the time that those considerations were being made is that we are now going through a certification process. We have to provide test data, right? And in providing that test data we have to be very clear about how we got it. We can provide instructions, information, exactly what things are modified, what are turned off, so that the test is repeatable. It is in our interest to make those tests repeatable because you will audit us some day and we want to make sure that you get the same answer as we do. And now here is the database, the central database that anyone who wants to do that audit can go to to find out how to make the modifications that we made so that battery charging alone can be measured. Ken, can you please move on to the next slide? Thank you.

So that is really what we do propose here. We would like to allow non-charging functions to be recognized and disconnected as long as there is no alteration in safety circuitry – that's a critical part of the charging process. But we provide explicit documentation of all changes made and what is being made so that it can be understood, the test can be replicated and audits can be performed on what we're doing. So how do we take advantage of this? Suppose we are doing something that's, well, we made a modification

to the charger that affects the results. Well, here is the assurance that we haven't done so. The test is conducted on a modified unit and an unmodified unit. And the battery discharge energies are compared in both cases. They should be substantially the same. In that way we will demonstrate that we have not modified the chargers.

So what are the advantages of this approach? Well, energy consumption by non-charging functions is accounted for, it's simple, it's easy to update as new technology approaches, there is no reason to maintain and update matrices of energy allocations, it's applicable to products that Motorola Solutions knows nothing about today and that, well, really no one here in this room knows anything about today, it's adaptable. Now, it will require additional money and additional documentation. But honestly, we think this is the appropriate approach, how to proceed. It is the correct way to minimize the total consumption of energy and to reduce the total amount of E-waste. Thank you.

At this time I don't know if we have time at the moment. There is a second half of this presentation that would be presented by my colleague, Dan Jakl. Shall we proceed or shall we halt until after lunch?

COMMISSIONER DOUGLAS: How long will it take?

MR. JAKL: Ten minutes.

COMMISSIONER DOUGLAS: Okay, let's continue with

that.

MR. PAUL: Okay, thank you for the opportunity to speak today.

MR. JAKL: Okay, well almost good afternoon now. My name is Dan Jakl, I work for Motorola Solutions. The second issue that I'm here to address is differences in chemistry between nickel batteries and lithium batteries. I believe I brought this up again in last March's workshop, but I would like to address it once more. In the meantime I do also want to thank Ken Rider for working with us over the last several months and the Commission for allowing us to have this second workshop as well. So, off to the presentation.

Right now the regulation as it's proposed does not differentiate whether you are a nickel-cadmium battery charger or lead acid, lithium-ion charger. There are limits that you have to meet. Ken, if you would please go to the next slide.

Most of our products that we offer for mission critical use are multi-chemistry. We have nickel-cadmium, nickel metal hydride and lithium-ion product. There are some advantages still with nickel-based batteries today. For some the cycle life is nearly double that of, let's say, a lithium-ion product. So some customers find that as an advantage in that they like the NiCd for that reason. In

other cases nickel batteries in general tolerate cold temperature, they operate better at cold temperatures. And I will have a chart coming up later to go through that. So for some mission critical customers at maybe freezing cold temperatures they want that additional capacity energy that they can get out of the battery for further operations. And we have listed a couple of uses for mission critical product. All right, Ken, please the next.

Okay, some of the unique differences between them. Unfortunately for nickel the charge efficiency isn't all that great, maybe it's in the 80 percent or possibly 85 percent range. Whereas when you look at a lithium-ion product you are near unity, you're 99 to 100 percent almost in efficiency as far as the amount of energy going into the battery and the amount of energy you're going to get back out. So lithium has a great advantage there, it's much more efficient when charging. You know, when Suzanne was up from ECOS they had a nickel-cadmium charger but I don't think it was a 1-2 hour charge, I think it was more like a 12-hour charger. Our mission critical products, they need to be charged in an hour, two hours, maybe three hours at the longest. Our customers typically want to be able to put a radio on the charger and come back just a few hours later, take it out and it's ready to go for the rest of the day or another ten hours of use or something of that sort. It's

not necessary to leave them in there overnight.

We do maintenance charge as well for nickel and they do have a little bit higher self-discharge, which I know the Energy Commission in the proposed ruling is already trying to help improve the amount of energy that is available for that function. And the other couple of things are just ways that chargers and our batteries and products are used. Once again, leaving a radio on or having it on when in the charger, we can shut that off based on the way the procedure is written today as far as those products. Next slide, please.

To try to highlight the difference in energy that nickel has versus lithium, we went back and we actually found some data that was taken a few months ago on one of our latest products. And the chart on the left shows a nickel-metal hydride battery. And if you look at the red curve, the one that goes up to about 25 watt-hours, that's the amount of energy that physically went into the battery during the charging process. The first straight line goes out to about 90 minutes or so, that is the rapid charging function. And then you can see it kind of slows down a little bit, there is about a one hour trickle mode where you get a little more capacity into the battery, and then it's flattened out after that and there is very little maintenance in that case. And then the green curve shows

the discharge. In this case, this discharge, we were doing this at about a 1.0 C rate. I realize the test procedure allows you to do about, I think, a 0.2 to 0.25 C rate. This test data was done at 1.0 C. But you can see the difference between the two is pretty significant.

And then you look at the lithium one on the right-hand side and you can see the difference between the energy going in versus the energy getting back out is much closer. And in fact I did some ratios on the nickel battery, looking at the peaks of that curve charge energy in was about 24.13 watt-hours and discharge energy coming out was about 15.8. So if I did a factor, a charge return factor, dividing the two I was getting a 1.52 factor. Whereas in the lithium battery on the right doing the same math we had 19.94 watt-hours going in and we were able to get 16.9 watt-hours out. The factor is about 1.18. Significantly more efficient. And, once again, this is just the energy going into the battery and the energy coming out, it does not involve LEDs, other functions or AC conversion and losses in charging circuitry. This is just the battery energy going in and out. Okay, next slide, please.

This slide here, we're trying to once again show, well, if nickel is so inefficient why do you still use it? And so the colors here are trying to help highlight where there are some advantages still for nickel. So if you were

to look at the left column there, the temperature, at 0 degrees Celsius, freezing temperatures – which I believe you have those in the State of California – a NiCd, NiMH have 80 to 85 percent energy available. And this is based on a 0.2 C discharge. But now we go to a lithium design, maybe you only get 50 percent as far as the energy that you're going to be able to get out of the battery for those customers that need to use them in those temperatures. And getting even colder, -20 C., the lithium is basically down to 20 percent for a cell that was specifically designed for cold temperature performance. Whereas a metal hydride is at 50 percent. Next slide, please.

So going back to two slides ago we are hoping for one if we could only – we have tri-chemistry chargers. If we are allowed to test only the lithium-ion product, which in that case is more efficient, it levels the playing field for us and for our products. If not, could it be possible that the regulation could give some additional offset for nickel batteries? And in this case we put a 1.9 in there versus a 1.6. And I believe a question came up earlier, Well, where does the 1.9 come from? And what I was doing was I was looking at the difference between the lithium curve that was given, the 1.18, and subtracting that from 1.6 and then adding that to the nickel battery, which I believe I said it was 1.58. And that gets me to the 1.9

number, to kind of equalize and level off the tradeoff between the nickel and the lithium product.

Well, thank you for the time.

COMMISSIONER DOUGLAS: Thank you to both presenters from Motorola. And we will look forward to more presentations and discussion this afternoon. We have on the agenda to come back from lunch at 1:15. We have eaten into that by about seven minutes but unless anybody thinks that's a huge inconvenience let's still come back at 1:15 and we will resume then. Thank you.

(Off the record at 12:07 p.m., to resume at 1:15 p.m. this same day.)

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

1:17 P.M.

MR. LEAON: Good afternoon, everyone. Welcome back to the workshop. I think we are ready to go with a presentation from NRDC.

MR. RIDER: Well, we have a caller from London in a different time zone. So we are requested to make a presentation from Larry Albert from PTI first.

MR. LEAON: Okay. Let’s go ahead with that presentation.

MR. RIDER: I will try to unmute Larry. Can you hear me? Larry?

MR. ALBERT: Can you year me?

MR. RIDER: Yes, we can hear you now.

MR. ALBERT: Okay, great.

MR. RIDER: I will go ahead and change the slides when you ask me to.

MR. ALBERT: Oh, thank you. Thanks for doing that, Ken.

MR. RIDER: No problem.

MR. ALBERT: I would like to introduce myself. My name is Larry Albert and I work for Stanley Black & Decker in the role of a Senior Technical Manager for product safety and compliance. I have been a participant in past discussions on battery charger energy efficiency and

external power supply energy efficiency here at CEC as well as at DOE, Energy Star and Natural Resource Canada discussions. I would like to thank the Commissioner and CEC staff for accommodating me in allowing me to provide commentary today. I know it was sort of on short notice and sort of acknowledging the fact that I have this time zone issue that I'm dealing with. So thanks again.

Today I would like to focus really just on one sort of narrow and perhaps a somewhat technical consideration regarding the proposed CEC standards and the impact that they would have upon nickel-based chemistries. This was touched on, I think, a little bit earlier by Dan Jakl from Motorola. And I would like to sort of elaborate on some of these considerations because they are certainly key to our industry and to other appliance manufacturers. Next slide, please, Ken.

So just a little recap here, or introduction rather. So basically what is happening here, the part of this that we are most focused on is the proposal to regulate small consumer battery charging systems with the understanding that's both the charger and the battery combined. And then a large proportion of these systems are used in appliances and power tools. And a significant portion of those are comprised of batteries that have nickel-cadmium or nickel-metal hydride cells. The reason that these have become so

highly used in this product category is because of their robustness, their safety and their ability to handle really high discharge currents. And I think Dan mentioned before, too, that – and this is not a small thing – that they are much better than many other chemistries at lower temperatures. However, there are some inherent characteristics about these cells that tend to result in lower efficiency for the charging systems that they are part of. And we have understood from discussions earlier and statements made earlier by CEC staff that it is not the intent of this rule to outlaw a particular type of chemistry as a means of achieving the targeted energy savings. And so we are sort of presuming that to be still the case. Next slide, please.

So just to kind of review the history here a little bit. The original CASE proposal had essentially, in addition to the power factor requirement, three other metrics it was pursuing: no-battery mode power less than or equal to 0.3 watts, maintenance power less than or equal to 0.5 watt, and E24, which is the 24-hour combined active mode and maintenance mode would be that formula 12+1.6 times Eb. This formula, this limit value is based upon two considerations. One is the presumed 60 percent conversion efficiency, conversion efficiency being the input to output power efficiency of the battery charger into the battery.

And that you get by taking Eb, dividing it by 0.6 and you get the 1.6. And the 12 comes from the half-watt maintenance power limit over the 24 hour test period that you conduct the test in. And that's what gives you the 12 watts, that constant term in the equation. Next slide, please.

So the E24 limits, the development of that, that started with that equation in the CASE proposal. And the way that it was sort of illustrated in graphs and so on is this active mode efficiency, which is the Eb divided by E24 value. And so it's essentially translatable, you can translate sort of that curve to what you see for an E24 limit. And so in that CASE proposal there was a scatter plot that showed that curve versus the battery energy and plotted data points from various charging systems that have been measured, compared them to the proposed limit line. In that case what concerned us the most was that we saw no nickel-based systems that were seen to comply above about a 10 watt-hour line.

And that is a big concern because for a lot of power tools, I would say most power tools and other medium-sized appliances, this is sort of the category that they live in with respect to battery size and consequently charger power. When the March workshop came around there was no recommendation to change offered by CEC staff and

essentially, from what I can tell in the proposed regulation, this requirement has stayed fairly constant. It is essentially the same now except for it tops out at 100 watt-hours. Next slide, please, Ken.

And this is not my slide, I borrowed this from the CASE proposal presentation. And it illustrates in the blue line there the proposed standard, as I mentioned before, plotted on this 24-hour efficiency versus Eb graph. And again you can see that once you get past about 10 watt-hours you don't see any of those red or orange dots that are above the line. And so that's obviously of concern because the question it raises is whether there is fundamentally an issue with the feasibility that's associated with the proposed standard value, whether this is even achievable given the cells that are involved. Seemingly, lithium cells didn't have that problem and the question is whether that is just a function of technology that is later on in its development or something fundamental to cell chemistry. Next slide, please.

So in a similar fashion Pnb in the CASE proposal was set at 0.3 watts. In that graph, which we will look at in a moment, there was only one case above 20 watt-hours for nickel systems that satisfied that. And for maintenance power below half a watt there were again no cases of the data that was used in the CASE presentation that met the

requirement above the 20 watt-hour line. So we're talking again about these mid-power type chargers and their correspondingly mid-energy battery packs.

In the staff proposal of the March meeting there was an improvement in that there was a proposal that – or recognition, anyway, that scaling was appropriate for the maintenance power limit as the maintenance power that is required to maintain batteries is a function of battery energy. And so therefore there was an analysis done which looked at a self-discharge rate of three percent, factored that into the original equation and came up with a modified equation with a coefficient of 4Eb that then now applies an extra allowance in cases where Eb is fairly large. This is a pretty modest adjustment. I think you can see that even when you are out at 100 watts the correction there is still, you know, about 0.2 watts at that point, it's pretty small. So not surprisingly when you again compare this new limit line against the data points that are available there again were no cases of nickel systems that filled the requirement in that range above 20 watt-hours.

And most recently the proposed amendments had another change that I would treat as an improvement. This is where Pnb and Pm measured combined now need to be less than a limit value that again has a scaling factor correction on it. And essentially a constant value that is

roughly equal to the sum of the two quantities we had before, 0.5 watts and 0.3 watts. So you would expect at least that. In addition, it bumped up by an additional 0.2 watt. So, while this is, you know, again a conceptually important step to take because it recognizes the fact that there are tradeoffs in design between these two elements it really doesn't address the fact that there are not, again, many cases – in fact, no cases – that would comply above 20 watt-hours. Because now you see the Y intercept of the blue line going up to 1 watt but really not a lot of change out in the midrange. Next slide, please, Ken.

And so here the two graphs depicting that. This is again the original graph from the CASE document. And again you can see there is only one case once we get out there past 20 watt-hours that is below the line. Next slide, please.

And this came out of the March 3rd workshop. This is a combination of the original proposed limit line in the CASE document along with the staff improvements by applying the scaling factor. Again you can see how obviously the line increases as you go up in higher watt-hours but still at 100 watt-hours, which is the limit for these small consumer chargers, it doesn't even creep above the one watt line. The proposal that's been made most recently is to take this and the Pnb value and add them together and add an

additional 0.2 watt. So what that basically would do is take the blue line – I think Ken might have had a slide earlier which shows this better than this or maybe it was Suzanne – and it actually starts at one watt then but it ends up pretty much in the same place over on the right-hand side. This is a log plot. Next slide, please.

So far, you know, our big concern is that sort of variety of steps, while there has been improvements, still all of these proposals fail to address nickel-based battery charging systems. And that's certainly evidenced by the data that we see depicted in these scatter plots and where the proposed lines are. However, it is an improvement to have Pnb and Pm combined together because it certainly allows for design tradeoffs. But it is still at this point not high enough to allow for the more typical nickel-cadmium cases.

So in general we have nickel-based systems that are not represented here by these lines and so therefore our concern is that they would be basically left out and we would not be able to continue to use nickel-based battery charging systems for these sort of mid-powered products. They are all related to, I believe, the essential nature of the way these cells – nickel-cadmium and nickel-metal hydride cells – are constructed and how they operate. And so I'm concerned that these would ultimately be – since it's a

function of these cells – it would basically outlaw anything that was comprised of those cells. Next slide, please.

Okay, so here's an example from a pretty representative power tool case. For an 18 volt battery, a nominal 18 volt battery at 2.2 amp-hour the Eb for that battery based upon the nominal ratings of the cells would be 40 watt-hours. The required maintenance current to maintain that based upon typical recommendations of cell suppliers would be maybe C/40. So at 2.2 amp-hours divided by 40 that gives you 55 milliamps. During the end of charge, during maintenance cells that are nominally 1.2 volts per cell, per NiCd cell, rise to as high as 1.5 volts because now they are actually under a state of charge. And so therefore that 18 volt nominal battery actually reads out closer to 22.5 volts.

The required power into the battery in this case is then the product of the current in the voltage, which is 1.24 watts. Going back to the CEC formula that the Pnb plus Pm for this case here would allow only 1.08 watts for both the no-battery mode and the Pm mode combined, which is obviously lower than the power going into the battery all by itself. So even if we had a 100 percent efficient charger and zero no-battery mode and no overhead, this system would fail the requirements that are being proposed on the latest CEC proposal. And that's a concern because we really looked

into nothing in this design other than the fundamental nature of the cells and what their requirements are. The failure can't be attributed to poor charger design because the charger is not even taken into account here. We're looking at just what the requirements of the battery alone would be independent of any charger providing the energy to it. So if you can't meet this in the most abstract case then it's unlikely we're going to be able to achieve these requirements for nickel-cadmium cells with any real battery charger. Next slide, please.

So why does this occur? These cells have, as has been mentioned, a significant self-discharge rate unlike, for example, lithium cells. And that requires ongoing charging at a very low charging rate. Because of that cells are designed to be overcharged, meaning that past the point of being charged you can continue to put energy into them and some of that energy is provided to overcome the self-discharge of the cell. But to do this overcharging safely requires that you have a secondary reaction in the cell. This is what the cell suppliers provide. And this reaction is necessary because these are sealed cells. They don't actually share their internal environment of the cell with the atmosphere. And because of that it's a closed system. And any gas byproducts of the charging reaction have to be consumed by the recombination reaction.

This reaction, this secondary recombination reaction, actually uses far more energy than the self-discharge does. And so, considering that self-discharge has been the case before it does not accurately reflect what the demands of the cell are because they are really related more significantly to the secondary reaction. The typical recommended charge rates to provide maintenance of cells is anywhere from C/50 to C/20. That means the capacity of the cell in amp-hours divided by 50 to 20, which is, you know, for a two amp-hour cell or something it's like 40 milliamps to 10 milliamps.

So what happens is, not only is this a factor when you're maintaining the cell but it's also evident when you are doing bulk charging, that is active mode charging. Because during that time the reaction is still present and it's competing with the charging reaction. And so it is basically diverting some portion of the charging current into the recombination reaction and lowering the charge efficiency of the cell, that is, the amount you're going to get out of the cell compared to the amount you put in. It's a function of charge rate but a typical value might be around 1.4. You know, again meaning you would have to put in 40 percent more charge into a cell than the energy you're going to get out of it. Next slide, please.

So – and this gets a little dense here – but to go

through the development of this we start with sort of the original proposal, or from the last workshop, of 0.5 watts plus some coefficient times Eb. And we stick with Pnb equals 0.3 watts. This K times Eb was 0.0021 at the workshop. What I'm concerned about here is, what should the coefficient really be using the same sort of thinking that was used back then? And basically the notion was rather than looking at data to determine what those limits were CEC seemed to pursue trying to understand more deeply what the nature of the battery charging systems needed to do and how to account for that in terms of establishing minimum requirements. And those minimum requirements would be reflected back into sort of the optimal efficiency of the battery charging system.

So this is an attempt to improve upon that approach by going in and actually taking into account some of the real considerations that happen in nickel-cadmium systems. So therefore the maintenance power then from that formula is 0.5 watt plus the battery charge times the charging current divided by this 0.6, the conversion efficiency that was used earlier. If you assume maintenance current at Im equals C/30 and we know that the energy of the battery is the battery voltage nominal times the capacity. And we further know that battery voltage in the charge state is roughly 1.25 times the battery voltage nominally. And that is due,

again, to the cell voltages being higher during maintenance charging.

So if you combine that all together what happens is you get down at the bottom a limit equation of Pm equals 0.5 watts plus 0.7 Eb for maintenance power by itself. But we are looking for the combination of maintenance power and no-battery power. And so if we add the 0.3 watts back in we get an equation of 0.8 watts plus 0.07 Eb. So this works out well. The only thing I think is the problem with this is that when you get down to very low powered chargers I think there is a recognition on the part of the most recent proposal by staff that you need to have a sort of floor of power provided to ensure that those very low chargers there can actually satisfy their minimum charging requirements and also provide the overhead that they need to be able to terminate or whatever other kind of processing they need to do. And that has been reflected by putting a one watt minimum into that equation.

And so what I'm proposing here basically is that the combination, the limit value, should be the greater of one watt or this equation, 0.7 plus 0.07 Eb. That 0.07, that larger coefficient for Eb, would allow more correctly for mid-power chargers so you could actually achieve that through chargers that need to charge in that, you know, over 20 watt-hour range, from 10 on or 20 on all the way up to

100 watt-hours. This takes care of the Pnb plus Pm limit. Next slide, please.

So same problem when we're talking about E24. If you start with what is currently proposed here, which is 12 plus 1.6 Eb, and just sort of decompose it into the elements that went into making it, the first term there is really 24 times the old proposed Pm value of 0.5 watts. And the second term is really the battery energy divided by the conversion efficiency, which I have reflected with eta here. So the first time is really kind of the maintenance component of the combined maintenance and active mode and the second term really is intended to handle the active mode portion of what happens during E24.

So if we focus on the active mode term for a moment, the charge efficiency for nickel-based systems again is somewhere between maybe 1.2 to 1.6, depending upon what the charge rate is. If we choose 1.4 as sort of a median value and then we pick an eta value that is actually higher than the originally proposed 0.6 – because this represents the conversion efficiency during active mode, which we would anticipate would be more efficient than during maintenance mode – then when you come out you get an active mode term that comes out to be 1.86 times Eb. Next slide, please, Ken.

The second part of this is the maintenance term of

the equation. And this is 24 times the maintenance power. The previous equation that we used for maintenance power is 0.5 watts times 0.07 Eb. You substitute in and you go through and you multiply things through and you get 12 plus 1.68 Eb. You put that together and the final form of this is E24 less than or equal to 12 plus 3.5 Eb. Essentially this same notion was presented in March except with a coefficient that we think is much more appropriate to handle the charge efficiency issues that are associated with nickel-based system. And again for these very low systems we propose setting a floor for these of at least 20 watt-hours, which is really very small because that's essentially an average of 0.8 watts per hour over the 24 hour test period. So that would be the minimum value or whatever the equation calculated out to be, whichever was the greater. Next slide, please.

So in summary we feel that the limits right now essentially create a situation where nickel-based mid-powered systems would be effectively outlawed and would no longer be available within California after the effective date. You don't see that there has been any feasible solution evidenced either by the data that is in the CASE document or subsequent to that nor the engineering analysis that's been performed by CEC. Allowing mid-powered charging systems more leniency to allow them to continue to exist

would not have any effect upon the proposed low power limits the CEC is advancing here.

And so essentially all of those products down below 10 watts would not change in terms of whether they were in or out in any appreciable manner. This is truly something to accommodate the mid-powered products out there, which admittedly there may be fewer of. But some of the needs for using nickel-based systems are just as important there as they are in the lower powered products. And so we would like the Commissioner and Commission staff to consider this proposal as an alternative to the ones that are being advanced currently.

I appreciate all of the accommodation that CEC staff has provided in allowing me to speak today and in the past and having this ongoing discussion about these issues. And I appreciate also the flexibility that we have seen so far in terms of coming up with alternatives to the original proposal. Thank you.

MR. RIDER: Larry, would you be able to hold on on the phone until after the NRDC proposal? I have a blue card with a question here but seeing as we were trying to hold off questions until after the presentations, will you be able to hold on for another 15 or 20 minutes?

MR. ALBERT: Sure.

MR. RIDER: Okay.

MR. ALBERT: Are you going to mute me in the meantime and then unmute me?

MR. RIDER: Yes, I will mute you and then I will unmute you when the question is asked.

MR. ALBERT: Okay, great. Thank you.

MR. LEAON: Okay, our final presentation will be from NRDC.

MR. DELFORGE: Commissioner Douglas and CEC staff, thank you for the opportunity to present NRDC's perspective on this important rulemaking. First slide, please, Ken.

I would like to start off saying that we strongly support the CEC proposal on this rulemaking and we urge you to proceed without delay. And I will get into why we think it is important to proceed quickly. The savings of this proposal are very large, the equivalent to a 350 megawatt power plant. That is as much electricity as is used by all the households in a city the size of San Francisco. And from a financial perspective it is $300 million per year in Californian's pockets, which will stimulate the economy and create jobs. So this is also very important from an economic perspective. From cost effectiveness, it is extremely cost-effective with a benefit to cost ratio of seven to one overall. So, you know, I think this is an important proceeding to pursue. Next slide, please.

Before we delve into the reasons for our support in

moving forward I would just like to – it is important to note that some of the efficiencies of the products currently on the market are extremely low today. And especially looking at these low power products, the efficiencies as measured by this test method are around two to three percent for the worst products, which effectively means that 98 percent of the electricity is wasted, either by the charger or in the off mode functions and not delivering value to the user. And on behalf of our members, NRDC thinks that this is unacceptable in the current climate that we waste this amount of energy and clearly something needs to be done. Next slide, please.

So let me address the key question. You know, with DOE moving ahead with its own proceeding, which will preempt California when it is effective, why is it important for CEC to move forward? I think the important thing to consider is that DOE has proposed different Candidate Standard Levels, or CSLs. The two most relevant ones are CSL1 and CLS2, CSL1 being middle of the market and CSL2 being best in market. And CSL2 yields approximately 60 percent greater savings that CSL1. So if we think of it in terms of what is our desired outcome here we would like to – you know, we think the best outcome would be for CEC to adopt a strong standard at the CSL2 level, which is roughly what the current proposal is, and to have DOE follow suit within their own

timeline.

And in order to do this it is important that CEC moves forward before preemption and therefore before the DOE adopts its final ruling. If we did not do so, you know, not only would we forsake the savings until DOE's rule comes into effect but we also would potentially forsake the savings in an ongoing basis that would come from having a strong standard at the CSL2 level. So we think this is one of the key reasons why we are urging the Commission to proceed with the current proposal as soon as possible. I would also like to point out that, as presented by Dennis Beck this morning, the schedule for DOE is very uncertain and seems to be significantly delayed. And that every month that CEC can gain on the DOE schedule will save Californians an extra $25 million, which is also very significant. Next slide, please.

Now I would like to address some of the industry concerns that have been raised over the past three workshops. And first we acknowledge that there have been very significant changes and adjustments made to the proposal in the last round, sixteen changes both to scope, test procedure and the standard, including some very significant ones. We recognize that there are some legitimate concerns that have been addressed and need to be addressed but we also caution the Commission about giving

out too many concessions that would weaken the standard. I think we have one shot to get this right. If we try to go again, you know, if we do incremental changes, the last incremental steps may not be as cost effective to justify the standard. So it's important that we get it right from the first go. And I would urge the Commission not to trade stringency for timing. I think it's important to go quickly and to try and have the standard implemented as soon as possible but it's also possibly even more important to have the right standard with the right level of stringency.

I would also like to point out that there have been some very supportive comments, in particular one comment on the docket which is from the _____ Manufacturer's Association – and, Commissioner Douglas, I don't know if you had the chance to read it but I think it's important. It's a statement in support of the proposed standard. They are the manufacturers who actually manufacture the components used for battery chargers and external power supplies. And they state that technically these components are already on the market so it's technically feasible, it's affordable, and they think it's actually good, it's important to move forward with that type of technology. Next slide, please.

I would also like to point out that in the past – in particular two proceedings, one on the external power supplies – we have heard some dire predictions about empty

shelves and product not available because they might not be able to meet the standard. And the reality is that none of this happened. The standard was implemented with no harm on California and was even adopted in the US and internationally and it was extremely successful in terms of saving energy and in terms of financial savings. I think this EPS standard in particular is a model of what we need to achieve on the battery charger standard. Next slide, please.

Another one even more recently on TV, which again the prediction from CEA was that the standard would empty shelves. And the reality is that the majority of the products on the market already meet Tier 2 two years early, they cost less and have more functionality than prior to the standard. So I think we should recognize that this is not representative of the entire industry feedback and a lot of engagement has been constructive. But we also urge industry not to be overly pessimistic or conservative in the claims of the impact of the standard and to support a standard which will be in the interest of Californians and of the future of society by eliminating undue energy waste. Next slide, please.

I would like to briefly address some concerns expressed by the IT industry representatives. I have spoken to around the previous version of the standard before the

combined metric, which was both in terms of the test procedure and the stringency of the limits in no-battery mode and maintenance. And there is another standard coming into effect in the EU which requires 0.5 watts in standby mode by January 2013. So it is not exactly comparable because it doesn't address the battery charging energy, purely the EPS and the (unintelligible) in the notebook. But when you compare the different components of the two standards the current CEC proposal with the combined limit based on our analysis is actually slightly less stringent than the EU standard and allows more than necessary energy for charge control and battery losses of the lithium-ion batteries. So certainly we think this is sufficient and it could even be slightly tighter, like to the 0.8 plus 0.0021 Eb, and would still allow notebooks to comply.

There was also concern about the test procedure and, while we understand the suggestions of eliminating or isolating the non-battery charger rated functions from the test procedure, we think that this is not necessary. This actually could be counter-effective as explained by Suzanne Porter from ECOS this morning, that it would create a loophole by allowing unnecessary waste in off mode. And the current standard level allows compliance within the current test procedures. We don't see a need and we don't advise that the test procedure be modified to meet that need. Next

slide, please.

So finally I just want to address the labeling or efficiency marking requirement. We believe that this is something which will facilitate enforcement and we have a precedent on this with the EPS, the external power supplies, where a similar mark was extremely successful and instrumental in getting the efficiency requirements implemented nationally and internationally. So this facilitates compliance because the mark is much easier to verify than a set of equations and metrics and limits. So it allows the compliance to be obvious just from looking at the product. Next slide, please.

So I recognize some of the concerns by industry that this creates an additional local- or state-specific mark but really this is not the intent of the mark. The intent of the mark is to become a national and, if possible, international mark just like the EPS one. It will facilitate compliance verification. So, as Ken clarified this morning, it would not replace certification in California. But I think the compliance verification benefit still holds. Perhaps more importantly it creates a framework so that internationally we can have a set of consistent regulations on an international basis which makes implementation of the standard much more cost effective internationally. So we believe it is important to adopt

this requirement and to move forward with it and that will be a success factor for having the standard adopted nationally and internationally. Next slide, please.

In terms of the location of the mark, we have had some concerns about where the mark should be located, which of the components or the battery chargers. We have made some suggestions here showing that, you know, there are already many marks on these products for safety, for materials. And what we are suggesting is just to add one for energy efficiency, which I think is very warranted. And the issue of the four different form factors that we find commonly on battery chargers, there is a – you know, it's easy to find a place to put this mark. Again I want to clarify this is not a consumer-facing mark, it's a compliance mark and to facilitate a regulator, enforcement and manufacturer compliance as well as management with their suppliers. Last slide, please.

So just in summary we think this is an extremely cost effective standard, again, with a benefit to cost ratio of seven to one. It is technically feasible and reasonable, as demonstrated by the power source manufacturers' feedback. It is going to be a major energy and greenhouse gas savings opportunity in support of California's greenhouse gas goal. And it is also a great opportunity for growth and jobs in California, given the magnitude of the savings for

Californians. That concludes my comments. Thank you.

COMMISSIONER DOUGLAS: All right. I think we are through the presentations. We have a request to ask a question of Larry Albert. So, Larry, thank you for hanging on the line. Gary Fernstrom, you have a question? Please come forward. Gary Fernstrom is from PG&E.

MR. ALBERT: Gary?

MR. FERNSTROM: Hi, Larry. Hey, thank you for hanging in there until after ten o'clock to take my question.

MR. ALBERT: No problem. I wish I was there in person, believe me.

MR. FERNSTROM: Yes, we wish you were here, too. It's a beautiful day in California. Here is my quick question. I have worried too many times about nickel-cadmium battery chemistry with respect to these standards. And I think you and the folks from Motorola make excellent technical points about that chemistry. But I have been led to believe by the technical experts that I am in contact with that if nickel-cadmium batteries had the same smart charge algorithms and the same smart charge circuitry that lithium-ion batteries did their performance could be improved. If they are charged with conventional circuitry in the conventional manner then, yes, they behave as you and Motorola represented.

So would you care to comment on whether the opportunity here is with the battery chemistry or whether or not the charge algorithm and charge circuitry might have a bearing on performance?

MR. ALBERT: Yes, no problem. It's a really good question, Gary. And it's going to require a little bit of explanation but it's worth going through, I think. The fact of the matter is that because nickel-based chemistries require maintenance charging there are two broad categories of chargers that are out there. There are chargers that – maybe calling them dumb wouldn't be fair, but they are definitely not smart, right? These are chargers where basically the active mode charge rate is low enough that it can also suffice as the maintenance charge rate. And so this might be a charger that, you know, charges maybe over 16 hours. And because of that the charge current is pretty low. And it's low enough that you can actually keep on charging it at that rate because the cells can in fact tolerate it. And, of course, it will maintain the cells during that time. But it's an excessive amount of overcharge for what the cells actually require.

And so I think it's been recognized by folks that these kinds of chargers in fact are the ones that, you know, are probably the worse offenders when it comes to appliance battery chargers. Because there is an opportunity once the

pack or the battery is fully charged to lower the charge current down to some more moderate value. There are already any number of chargers out there for nickel chemistries that already have smarts in them, either because they need to because the charge rate is too fast to be able to employ this simpler system or for a variety of other reasons, right? So certainly the technology to do charge termination for nickel-based systems is well known. It is not necessarily as simple maybe as folks might think it is but it certainly can be used.

You still, however, are stuck with the situation that when you fully charge you have to maintain the charge of the batteries. And so you can throttle the charger down to whatever that minimum level happens to be for that battery to be able to keep it in the state of readiness until the user needs it. But the inherent nature of these cells is they do have self-discharge, they do require maintenance charging and so on. And just to compare this to lithium – which is like the complete opposite case, right? – in lithium cells not only can you terminate but you must terminate because you cannot continue to charge these cells past the point where they are fully charged for safety reasons. And because of that then obviously there are technologies developed that terminate charging and completely turn off the current into the cells because it is

essential to do so. The reason you can get by with this with lithium cells is that they have effectively no self-discharge rate and so therefore don't require maintenance charging. That is one of the key differences between the two kinds of chemistries.

So in short, definitely there is an opportunity for improvement for nickel-based charges, particularly of the not-smart type. And I think, you know, certainly in talking to Ken and Harinder and so on I think they understand this in terms of where they are trying to go with the standards and proposing a maintenance power limit of combined no-load and maintenance power limit that is low enough that it essentially would not be able to let chargers that don't terminate through. But at the same time you shouldn't be setting that limit so low that you can't keep these cells in a state of readiness.

So really the discussion is not about – at least in my mind it's not about the question of whether we get rid of continuous rate chargers. I think that is already decided. I think the question is making sure that the smart chargers that we have going forward can in fact do what they need to do by setting the maintenance limits at a level that appreciates the necessity of nickel-based cells for this.

MR. FERNSTROM: Okay, so Larry, just one more really quick question. Having focused in on this

maintenance charge necessity for NiCd cells, would it be possible to perhaps cycle the cell between a hundred percent readiness and ninety percent readiness rather than continuously charge it to maintain a hundred percent readiness and gain some additional efficiency that way? I'm just looking for other algorithms or other opportunities that maybe haven't been considered.

MR. ALBERT: It is a good question, Gary. And I don't have an answer for it because I'm not familiar myself with if such an algorithm exists or not. You know, whether it's been patented or anything like that. I know ideas like this have been talked about. You know, one kind of thinking would be that eventually you're going to have to recover that charge anyway that you've lost. And when you do that you are going to suffer the same kinds of inefficiencies. There might be a marginal improvement in doing what you suggested. I don't know whether there is any basic research going on out there to do this. But certainly, you know, you could imagine that if you figured out that that was something that could improve energy efficiency you could imagine there being an algorithm, as you mentioned, to accomplish it.

MR. FERNSTROM: Okay, thank you very much for your thoughtful responses.

MR. ALBERT: Hey, sure. No problem, Gary.

COMMISSIONER DOUGLAS: Are there any other questions for Larry before we let him get off the phone?

MS. PORTER: I had a blue card with one question on it.

COMMISSIONER DOUGLAS: Is it a question for Larry or is it a comment?

MS. PORTER: Yes, it is related.

COMMISSIONER DOUGLAS: All right, well why don't you come forward then and that way if he has any response he would like to give he will be able to do so.

MS. PORTER: This is Suzanne Porter representing the IOU statewide codes and standards team. Hi, Larry.

MR. ALBERT: Hi, Suzanne.

MS. PORTER: I wanted to make a couple of comments related to the differences between nickel-cadmium and lithium-ion chemistries. It's true that they have different technical characteristics but there are also elements related to the market that have created significant differences in the way that the battery chargers have been designed for these two chemistries today.

So Larry pointed out first of all that the products that we see in the market for nickel-cadmium and nickel-metal hydride, fewer of them meet the standard and in certain ranges none of them meet the standard. And he suggested the primary reason for that is because of

technical differences between the chemistries. There are a number of market differences between products that have lithium-ion chemistries and those that have nickel-cadmium and nickel-metal hydride that I would like to point out, that in part have led to low cost, less efficient designs, which makes it difficult to find these kinds of designs in the market today.

First of all, nickel-cadmium and nickel-metal hydride is not a safety issue to overcharge nickel-cadmium and nickel-metal hydride cells in the same way that it is for lithium-ion. As a result of – it's possible to overcharge and overcompensate for the trickle charge, which is a lot of what historically has been done as sort of an engineering rule of thumb to ensure a hundred percent readiness. Significant research by Isidor Buchmann, who is the head of a battery analyzer company in Canada and has published a number of books around batteries and battery chemistries and how they behave, suggests that the trickle charger for these products can actually be significantly lower than the engineering rule of thumb that historically has been used, enabling much lower battery maintenance levels than we see in products today. And it's on these numbers that we have built the model that formed the foundation of the Codes and Standards Enhancement Report as well as the models that we supplemented in the March

workshop, where we picked the highest battery chemistry that was available on the market, including the same power tool example that Larry gave. And our model shows very different battery maintenance requirements at lower trickles. So I just wanted to point out that part of the reason why we don't see products today is because of the nature of the chemistry and the fact that we can overcharge it significantly.

Secondly, nickel-cadmium and nickel-metal hydride are a lot less sensitive to cold and temperature differences. They are a lot more proven technology. But the other thing that I wanted to emphasize is they are also a lot less expensive than lithium-ion chemistries. And that cost differential has been going down over time. But as a result they tend to be incorporated into products that are very price sensitive. So what this means is that the simplest circuits split pennies in order to try to reduce cost to the consumer to beat in the market that are being sold in the Home Depots and other low cost, high volume products is an important consideration that the market has driven. And this is an opportunity for the Commission to create an alternate market incentive to enable a lowest cost life cycle to the consumer rather than having a very low first cost and a more expensive energy bill over the lifetime of the product.

And I won't go through the detail of the model that showed the trickle charge values that we felt were needed, but there are between 0.3 and 0.36 watts, they are documented in the docket in the presentation we made in the March workshop. And we would be happy to supplement that with comments in our IOU response. Thank you.

COMMISSIONER DOUGLAS: Thank you. Larry, if you are still on the phone we will give you an opportunity if there is anything you would like to add and then send you on your way at past ten p.m.

MR. ALBERT: Okay, thank you. With regard to Suzanne's first comment, the values that I mentioned in the analysis there were recommended values from the cell suppliers themselves typically. And, you know, they vary all over the map. And so there is certainly an opportunity to do some research for lowering whatever the minimum current requirements are. I just want to caution people who are not manufacturers that, you know, when you need to make a product for a certain environment you need to consider the application of the product over a wide range of considerations. And most companies that do this on a regular basis have pretty extensive test regimes, pretty extensive laboratories to do this kind of testing. So it is typically the case that when a manufacturer is choosing some sort of maintenance current they are certainly going to be

prudent to make sure the performance is there and they are certainly going to test it over a wide range of conditions that might happen in real life. And certainly in laboratory situations you can get some pretty optimal effects that are not necessarily achievable in the actual marketplace or during manufacturing. So, you know, certainly if there is data to suggest or there are certainly examples out there that we can point to that show in similar applications lower charging current then certainly I think manufacturers would be interested in that.

With respect to the lithium versus nickel question, this really gets down to the point of whether it is the intent of the Commission to achieve lower energy consumption and higher energy efficiency in battery charging system by essentially eliminating nickel-based systems because of their lower inherent energy efficiency. And we have been repeatedly told that that has not been the case, that was not the intent of what was going on, there was every intention to maintain chemistries and let them live out whatever life they were going to live out. And it was not something that was going to be constrained in such a way by regulation as to basically force manufacturers to switch chemistries before they or their customers were willing to make that change. And so for whatever reasons we might suppose why nickel is around and lithium is not, the

question is if you find a nickel-based system out there you cannot in your analysis, I would think, fairly say that you are going to achieve the required energy efficiency by switching it to an alternate chemistry. And if that is your intent then I think it would require going back and first of all notifying stakeholders and manufacturers of that intent and, secondly, to consider that as part of the cost of making the switch to the more efficient system and what that would entail, both in terms of product cost and also in terms of retooling cost. And certainly that has not been what I've seen so far.

Most of the considerations with respect to what it would take to comply have involved taking the chemistry as it stands and just working with it to try to improve the energy efficiency of the system. So it would be interesting to see whether the Commission's intention is to do as sort of Suzanne is suggesting and create a limit that is strict enough to effectively outlaw nickel systems in the hopes of finding higher energy efficiencies and lower consumptions.

COMMISSIONER DOUGLAS: All right, Larry, thank you very much for joining us from London and thank you for your very detailed and well-developed comments. It helps us a lot when we have very specific comments like this to look at and to consider. I would like to invite you to submit written comments as well and elaborate on anything that you

may have given us or based on anything that you might have heard today. And with that we will let you go. So thank you very much.

MR. ALBERT: Thank you.

COMMISSIONER DOUGLAS: At this point I don't think we have any more presentations. I'm going to go down the list of blue cards in the order in which I've received them. I'm going to give Suzanne another opportunity because I think she stood up based on wanting to catch Larry. But there may be other things that she had to say. So with no further ado, if anyone else wants to fill out a blue card please do so. I would like to ask Rick Habben to please come forward.

MR. HABBEN: Good afternoon. I want to also thank the Commission for having this additional workshop. I appreciate the opportunity to come and to comment. And I also want to thank Harinder and Ken for the recent openness and being able to have, I think, some good discussions, some good comments back and forth, dialogue on some of these issues.

I would first like to start out that, you know, I have some concerns and maybe I'm not familiar with where all the data is coming from. But I hear mainly from ECOS the amount of savings that are going to be obtained through some of these changes. And I guess, you know, I'm not seeing any

background data as far as the households, you know, is it the average household energy that is being calculated as far as the savings, are they four-family homes or are they two person homes? You know, where is the background data for all this energy savings that is being thrown around?

The other thing that I would just question is, you know, are duty cycles that we've mentioned in the past being taken into consideration when all these calculations are being made? Obviously, for beard trimmers that we make, the majority of them are not left plugged in. So to take a wattage from a beard trimmer and apply that to 24/7, 365 days a year is completely not rational to do because that is not the way the products are being used. So I'm just wondering where all that energy savings and what the numbers are based on to come up with the kind of numbers that we are talking about.

I would like to go through some of the issues that were brought up on the one slide of ECOS. And, Suzanne, obviously you can answer at the end and I'm sure you will have some answers for some of this. One of the things that I wanted to bring up was regarding the circuit board. In there, there is a comment that says circuit design and board design can be absorbed into regular OEM redesign schedules. It depends on your company and the way you function if that is really the case. Many companies, such as ours, when we

develop and design a product it doesn't necessarily go away with a new design that comes out. Sometimes the new design will be an addition to. You know, a customer, they have a particular model, it is maybe an older model and they will continue to want to sell that. So just because you come out with a new trimmer or clipper you may have other retailers that may want to keep the older one or they may want to put both in to give the customer more opportunity. So they don't always just go away just because you come out with something new. So I kind of wanted to eliminate that there is always going to be something new to replace it.

It also says that changes to product molding is not required. And that is simply not the case. The one example that ECOS actually gives, that's actually our trimmer. We were able to adopt the lithium circuitry into the trimmer. However, I have other products that are much smaller than that and have no PC board in them at all. So to say that tooling wouldn't be required and that housing could be accommodated in something that doesn't even have a PC board in it right now, it's impossible to do. So it depends on the product. Yes, there are some that can be adapted such as that one that is shown up on the screen. But there are other ones that cannot be adapted. So it is not a fair statement to say that changes to product molding are not required.

That also goes along with, you know, components that are smaller can be fit on existing boards. If you have a board in there, there is probably a good chance that you might be able to fit the components onto the existing ones. You know, the surface mount components are small. But it has to be done on a case by case basis.

In addition, the mark-up costs that are being thrown around – and I stated in the last workshop that we had – are not correct. And I have a question. Did anybody from ECOS consult any of the retailers regarding cost mark-up and what was their answer? My feeling is that if they would have asked the retailers what their mark-up was you would know that the numbers that we are throwing around are not correct. And I'm not saying you take my numbers, I'm saying to ask the retailers, you know, What are your mark-ups when you are purchasing it from an OEM versus retailing it, what are your mark-ups? And all I'm saying is that if you are taking the base cost of components to make these changes – let's say it's thirty to forty cents – and then the manufacturer has overheads and stuff that he has to apply – so let's say that doubles to – normally that does double with the overheads and labors. So now you are up to sixty to eighty cents. Now when you take that product you've now increased that product by eighty cents and you sell it to a Target or a Walmart or a K-Mart their costs are going to

approximately double again with the retailer's mark-up. So, you know, you can't take raw cost of five cents and say this is what it is going to cost your consumer. That is not realistic and not feasible.

In addition, another statement on that slide was full safety testing unlikely required with these changes, turnaround likely four weeks. If you have a product that is currently UL- or ETL-approved normally your retailers want to continue to have that product UL- and ETL-approved. Just because you redesign it doesn't mean that no longer are the approvals required. With all the lead in the paints, the drywall issue, the dog food issue, you know, retailers want to know that the products that they are selling are safe. Even if they are low voltage they still want to know that they are safe. So if you make a change in the circuitry or the design, and especially if you go from nickel-cadmium or nickel-metal hydride to lithium, they are going to want to know that those are approved products and have been tested by a third party safety organization. The four weeks is pretty aggressive. I would challenge you to call UL and ask them to give you their timelines that they have even for small personal care appliances from the start of the project to the finish. And in most cases if you look at projects they are longer than four weeks. I would say they range more from six to eight weeks.

So I want to go back to the proposal as far as what has been done. I appreciate the Commission and the proposal that they have done as far as combining the no-battery and the maintenance mode together. What I would like to propose – and it was alluded to a little bit in Ken's slide and also in Larry's slide – is that for the small units that have a very small double-A battery, such as the unit that you're seeing up on the screen now, those battery capacities are extremely small, normally around anywhere from 600 milliamps to 1200 milliamp-hour. So when you put them into the formula of the 12 plus 1.6 times the Eb, because the Eb is so small it doesn't gain you anything.

And so what I'm proposing is from the zero to five watt-hour batteries, which are still very small batteries, that the formula – we could do it one of two ways and I'm open to either one. Either the formula could be modified – and if we modify the formula my recommendation would be instead of 12 to move that to 16 plus 1.6 times Eb – or to have a floor level of just saying 20 watt-hours. Either one would be acceptable for me. And, again, this is just for the zero to five watt-hour batteries.

And the reason I bring that up is because I did some testing on my products. And I have two products, basically one in the maintenance mode level does not exceed more than – it is 0.645 watts, that's what it is. 0.645. And I have

another one that is 0.748. Both of those with the formula the way it is now would not be compliant. I mean, they are very close to being compliant with the levels but they would still fail. The levels that they would have to meet for the 0.645 watt would be a total of 14.3 and my appliance is 15.8. So I am very close. The other one, the requirement would be 16.06 and my product is 18.52. So you can see I'm very close. And the duty cycle, which we haven't brought up too much at this point in time. But the duty cycle on those products is very low but in addition the level of compliance versus not is very, very close.

And then the last thing that I want to bring up at this point in time would be the effective date. And I have, I guess, some things for the Commission just to think about with the effective date. It appears right now, unless you don't take any time for any of our comments, you are going to be beyond the July date for when you guys wanted to finish. So you guys are probably looking at, I would say, probably August or September maybe before you would have things done. So what I'm saying is that, because you have the Christmas retail season, it would be much better for us if we could push through all the product and have the design changes effective for January of 2013. The second reason for that is because if we do need – which we are going to change some of the products, then you would have a clean

break for price increases to your retailers. Where right now if you make the effective in September, October, you know, we as manufacturers have to decide do we eat those price increases that are taking on with additional components or do we try to go to the retailers at that point. It's usually very difficult to try and do that in the middle of the thing. So I would ask that, you know, if you could push it to January at least it gets us through the retail season and all the products starting as of the January 2013 then would be manufactured compliant.

So that's all I have at this point.

COMMISSIONER DOUGLAS: Thanks for those comments. I was going to ask, could you just identify your name and title and company for the record so that we have that?

THE REPORTER: Mr. Habben gave me his card.

COMMISSIONER DOUGLAS: He gave you his card? Okay, so you will put it in.

THE REPORTER: Yes.

COMMISSIONER DOUGLAS: Okay, well, never mind then, that's fine. And you asked a couple of questions about the methodology for how we calculated savings and to what extent and how we took into account the uses of the various products in that calculation. And I wanted to see if either ECOS or staff wanted to give you – I mean, we could say go back and read it, but we are all busy. So if somebody could

give you the one-minute version would it be helpful?

MS. PORTER: Ken, you should feel free to chime in here as well. This is Suzanne Porter, representing the IOS Codes and Standards group. In response to your question regarding substance in the numbers, first of all I wanted to recognize that we heard your comment from the last March meeting and the IOU statewide team actually recommended a slightly less aggressive duty cycle for the product category that trimmers occupy and recommended that the Commission incorporate that into their energy savings model. And at this point the model and the changes that are being made as a result of the pre-rulemaking activities are being handled by Ken Rider and the other part of the Energy Commission staff. And my understanding is they have a model up online for careful consideration, including duty cycle and so forth. It's a pretty simple model so it can easily be reviewed and I would encourage you to do that.

The other thing about the substance of the numbers that I just wanted to say is, in terms of the way we calculate the number of household energy savings, an average electricity use of the California household is about 6660 kilowatt hours per year and that's the value we used for the presentation.

MR. HABBEN: So is that just an average household? You combined obviously large and small and that's just the

average that they go across the whole state?

MS. PORTER: That's correct. It's a household average electric use. So it's meant to represent the magnitude. You know, sometimes it's hard to put our heads around what is this many gigawatt hours or that many gigawatt hours. But this just helps us to get a sense of the order of magnitude in terms of the savings that we are looking at. So that was the specific number used. I also just want to emphasize there is a lot of substance to the numbers that we put forward and we have been providing those to the Commission.

MR. HABBEN: Just another comment. Could you comment on the mark-ups? I know you said you used from DOE but I was wondering if you guys did any more additional research regarding product mark-ups.

MS. PORTER: The CASE report was prepared before the US Department of Energy released its preliminary analysis. And we for that methodology actually overestimated the mark-up of about two times the bill of materials cost. Since that time – and we made recommendations that the Commission incorporate this into their energy savings values as well – the US Department of Energy released its preliminary analysis and their methodology for conducting the mark-ups was much more extensive than ours. It included interviews with

manufacturers, it was by product category, and it was superior to the methodology that we had used in the original report.

And so for all subsequent analyses that we presented as a part of these rulemaking activities and for recommendations to the Commission in the March comments we recommended the DOE methodology, which includes mark-ups of manufacturer's sales price, manufacturer's sales price to retail, as well as tax. And so the numbers that you saw on page nine related to the power tool and the numbers that were represented in the March 3rd workshop were the product of all of those compounding mark-ups from level to level throughout the market chain, including tax to the consumer. So if you have concerns about DOE's methodology itself I would encourage you to give them those comments. But that was the best available information that we have on this product in terms of mark-ups at this time. And so that's what we incorporated into the analysis.

MR. HABBEN: So just for the record I would comment that, you know, as of right now we believe, based upon what is reality in the real world, that the mark-ups being used are not correct. I can't say that extensively across all categories but from what I know as far as what the real numbers are that is incorrect.

And then one last question I have for you, Suzanne,

is regarding the cost of the components. When you guys are gathering the cost that it takes to incorporate these changes and to improve the products, the quoting of those components, how is that done and what quantities is that pricing based on?

MS. PORTER: So as quantities of these electrical components increase, the cost goes down considerably. And at very low quantities, like 2500, the cost is fairly high. But as DOE indicated in its own analysis of battery chargers, once you reach a certain point, shortly thereafter there are price differences but it doesn’t go down very rapidly once you reach a certain point. So estimates that we used are based on tens of thousands of quantity. So it is well within the types of quantities we would see within the State of California, particularly for consumer products that sell in vast quantities from discount retailers.

MR. HABBEN: So I guess my comment on that is that when you’re talking tens of thousands, you know, there might be certain models that you may sell tens of thousands of. But there are a lot more models where there is going to be other small retailers. And I want to explain a little bit. Normally if you have a product that a retailer such as Walmart is taking, normally there will be other smaller retailers that won’t want to sell the exact same unit because they know that they can't compete on the same price.

So what they will do is they will take one of your other models that has basically the same function but may look different and may have a completely different circuit board design or whatever. And, obviously, those quantities are much smaller.

And so you don't want to not sell the smaller products to not meet the needs of the other retailers or competing retailers or the smaller guys. So I guess we just have to be careful when we are throwing these extremely low numbers to make these cost designs that there are products out there where you are not going to be selling tens of thousands. You know, it may be ten to fifteen thousand pieces a year instead of, you know, a hundred thousand pieces.

COMMISSIONER DOUGLAS: Well, thank you for your comments and your questions and for being here. We invite you to submit further comments on mark-up and on anything else that you would like to. Dennis?

MR. BECK: Commissioner, this is Dennis Beck from the Chief Counsel's Office again. Let me make an important point here. One of the things that we have asked for in subsequent workshops is when assertions are made such as the incremental cost and what people in the industry believe to be the true case and when they believe that what is in the CASE report or what we have in our analysis in the staff

report is incorrect. What we really need is data that we can evaluate these claims as best we can.

I know that a number of businesses and industries are very reluctant to submit that information because it is business proprietary information. But we do have a confidentiality process. Mr. Erdheim, who is in the audience today, availed himself on behalf of Philips of that process and that is in the process of being – that confidentiality application is being processed right now and my understanding is that it eventually will be approved. So there is a process by which industry, if they do have data that supports these claims where they don't want it necessarily to become public, you can avail yourself of that confidentiality application process. And that is set forth in the data request that we sent out a few months ago. That's really what's going to help us make an evaluation, if we have that data.

COMMISSIONER DOUGLAS: Yes.

MR. HABBEN: This is Rick from Wahl again. I got the initial form from Ken, that confidential form process. I would like to stress, I thought it was going to be a simple form that you kind of sign off. Your form is very lengthy, cumbersome and complicated. And I would urge you to streamline it to encourage more data being submitted. Right now it just is very detailed and that's why I have

been working with Ken and Harinder via phone and trying to supply to them what I could without going through that process. But I think Ric Erdheim did send in some stuff, but I think it is still held up in your review and that has been a little while. So I would just encourage you to do what you can to try and improve that.

MR. BECK: I believe the Philips application was submitted on the 9th of this month and under the Title 20 we have 30 days to make a decision on the request for confidentiality and to inform the person making the application. So I think we should be making that notification, that decision and notification, well within the 30 days.

COMMISSIONER DOUGLAS: All right. The next card is Ric Erdheim, Philips Electronics.

MR. ERDHEIM: Good afternoon, Commissioner, Mike, Ken. Thank you for the opportunity to comment. My name is Ric Erdheim, I am Senior Counsel to Philips Electronics. We are the world's largest lighting company. I believe, Commissioner, you are familiar with some of our lighting products and I know you've seen our 60 watt LED bulb. This week at Light Fair we announced that we will have a 75 watt replacement LED bulb. And I think at the trend you could see we will probably have a 100 watt bulb pretty soon.

We were discussing earlier today amongst some of

industry members who had more products that were affected by this regulation. And I'm not sure we came to a conclusion but I would argue Philips is in the lead. We have our consumer electronics and shaving products, Norelco shaving products that you are probably familiar with. We have inductively charged Sonicare toothbrushes. We have exit signs and emergency lighting, which you have heard something about today. We've got medical devices such as sleep apnea machines and automatic external defibrillators. And so this has been an interesting process for me trying to represent all of these different groups at Philips to provide you with comments.

We appreciate this additional workshop. We have worked with staff – I think Ken and I have become pen pals – dealing with many of these issues. I'm pleased to say that staff has addressed many of our concerns but we still have concerns that others will be raising. You've heard some of them already: effective date of the standards, standards for small battery chargers with nickel chemistries, infrequently charged products. And I would just add in, this is probably the first hearing I've come to – and I've come to many – where I wasn't waving my beard trimmer, which I use once a week, charge maybe four times a year for three hours at a charge. If I'm lazy and don't get it at three hours maybe it goes up to four or five hours. So it gets

charged maybe one day a year. So it really doesn't matter how efficient you make the battery, the energy savings for that product are minimal. And also some of the labeling issues which I raised at the last hearing.

I'm not going to repeat those comments. I will be submitting comments again and others will be talking about it. I want to focus on emergency lighting, which is an issue that no one else is going to be talking about. We appreciate that the staff has proposed to exempt exit signs but the proposal would continue to regulate emergency lighting products. And just so we are clear, emergency lighting products provide emergency illumination to the egress point, whereas the signs show a change in the egress direction.

Now, the proposed energy levels in the proposal are below those that would be necessary for most of our existing emergency lighting products. Unlike other products subject to the regulation, emergency lighting products are heavily regulated, they are in all the building codes, it tells you exactly what type of light you have to provide in what area. Unlike other products in this proposal, emergency lighting performs essential life safety functions. And unlike other consumer products, our product scope is not going to be regulated by the Department of Energy. So I know from past discussions with the staff that there is concern about

getting these regulations done before the DOE so that they are not preempted. You don't have that issue with these products. They can be regulated at any time if you so choose.

Now, our concern goes back to the original CASE report, which called for regulating these products. But unfortunately it did so without understanding the nature of the existing regulatory requirements which already apply for emergency lighting products. It simply examined the efficiency of a low end product. And ironically you saw that product in the presentation that NRDC made. It was the fourth one, it was a low end emergency lighting product. And by saying, well, that product could achieve the standard therefore all emergency lighting products could meet the proposed standard. And the fundamental flaw in that is that emergency lighting products are not regulated as a product. What you regulate is the amount of light put out in an area. You can achieve that by one product, two products, ten products, any number of products. But it's not the product that you are focused on, it's the light in a certain area. It is measured by foot candles. So that's what the focus is.

So when you look at a product you ignore the existing regulatory requirement of focusing on light in a certain area. And in fact we provided the staff as non-

confidential data with an analysis showing that if you took that product that was shown in the NRDC proposal you would need nine of those to provide the light that would be necessary for two of our standard products. And then when you actually added up the energy used in those nine products versus the two of ours you would be using double the amount of energy to provide the light that was required for by the standards in a certain area. You would need double the energy that our two products would provide but on a product basis those two products are much higher. But you only need two of them as opposed to nine of the low end products.

So we think when you establish a standard for emergency lighting by product you simply fail to understand the existing regulatory requirements, which focus on providing light in an area. I think the concepts – we would request that emergency lighting be exempted from the standards. I don't think this is a radical solution. Last year, in fact, the Congress exempted all life safety products from the external power supply standards, federal external power supply standards. But even if the CEC decided that it wanted to continue working on this – and we have been working with Ken – and I would say in response to Dennis that we have supplied confidential data on this. But, just to make the record clear, it took me a long time to gather all the information. It is not an easy process to

go through. I realize this is not the right forum, but I hope you would consider reforming that process.

But even if you decided you wanted to continue looking at emergency lighting we would note that, again, there is no rush to judgment, there is no preemption that is coming from the DOE. And we think that you should separate emergency lighting from this rulemaking and consider it separately.

Now, the proposed requirements also have lighting controls in them. And we noted that there are no comments on lighting controls so we are not going to talk about them. And at the last workshop that we had Gary Flamm from the staff talked about how he sat down with the National Electrical Manufacturers, who represent the lighting control manufacturers, including Philips, and worked out this standard such that there are no comments because everyone is onboard with that. And what asked Mike at the time was, why don't we have that type of process for emergency lighting? Maybe there is something that can be done. Our initial thought is probably not, but we are willing to sit down and go through that. But what we face now is, well, we've got to get these regulations out because we are going to be preempted from the DOE. So we are rushing through to get these things out without a full understanding of the regulatory requirements affecting emergency lighting.

So I thank you for your attention. I would be happy to answer any questions.

COMMISSIONER DOUGLAS: Thank you for your comments and for being here and for submitting data under that process. If a few more people say that, you know, I will rush out and try to figure out if we can make it easier. But it's important to us to get data, it's important to us to have information that we can really analyze and understand.

I have one question for you. I have to say I am familiar with your LED bulbs but I'm also familiar with the incandescent bulb that Philips makes that is compliant with our lighting standards and is one of the examples of why Thomas Edison is alive and well. So, you know, I'm just trying to understand your example of emergency lighting where, say, two high end units might produce –

MR. ERDHEIM: Because of the amount of light.

COMMISSIONER DOUGLAS: Absolutely. But what I'm trying to understand is, you know, we are regulating the battery charger not the product. And so my instinctive reaction to that is, regardless of whether it's a high end light or a low end light, we want the battery charger to be more rather than less efficient. So maybe you could help me understand the point of your example.

MR. ERDHEIM: If you have two products instead of

nine products you are probably going to be drawing more energy per product. And in fact they do draw more energy. So if you base the standard on that low end product and say you can only draw the amount of energy used for that low end product you won't have the amount of energy you need for the higher end product.

COMMISSIONER DOUGLAS: Are you saying that in this case with emergency lighting the higher end product has a battery charger that needs to draw more energy – okay, you know, does it need to use more energy in maintenance mode, does it really need to charge when the battery is – you know, you get into some of the same questions about why any charger shouldn't be able to be more efficient.

MR. ERDHEIM: So the proposal only would regulate maintenance mode, right, Ken?

MR. RIDER: Yes.

MR. ERDHEIM: Okay. So the proposal would only – so we're only talking about maintenance mode. As I said, we would be willing – I speak for Philips, I can't speak for all of NEMA – but we would be willing, and we have had some meetings, and I know Ken said he wanted to have more meetings. I think the problem is that we are talking about a fundamentally different area, we are not talking about a product. We are talking about light in an area, which can come from one product or from ten products. And that makes

the calculation much more difficult.

We are willing to sit down with the staff and see if there is some way to save more energy. My experts are telling me they think not. But we are willing to sit down and go through that. But that's going to take some time, it's going to take some focus. I know Ken and Harinder and Mike are dealing with all the different companies, all the different industries. You've heard from some of them and you are going to hear from about, well, that doesn't work for my area. And I think being in this process where we are rushing because we want to beat the DOE proposal, we're concerned about preemption, I think because we don't have that issue I would suggest that we take this out of that proposal and see if there is something more that can be done in terms of efficiency.

I hope I don't have to convince you, Commissioner, of our commitment to energy efficiency, given the lighting products that you've seen us develop and take the lead on. But we've got to do it in a way that makes sense. And we're dealing not with a – you know, it's one thing if you say I can't sell a low end grooming product, the world is not going to end. But I don't think we want to be messing around with banning large types of emergency lighting. So did I respond to your question?

COMMISSIONER DOUGLAS: That was helpful. And I'm

sure we will get more information from you, so we will look at it.

I do want to say one thing. In characterizing this process as rushing to beat a deadline, I don't really see it that way. You know, there is a timeline that we are on, we are willing to take a little more time if we need to make sure we've got it right. We did take time by having this workshop. And, you know, depending on the detail and depth and amount of information and comment that we get out of it, we will take the time it takes to get through it.

MR. ERDHEIM: Again, I do appreciate that you have had this workshop. I'm simply reflecting comments that staff has been pretty candid about that, you know, we have this preemption and we want to act beforehand. So if my characterization of that is troubling to you, I withdraw the characterization. But clearly acting before DOE acts is something that is on the mind of the Commission and the staff, that's what I was referring to. We don't have that same issue for our products, we don't have that same issue for the Motorola products that we're talking about and probably a lot of other products.

COMMISSIONER DOUGLAS: Well, thank you for your comments and thanks for being here. And we will definitely take a close look at the information you submit.

Next is Jennifer Cleary from AHAM.

MS. CLEARY: Hello. Jennifer Cleary with the Association of Home Appliance Manufacturers. I am the Director of Regulatory Affairs and previous to joining the staff I acted as legal counsel to AHAM.

First, I would like to also thank the Commission for making amendments to the original draft proposal. Although we still have a number of concerns, such as the failure to take into account frequently charged products, product categorization and usage factor, we certainly think that some of the proposed amendments we are discussing today are a good first step. Nevertheless, we continue to question why CEC is engaged in this rulemaking at all with regard to products that will soon be covered by the Department of Energy standard.

CEC should not be pursuing those proposed or any battery charger standards for products that will soon be covered by DOE. DOE is in the process of their rulemaking on many of the very same products that are proposed to be covered in the scope of CEC's proposal. This rulemaking must be completed per statute by July 2011. I think we all recognize that that date will not be met. However, we have heard from DOE as recently as this week that it plans to release the final test procedure this week or very shortly thereafter and that a standards NOPR could follow as soon as one month from today – or not from today but as soon as

approximately one month from now.

Therefore, CEC should only consider rulemaking for products that are not within the scope of the DOE standard. It is a waste of CEC resources and everyone's resources especially in these economic times, it's not justified. You should not be forcing manufacturers to retool for a California standard to only then potentially retool again for a federal standard. Furthermore, I think that the July 2015 potential effective date for DOE that was mentioned earlier is most likely an overstatement given the timeline that I mentioned I heard from DOE this week.

Secondly, if CEC does pursue this rulemaking we request that it change the effective date. This has been discussed earlier today. The CASE report recommended two years for manufacturers to source component and change designs. And AHAM has predicted that that compliance time could take longer. Under that timeline, of course, the need for a CEC regulation becomes even less clear. Similarly, we wonder, as others have, whether CEC intends to stay on the timeline previously shared. I think today it has been indicated that you do not, which we would support. Because otherwise we would think the 45-day rulemaking would need to come out before the time to consider many of the comments that have been made today. So we appreciate Commissioner's earlier statement to take the needed time. We support that

approach and hope that CEC will not rush the rulemaking process simply to beat DOE to the finish line. Also we echo comments that were made earlier today that if the effective date is going to be later than July for CEC that you consider the busy seasonal buying season before setting the effective date.

Regarding the specific proposals that were made and are being discussed today, AHAM supports removal of the power factor. This will closer align and allow harmonization with DOE. We also support the combining of the maintenance and no-battery modes. We continue to believe, however, that the best approach is one metric that includes a usage factor. The metrics cannot be further combined from the current proposal without including that usage factor. DOE is likely to use a usage factor and to use one metric and we would support a similar approach under CEC. Furthermore, the Warren-Alquist Act requires consideration of the usage factor. Regulations must be based on a reasonable usage pattern. Therefore, CEC should work harder to understand the usage patterns. We understand it's very difficult to do so, especially given the wide range of products being considered in this rulemaking. But in order to properly justify one standard it's necessary to do so.

Furthermore, if CEC does proceed with a multi-metric standard like it has proposed to do the levels in the

equations need to be revised. The proposed amendments, as have been discussed extensively today, will eliminate nickel-based chemistry chargers for battery energies above about 20 watt-hours. CEC has appropriately stated that it does not wish to eliminate such products. Nickel-based systems are in a large number of home appliance systems and are safe, durable and effective. Even at the amended levels, as Larry Albert explained earlier today, many products will be required to shift to a lithium-ion battery chemistry in order to meet the standard. While we don't disagree that improvements need to be made to many nickel-based chemistries and that more efficient technology can be used, a total shift in technology should not be required by a standard. I don't think CEC would want to find itself undergoing the same criticism that Congress has been giving DOE for the supposed elimination of the incandescent light bulb or the top load washer. It's not a good position to be in and we fear you could be headed on that path.

Requiring elimination of the nickel-based chemistries to meet the standard does not meet the Warren-Alquist Act's requirements that efficiency levels be based on feasible and attainable efficiencies. Therefore, we propose some amendments to the smaller battery charger equation for 24 hour energy. We will provide the details in our written comments as well as technical substantiation for

that. They have been discussed previously today and in some amount of detail. But essentially there would be very minimal energy savings to be found there. And so we think that these adjustments will be appropriate. Also, we suggest some changes to the maintenance mode and no-battery mode equation to account for efficient nickel-based chemistries.

Moving on to the labeling requirement, something that hasn't been discussed extensively today. AHAM opposes the labeling requirement as it has been proposed. A label typically serves one of two purposes. One is to differentiate a product in an instance where there are more than one standard, like a UL and CSA, which one it complies with; or, two, to differentiate products that are under a voluntary standard. Neither of those purposes is served here. CEC is proposing a mandatory standard. Furthermore, compliance will be adequately demonstrated through the certification requirements, not only to CEC but to consumers as well who will be able to view the products that comply with the standard. The label will only add cost and burden without any corresponding benefits to consumers or the CEC. It will also be superfluous and confusing when DOE preempts the standard.

Regarding the test procedure changes, just a couple of quick comments. AHAM supports the clarification that has

been proposed that single phase battery chargers are to be tested at 115 volts at 60 Hertz and are not required to be tested at 230 volts at 50 Hertz. We also have a couple of questions that perhaps can be answered today. First, will the test procedure continue to be copyrighted? We understand that once it's adopted by California the rights would need to be relinquished to that. We would support that. Also will the test procedure be fully memorialized in the rule once it's adopted? We would support that so that any changes that are made to it should undergo a formal rulemaking process.

Finally, I just want to address some of the conversations about data that we've been having. We agree data should be the basis for all decisions and certainly industry should support its positions with data as well as the Commission. From an association perspective, it's been very challenging in this rulemaking to provide data from our members because we need to aggregate it, you know, to address antitrust concerns. So with all of the products we cover being lumped into one category, you know, from a toothbrush to a clipper to a hand-held vacuum, it's very hard to figure out how we could include that data together in any meaningful way to the Commission.

So we've been wrestling with that and that's one reason you haven't seen data from us. But I hope you have

been getting it from our members. We have, however, heard from a number of our members that the burden association with the confidentiality process in some cases is prohibitive. You know, you've heard mention that it takes significant time to prepare that and that in addition the 30-day decision time, sometimes it seems like perhaps the decision on the rule will be made before that 30 days ends. So we would urge CEC that if you know there is a request pending in the general counsel's office for a confidentiality determination that any finalizing of the rule or proposed 45-day rule be delayed until there is time for that determination at general counsel's office to be completed and for the confidential data, if in fact it's deemed to be confidential, to be reviewed.

So thank you for the time to make the comments.

COMMISSIONER DOUGLAS: Thank you. Can we have any help with the questions that she asked?

MR. BECK: Dennis Beck again from the Chief Counsel's Office. One thing I would like to note, though, in terms of the confidentiality. We would encourage people if they are going to seek this confidentiality privilege that they make sure that they get their application in as soon as possible and not wait until the 45th day and then submit a confidentiality application. You can understand that that might raise some eyebrows, as you can imagine.

The confidentiality process – first of all, I didn't write it so you can't blame me for its cumbersomeness. But just to let people know, we have a Public Records Act here in California that's I think even more extensive than, say, the Freedom of Information Act on the federal level. And in that application process we need to have information that clearly shows that the information would fall outside of the parameters of the California Public Records Act. So that's why it would appear cumbersome even to the non-layman, even to attorneys like yourself and Mr. Erdheim. But that is the reason why there are so many questions that have to be answered so we can make sure that when we get it and it's approved that it will not be disclosed via a Public Records Act request.

COMMISSIONER DOUGLAS: Thank you for your comments. I think that at a high level if we thought we were wasting our time by being here because of DOE's rulemaking we wouldn't be here. There are substantial potential savings in the time that this would be in effect and, of course, these appliances would be in California into the future. And that said, I want to make sure the stakeholders here understand that, you know, we are doing what we can to have some convergence between our rule and what DOE would require. And it would be at least my hope that compliance with California's standard would mean compliance with DOE's

standard. So at the point in which DOE issues a NOPR we will be more able to be certain that that's the case. But that's the kind of operating assumption here.

So I don't think that anyone here is expecting to require multiple redesigns due to state and federal law. And, of course, we will have to see how that develops. And the stage of the process that we are in right now is refining our approach and hearing from you on our approach. So all of the comments in that vein are very helpful.

Henry Wong, Intel Corporation, you will be next.

MR. WONG: Thank you for putting this workshop together. My name is Henry Wong. I am a Senior Power Technologist at Intel. My current role after 25 years of being in power management techniques, many of which you use today, is currently working with other agencies such as the Energy Star Program, the European Energy Commission on their ERP regulations and so forth. I also just recently came back from working with some of our colleagues or some of the agencies in China as well as Korea. And one of the items that we work on is essentially energy efficiency specifications and requirements.

And I did want to go ahead and highlight some of the items that are of concern for us in the industry, both from Intel and I see that there are a number of my fellow colleagues from the Information Technology Industry Council

online as well and they might add additional comments afterwards. One of the first things that I would like to do is to caution the Commission on ignoring some of the non-battery-charging functions, actually ignoring some of those very functions that allow us to save long-term energy in these components. The power management activities that we put into these devices as well as the technology advances that we've put into them constantly reduce the net energy consumed by these products. And actually, I think, ECOS consulting on their different arm did a study for the Power Advisory Council, the PIER equivalent supporting the California Energy Commission, that demonstrated exactly that and how for notebook computers and things of that nature that the energy consumption was rapidly coming down all on its own without any regulations whatsoever.

In looking at that one of the items that we are very familiar with in the computer industry is this notion of unintended consequences. By squeezing some of the power limits, if you will, on some of these low power modes what it tends to do if you don't do it correctly and you ignore those ancillary functions, the non-battery-charging functions, is that it causes users to go into higher power modes. You won't turn off your computer or you won't let your computer turn off if it takes too long to wake up. So you really have to be careful, especially as we put in all

of this intelligence into the systems, to not create standards and limits that actually encourage larger energy consumption activities.

So with that said, one of the things that was mentioned – because we spent some time early on talking to Ken as well as to Vic over at the DOE with regards to the testing methods as well as the limits being defined for this. And I have to apologize for myself as far as Intel is concerned in addition to some of the folks in the industry for not engaging earlier. We had mistakenly – at least I can say that for Intel – we had mistakenly tried to follow the Energy Star battery charger specification, which embedded functions or devices with embedded battery chargers, like notebooks and netbooks and things of that nature, were not in scope. So we didn't really pay much attention to it until we were told that DOE was coming up with it and then we traced it back to the California Energy Commission. So my apologies for not coming back with written comments earlier. But we did provide these written comments that you see here and I think it's going to be on the docket a little later on. And it is in the DOE docket as well.

One of the key items – and I want to go straight to the meat of this – one of the key items that we've highlighted there is the need to go ahead and identify three

different modes of operation, especially with regards to battery charging. One is maintenance, the other one is off, and no-load. The current mechanism by determining sort of the no-battery function gets confused between off and no-load. If you look at the regulations that are applying to Lot 6 or the off-power for computers – and I believe Pierre Delforge from NRDC highlighted that as a half watt – currently it is at one watt. And it is also defined to not include a lot of the networking functions and the maintenance functions that we anticipate will be necessary when we are starting to look at the battery charging effects. It is those functions that we would want to go ahead and start to isolate between what's battery charging and what is not.

And the reason it's important is because there are other specifications that are being derived to address the AC component, the grid component if you will, of these computer systems. So as long as those exist you don't want to go ahead and overlap it with a sort of competing set of standards, at which point the industry will get kind of confused as to which standard do they need to apply to, especially when we start to integrate a lot of these functions.

Our recommendation – and we actually provide a mechanism for isolating these items – but the reason I

wanted this picture up there was to give you an understanding on the different modes of operation for a notebook and a mobile computing device, if you will, where we've got charging occurring in this active mode, we've got the off mode and then the no-load case where there essentially is no load outside of the AC to DC brick that's there. It is that center portion, if you can envision it – and, Ken, can you move that up a little bit? Yes.

So one of the ideas that we've proposed here was to go ahead – in order to isolate the functions of the computer that are going to be pretty much AC-based is to either take the battery out when that is possible or have it fully charged, at which point there is no charging involved. There may be a little bit of maintenance, which we can probably isolate. But it will go ahead and identify how much energy is being actually consumed by those management functions outside of the battery. Now you've got the battery isolated and you can apply those battery limits, if you will, charging and discharging accordingly just on that one piece since you have eliminated the functionality part from the computer analysis. That's our primary concern and proposal.

I do have other items that I want to go ahead and check off here as well. One of which is a question whether or not USB devices without an external power supply are

going to be covered. Because there are a lot of additional devices that you may see or will see coming out that basically will require you to hook it up somehow to a computer and get it charged that way, through USB. Second, accessories that include battery charging as a secondary function. Third question is whether or not the BC marking can be allowed to occur on the outside packaging. Current devices, one, have very little room but also are beginning to look like NASCAR. I mean, we've got labels coming out the ying-yang on that stuff. And at least cosmetically it is problematic and in some cases we have seen, you know, labels and etches actually come off and become basically litter. And that is just not worthwhile. Whereas if we can put it on something like the packaging and so forth we know it has compliance and so forth at that point and we don't impede on either the aesthetics or the functionality of the device itself.

There are other items listed in the feedback, things like resolution and what I would consider misinterpretation of some of the international standards. What I would advise for the Commission is to go ahead and make sure that the specifications and the testing requirements are consistent with a lot of the international regulations and testings that are occurring. One of the interesting items that was discussed was duty cycle. Well, computer systems through

our work with ECMA-383 and I believe it's going to be IEC-62623 are coming up with methods of determining typical energy consumption, duty cycle, if you will. And although it's not perfect, it's something agreeable amongst the categories as well as the manufacturers of something indicative of that class of component. Now, that's not going to necessarily be applied to everything or all different classes of devices but at least it sets the stage for how we are trying to address this typical energy consumption and provide the profile so we are looking at energy as opposed to different power levels.

I think that's it. Thank you very much for your time.

COMMISSIONER DOUGLAS: Thank you for being here, thanks for your comments. Do we have anyone who wants to hazard an answer to the three questions that were asked?

MR. RIDER: Yes, this is Ken. I will at least try to address the USB question. The USB devices themselves are currently proposed to be covered. And maybe Suzanne can talk to the testing, but I believe that the test is past the power supply. So it's assuming just a 5 volt input, which is what a USB provides, and then test the USB device that has the battery charger inside of it. So, you know, it wouldn't be testing with the computer and then the USB device, it would be taking that USB device, hooking it to a

kind of artificial USB power supply and then charging it that way. So that answers that question, I think.

And then about the accessories, you mentioned – I wasn't exactly clear what kinds of things you were talking about in that case, like maybe an iPod charger that is built into something?

(Mr. Wong replies off microphone.)

Okay, Henry just mentioned music devices and MP3 players and like an iPod charger that might be included into another product. The test method requires the testing to be done with the typical charge configuration. So unless a laptop with a USB charger or an iPod charger comes with your iPod then you are not going to test it in that condition. You are going to test it with what is provided with the end use product that has the battery in it. So if it's an iPod or an MP3 player you are going to test that, if it's a USB charger only you are going to test it with that artificial 5 volt supply or with that external power supply that the manufacturer provides with that. You will not be testing it with a television, let's say, or with a laptop. You are going to be using it with what the manufacturer of that accessory provides for charging.

COMMISSIONER DOUGLAS: All right, thank you, Ken. I notice that there probably are people on the phone from the East Coast who might want to make a comment. And even

though they occasionally start calls at five in the morning and make us get up, I thought it might be a good idea to see at least how many people on the phone are in that category. Maybe if you could raise your hand if you are in a time zone at which you would like to be going home for dinner.

COMMISSIONER DOUGLAS: Yes, I'm going to go ahead and take Don Bartell. And I will take others later.

MR. BARTELL: Okay.

MR. RIDER: Don, you are live.

MR. BARTELL: Thank you, Ken. This is Don Bartell. I'm the Chief Sustainability Director for Motorola Solutions. As you and staff are aware, Motorola has supplied technical data and had many fruitful discussions with Ken. I realize that the focus of today's meeting has primarily been on those technical aspects. But both ECOS and NRDC made cost effectiveness an issue and we profoundly disagree with their conclusion.

Frankly, for complex commercial products, non-consumer products as ours the bill of materials is a very, very small component of any changes we might have to do to a charger to make it comply. The re-engineering costs and the recertification costs that we would have to go through for these complex devices far outweigh a couple of dollars that we might have to spend in additional or different parts. Our analysis of the increased cost to our customers compared

to the savings from lower energy use shows a negative cost-benefit analysis. It's much less than one to one. We show that the costs far exceed the benefits. The cost, for example, of a typical hand-held bar code scanner could increase as much as sixty dollars. And the energy savings calculated over the entire life of the product would be in the range of twenty dollars for a forty dollar net loss to our customer. For two-way radios such are used in mission critical applications, including those that would be used by California's police and fire agencies, the increased cost is in the range of twenty-five dollars with an energy savings below nine dollars, again a net financial loss.

All of these things were detailed in our letter of March 31st and in other conversations. And despite the reassurances from Commission advisors and staff we really haven't had a meaningful discussion of these cost-benefit analyses discrepancies. And I ask when shall they occur, when will we have those meaningful discussions?

COMMISSIONER DOUGLAS: Thank you for that question and comment. You know, the staff has certainly looked at your letter as has possibly the consultant. But let me ask staff to give at least a high level response to some of the issues raised.

MR. LEAON: This is Mike. Well, certainly we will look at this issue further after this workshop. Let me ask

Ken if he has any feedback on the cost issue.

MR. RIDER: Yes, sure. This is Ken. I just want to say, you know, the whole purpose of this workshop is to discuss 16 changes or more that were made to the regulations, the majority of which should reduce the incremental cost at very little amount of loss of efficiency. So we plan on reevaluating the model to account for these losses in efficiency and changes in cost from a less stringent approach and a more flexible design approach that we presented today. And we can discuss that. I think it has changed quite a bit from the March proposal. And so I think we would revise that in our final staff report.

MR. BARTELL: Yes and, Ken, as Chris Paul – who is there in the room – can tell you further, the changes that have been made – and we are appreciative of those changes – those changes have moved the redesign into the realm of possibility. Prior to those changes it was unlikely we were going to be able to make our products comply no matter what we spent, no matter what we did. Now we are in the realm of technically feasible changes. And Chris, I'm sure, can tell you further offline, we are still going to have to redesign essentially all of those chargers.

So while the bar has now been set at a height that it is conceivable to reach, to clear, it is still going to incur those chargers and those recertification and re-

engineering costs are going to far outweigh the energy saving benefits. Thank you.

COMMISSIONER DOUGLAS: All right, thank you. I see another hand up. Is it Joanna Mauer?

MS. MAUER: Thank you. This is Joanna Mauer with the Appliance Standards Awareness Project. We support the CEC moving forward on this rulemaking for standards for battery chargers. And I just wanted to briefly comment on the significance of the CEC rulemaking in the context of the DOE rulemaking on battery chargers.

First, the CEC rulemaking has a broader scope than the DOE rulemaking. DOE only has the authority to set standards for battery chargers for consumer products, while the CEC rulemaking is covering battery chargers for both consumer and non-consumer products. And these standards for non-consumer products will achieve long-term energy savings for California. Second, California has the opportunity to accrue savings for consumer battery chargers before the DOE standards take effect, which can help California meet its aggressive energy saving goals and reduce consumer electricity bills.

Based on the effective date in the draft proposed amendments regarding battery chargers, California would accrue at least one year of savings before the DOE standards go into effect. As was mentioned earlier today, DOE is

required by statute to publish a final rule for efficiency standards for battery chargers by July 1st, although we still haven't seen even a proposed rule published. DOE has recently missed its legal deadline on amended standards for residential refrigerators. The final rule deadline for refrigerators was December 31, 2010 and we still haven't seen a final rule published. And so therefore we would encourage CEC to move forward on this rulemaking as the timeline and the outcome of the DOE process are still uncertain.

Third, a strong California standard could potentially result in a stronger national standard than what otherwise might be achieved. The metrics in the draft proposed amendments would ensure energy savings in the field regardless of how a particular product is operated, since the standards would address efficiency in charge maintenance and no-battery modes. In the preliminary analysis that DOE released last year DOE proposed an annual energy use metric. DOE could follow California's lead and establish metrics that would closely resemble California's metrics to better ensure energy savings in the field. We along with other organizations proposed an approach to DOE in comments last fall that would more closely resemble the CEC approach. And we would hope that if California sets standards that achieve significant cost effective energy savings using readily

available technology DOE would establish standards that are no less stringent.

And finally, regardless of the ultimate DOE standards, the initial California standards would likely spur efficiency improvements in the market that could have long term energy saving benefits. Thank you very much for the opportunity to participate today.

COMMISSIONER DOUGLAS: Thank you for your comments. I will go back to people in the room. In don't see any other hands up for folks on the East Cost. So Spencer Stock with Lester Electrical.

MR. STOCK: Thanks for the opportunity to make comments. My name is Spencer Stock and I am with Lester Electrical. Lester Electrical is an industrial and commercial battery charger manufacturer located in Nebraska. We primarily make products that fall within what we call the large/small category. It is in the small category but it is in the above 1000 watt-hour category. So we make products for golf cars, floor care equipment, _____ platforms with general handling, etcetera.

There are a couple of things I want to discuss. The first one is the newly proposed 24 hour requirement for this large/small category, again for the energy batter greater than or equal to 1000 watt-hours. One of the stated goals that Ken had in his slides was that you guys wanted to

improve the discontinuity at the boundary between the large and the small charger category. Because the large charger category specifically has efficiency associated with the charger itself and not the system, we went through and did the math for typical applications that fall in that large/small category and calculated out the system efficiency and then calculated out the required charger efficiency based upon typical efficiencies of lead acid batteries, which dominate that category. And when you do the math the majority of the applications in that area would require charger efficiencies above the 89 percent for the large category. So you're looking at for golf, for example, fleet golf which is a big one that has been brought up, many times a required charger efficiency of over 90 percent, which is quite difficult.

You guys in your original staff report made comments that you wanted to have a technology-neutral standard that didn't eliminate key battery charger technologies. And within this large/small category silicon-controlled rectifier and ferroresonant chargers are major charging technologies. And this new level, it wouldn't be possible for those charger technologies to meet the required charger efficiencies based upon efficiencies of lead acid batteries. And so with this new level – first of all, it doesn't meet the goal because it goes above the large charger level. And

second of all, it would essentially eliminate transformer-based chargers. And within these categories practically the only chargers that are manufactured in the United States are transformer-based chargers. So it would essentially move all of the charger production within these categories to overseas charges, which are switch mode chargers that very, very few in that category are manufactured in the United States.

The second thing I want to talk about is the timeline. We want to commend and support the Commission on extending the timeline for non-consumer applications an additional year. That is critical. We want to point out the fact that there are some applications – and I mentioned golf already, I will bring that up again – that are considered consumer applications but that have the same restrictions or the same difficulties that the non-consumer or the industrial applications have. Ken mentioned that non-consumer applications have longer design cycles. And it is absolutely true for some of the things that you guys are classifying as consumer, specifically golf, where the typical cycle is a two-year cycle. Because within the golf category you're dealing with a cycle where you have to design a product and then all of the products get sold to the actual golf cart companies, they are the OEMs for the product. And so they have a two-year cycle for new products

where they do extensive field testing before they would deploy a new charging system.

And so a one year implementation timeline specific to the golf industry would be very, very difficult just based upon the fact that golf really is much closer from a design standpoint to the non-consumer applications even though it has been considered a consumer application and requires – based upon the fact that you have just a couple of very large customers, the golf cart OEMs, and they do not release new charging systems very often. That was another thing that Suzanne mentioned, the consumer products are regularly redesigned, that is not the case with golf, they are very seldomly redesigned. And then they have a long testing cycle before the golf cart companies would deploy new systems. So one year would make it very, very difficult for the golf cart companies in the State of California.

The next thing I wanted to mention was we very much support the removal of the power factor requirement for the small battery chargers. And I would make a comment that Suzanne in her presentation was asking for or recommending that it be reviewed, that the power factor requirement be added back in for energy batteries greater than 100 watt-hours within the small charger category. And she had a slide that made a comment that there is readily available silicon solutions for power factor correction. That is not

the case for silicon-controlled rectifier ferroresonant chargers. To the best of our knowledge and research, there are no readily available solutions to provide power factor correction for those technologies.

Then the last comment I will make along the same lines as the gentleman from Philips, talking about emergency lighting and this being a public safety application, I want to bring to the Commission's attention another particular application. We make chargers for the railroad industry for railroad signals and crossings. And the railroad industry has a – there was a 2008 Federal Railroad Administration law that mandated something called the positive trend control system or PTC. And this is a requirement to deploy collision avoidance systems in the United States rail network. It actually started based upon an accident that happened here in the State of California. And so there is a federal law for the railroads to deploy these collision avoidance systems throughout the United States by the end of 2015.

They have started that process, they have already tested and chosen equipment that they are deploying throughout the United States. And so if the railroads were required to test and then implement new charging systems in the middle of this deployment of PTC for the State of California it would provide a very big burden on the

railroads. And we have conference calls in the past with some of the staff members where we have had representatives from the Class I railroads operating in the State of California that were on there to also voice those concerns, too. So we just want to make sure that that is understood or bring that up to the Commission. Thank you.

COMMISSIONER DOUGLAS: Thank you and thanks for being here. Hopefully you will submit some of the comments about the lead acid batteries in golf cards and so on in writing.

MR. STOCK: Absolutely.

COMMISSIONER DOUGLAS: Where do you do your manufacturing?

MR. STOCK: We manufacture everything in Lincoln, Nebraska.

COMMISSIONER DOUGLAS: Thank you. All right, Mark Sharp with Panasonic.

MR. SHARP: Hi, my name is Mark Sharp and I'm with Panasonic. I have had the privilege over the last four or five years of addressing the Commission on a number of occasions for consumer electronics and I appreciate the opportunity to again address you.

I wanted to follow-up briefly on some comments that we submitted to the record earlier this week. And they are basically a request for clarification. I have had some

sidebar conversations with staff, with both Ken and Harinder. But we have also touched upon the same questions today with Intel's presentation so I just wanted to clarify. Basically what we are interested in finding out and getting clarification on is the intended product scope of these proposed amendments. Specifically, we want to confirm whether it's the Commission's intention to regulate ordinary USB ports as battery chargers.

Although it's not their primary function, the USB port provides limited power to recharge various battery-operated devices, as you are aware. And specifically one example that we are going to try to get our hands around and understand better, Panasonic TVs have USB ports in them to connect a variety of peripherals, including flash drives to look at photos. But our latest 3D televisions include shutter glasses that you have a rechargeable battery and they are provided cables to recharge through the TV set USB port. And we want to find out, this particular example and other examples are such a wide variety of devices that you can connect to any USB port. It is really impossible to measure the actual charging power as a result because there are so many different products that you just haven't accounted for potentially. So we wanted to confirm the intention of this Commission on the regulation whether the devices equipped with USB ports would be covered. Thank

you.

COMMISSIONER DOUGLAS: Thank you. Let me ask staff to respond.

MR. RIDER: Yes, the USB ports themselves wouldn't be regulated. Again, it's the devices that have the charge control circuitry. So if your 3D glasses have a USB port, I guess, to charge that device would be covered. But the television itself as sold, it has a USB port but it's not considered a battery charger. Same with like an external power supply. Like I know I own a few external power supplies that just have a USB port. If I were to buy that by itself at the store it wouldn't be considered a battery charger. It would be an external power supply but it wouldn't be a battery charger. So the parts that contain USB ports by themselves are not in the scope of what we are considering.

And I believe that the USB devices that would be covered, like the glasses themselves that contain a battery, are tested with just an artificially lab-created five volt input. And I encourage – I haven't read that portion of the test procedure recently, but I believe that's the source for the testing.

MR. SHARP: Thank you very much. I appreciate it.

COMMISSIONER DOUGLAS: Thank you for being here. Christopher Paul with Motorola Solutions. Actually,

Christopher, you gave a presentation. I don't know if this means that you would like to speak as well.

MR. PAUL: No, thank you.

COMMISSIONER DOUGLAS: Well, you do have the opportunity again. But if you have said it all, don't feel obliged. Dan Jakl from Motorola Solutions.

MR. JAKL: Once again Dan Jakl with Motorola Solutions. I wanted to go back to when Larry had presented from Black & Decker, I believe. And there were some questions about nickel-metal hydride and nickel-cadmium. And those are technologies that I've worked on for many years so I would like to give some additional comments on that.

I think one of the things we had heard was that sometimes nickel chargers may be designed to be much cheaper, more cost effective for certain products, certain consumers, things of that nature. The products that Motorola Solutions has and the ones that I presented actually earlier today, it was the same charger, same circuitry. Our chargers are smart enough to detect the differences in whether it's a lithium battery or a nickel-cadmium or nickel-metal hydride and then they apply the appropriate charging algorithm to that particular battery. I think there was a comment, Could they be made more efficient by modifying those algorithms?

Unfortunately, getting into how nickel-metal hydride or nickel-cadmium is charged, when you begin charging the chemistry – I'm not a chemist, I'm not a Ph.D. in chemistry but I trust the data that we get from them. And a lot of this is available from Sanyo and Panasonic, several manufacturers. But at the beginning of the start of charge they are very inefficient. There are some chemical changes going on in the cell where that charge current going into the battery isn't actually going to be some energy you are going to be able to get back right away. So in the first beginning stages they are not efficient regardless of how you are charging it or putting energy in, you can't get it back out.

After a certain point of charge the efficiency goes up significantly. So they are very efficient for a period of time. And then as the charger is trying to sense when it is full, typically at the 90 percent point, there is a thermal reaction. And when that thermal reaction occurs that's usually what the chargers are determining, to look for detection of charge. Either the temperature is going up significantly at an increasing rate or maybe the voltage is even starting to come down a little bit, it's another algorithm that some of these circuits and ICs use. So, once again, in the way that these batteries charge you have to be looking for these types of conditions occurring to fully

charge them.

So, once again, at that point when that heating is going on or the voltage is starting to come down the efficiency is not unfortunately not very good again. So you start charging and they are not very efficient, in the middle portion – maybe around the 10 percent level – it's very efficient, and at the tail end, you know, the 90 percent point the efficiency drops off again. And then the net effect, of course, is the whole efficiency of the charge profile is not as good as it is, say, for a lithium-ion product.

One other thing I do want to mention is, you know, we do charge our batteries fully for the customers that we have. We don't leave anything left on the table. And even in maintenance mode we try to maintain full steady charge for our customers. I'm not sure we've ever had a customer that said they only needed 90 percent of the battery. That has not occurred to us yet as far as a customer requirement. And I do want to mention that we don't overcharge on purpose. It is actually not good for the cells. Once again, you charge to a point where the chemistry tells you that it is starting to overcharge and then you shut off and you go into a very low rate of charge, some suppliers will say two hours or one hour for the trickle mode. You maybe can get another couple of percent of charge into the

battery, that's about all that's good for.

Extending that beyond that you are probably not going to get – you wouldn't want to continue at an extremely high rate where the temperature would go up to a dangerous level. Typically if you get above 45 degrees Centigrade in the cell you are going to damage it anyway. So that is something you don't want to do. We optimize our products for cycle life and energy, not necessarily for cost, for our customers.

MR. RIDER: Actually, Dan, can I ask you a question while you are up here?

MR. JAKL: Sure.

MR. RIDER: So in your presentation you mentioned, or you proposed, that we increase the charge in 24-hour charging maintenance energy. However, you didn't recommend any changes to the maintenance and no-battery levels. However, in Larry's presentation and in many comments and conversations that I've had with nickel battery chemistry charger manufacturers they have stated that they needed this very high maintenance mode energy. And as you stated, your products, it's extremely critical that they are full because they are life safety products or emergency products for first responders. And I remember looking over some of the numbers you presented me and the maintenance mode consumption between a Motorola lithium-ion and a Motorola

when you stick in a nickel-cadmium battery, they weren't that significant. There was a change but it wasn't that significant.

Can you speak to maybe why that is the case for your chargers and maybe what that discrepancy is?

MR. JAKL: Yes, I will definitely try. The majority of our products in the maintenance mode there is actually usually no current going through to the battery. We have tests that occur approximately every five minutes where there is a ramp-up of charge to get to continue to maintain. But it is not constant current at a very low rate of, you know, 20 milliamps or 50 milliamps. So it usually will be off for a majority of the time and then there is this rise of current. And we are using voltage to determine if, for instance, a radio was turned on and is actually discharging the battery and then we can compensate for that as well. Because our customers may do that. But we do this periodic test.

MR. RIDER: Great, Dan. So just to summarize to make sure I understand correctly, you have been able to achieve this lower maintenance by cycling the battery on and off very carefully with the circuitry monitoring the voltage and making sure when it starts to slip that you give it a little boost and then you turn it off again?

MR. JAKL: Yes.

MR. RIDER: Thank you very much for that explanation.

COMMISSIONER DOUGLAS: Thank you. We are almost through with the cards. Henry Wong from Intel wanted to make another comment.

MR. WONG: Yes, sorry I missed a couple of key points that I would be remiss at not highlighting. Some of it is in the document that we provided.

First of all, if the test modes are not going to be feasible in terms of isolating the non-battery-charging functions we do recommend that in order to be consistent with the developing activities in Europe, because we are looking at the additional functions as well, we are recommending a two-phase approach. And the first additive value associated with those functions is at 1.7 watts. That is consistent with the request that we have made to the European Commission as well as some of the data that we have been providing them in terms of the kinds of functions that are going to be upcoming for those systems.

The second comment that I failed to mention was that a lot of these notebooks and mobile computing devices have built in them very smart batteries. The battery structure and charging mechanism is a two-way communication. In a lot of case – I think in most cases – the batteries are not going to be able to be 100 percent fully charged nor will

they be completely depleted. If you open up your notebook you will hopefully never see a zero percent on that notebook. There are some housecleaning activities and safety functions that are built in that will prevent that from happening. And if you are writing up the test procedures you have to go ahead and then acknowledge that you can't really achieve that zero point or potentially even hit the 100 percent point on the battery.

My third comment – and that will be the last hopefully – is that I was wondering where some of the background information associated with the potential savings claims exists so that we can review them. One of the big concerns – and this occurred in some of our other studies with the DOE and the Energy Star Program – was to make sure that we understood what was going to be actually saved by the regulation versus business as usual. And, as you can see in your everyday life, our technologies are advancing very quickly, basically from competition as well as the use expectations of our devices. And it is that acceleration of technology that will save a lot of energy on its own. And we would caution claims of the regulation causing the energy savings when it might already be there. So that’s why we want to go ahead and make sure we understand the basis behind a lot of the claims.

COMMISSIONER DOUGLAS: Thank you. We are going to

have ECOS back up in just a minute and I will ask Suzanne to be sure to identify where you can find the background information. I am aware of the efforts in the European Union. It would be helpful to us to have you provide us some of that information as well because we are interested in consistency when we can possibly do so.

Gary Fernstrom from PG&E, do you have any additional comments?

MR. FERNSTROM: No.

COMMISSIONER DOUGLAS: So the last card I have – actually I have three of them – is from Suzanne Porter.

MS. PORTER: Thank you. And I will keep this as brief as possible given the fact that it is four o'clock and I think some people probably have to catch flights.

I just wanted to conclude in response, just make one response to Spencer Stock's comments related to technology and technology neutrality in the standard. Although it is true that in the CASE report we intentionally wanted to be technology neutral to battery chemistries, it is not true that we intended to be technology neutral to topologies or charger designs. In fact, the success of the external power supply initiative was built on the technology change from linear power supplies to primarily switch mode power supplies that were a much more efficient technology and they were very cost effective in terms of total cost of ownership

to the citizens of California.

Similarly for this standard, in order to meet the requirements there are going to have to be topology changes, both for small chargers and for large chargers, movement away from the older linear technology and towards hybrid approaches of silicon-controlled rectifier and ferroresonant together, as well as high frequency switch mode for the very large chargers because there are cost effective savings and our research suggest there are no functionality differences to the end user. So I just wanted to make the point that that is part of what we are trying to facilitate with this proposal, to move to some of the newer, more efficient technologies that haven't historically been adopted.

MR. STOCK: Okay, thanks for clarifying that.

I would encourage one thing. In some of these non-consumer applications – I brought up the railroad application – there has been no adoption of non-transformer-based charging technologies based upon environmental requirements and also longevity and ruggedness requirements. And so we haven't been able to – and haven't seen any examples in some of these extreme applications, these non-consumer applications, of switch mode chargers. And we make SCR chargers, we make ferrochargers, we make switch mode chargers. But there are a number of applications in the non-consumer space where there are requirements for

extreme environments, longevity, reliability, where there has been no proven switch mode designs that can withstand those applications. And there are no solutions in the market for non-transformer-based topologies for those.

And I will also just encourage the fact that, though some topologies offer higher efficiencies and other switch mode chargers, you know, in general can reach a higher efficiency standard, there are reasons outside of efficiency – I know that efficiency is the primary purpose of – it's the only purpose of what is being worked on right here. But it is important to understand that if the regulations are written to a point where there is no choice in topologies for battery chargers – and, again, I'm speaking towards these larger industrial non-commercial chargers – there will be losses to customers in things such as repairability, choices of US-manufactured products, and again, in our opinion and in our analysis, things such as ruggedness and longevity of the products.

COMMISSIONER DOUGLAS: Thank you. For the record that was Spencer Stock with Lester Electrical. We are through the cards. Is there anybody else on the phone who would like to make a comment at this time?

MR. HAILEY: Hi, this is Jeff Hailey with Dell. I am in the Office of Environmental Affairs. I would like to thank the commissioner for the opportunity for this

workshop. And I would like to reiterate many of the points that my colleague Henry Wong from Intel raised about the labeling, the separation of the functions, the charger from the other functions of our products. And to that end Dell covers many products from the consumer level up to the very high-end enterprise.

Many of our products with batteries are actually considered battery backup systems for storage controllers. And in that case there is really no easily way to separate the battery charger system out from the storage controller without going into the circuitry and disabling the storage controller. And so I want to be clear, you know, does the CEC intend to regulate those within this? And, if so, we need to have some method to clearly separate the battery charger.

COMMISSIONER DOUGLAS: All right, thank you. Ken, is that question something that you have already addressed or is that a nuance on the question you have already addressed?

MR. RIDER: Oh, gosh, I was busy muting all the lines. I'm sorry.

COMMISSIONER DOUGLAS: I think the question was where the functionality of having a charger is really more for storage. But I think it should be asked again just so that we get it.

MR. RIDER: Yes, could you repeat that question?

MR. HAILEY: Sure, Ken. So the question is around, we at Dell have many high-end storage products that have built-in battery backup to protect the write cache in case of power failure, to protect the user data. The battery function is a very small part of the overall architecture. And so whether it's an add-in card to a system or whether it is in a separate box that has a power supply in it, there is really no feasible mechanism with which to isolate the battery charger – well, let me take a step backwards. Without comprehending the other functions of the system there is really not a feasible mechanism to isolate the battery charger from everything else without disconnecting, you know, probably 98 percent of the circuitry.

And so is this going to be covered? I mean, obviously you have a separate line item for battery backup and uninterruptible power supplies now. But, you know, to disconnect that and measure the power of that you are going to have to disconnect other circuitry. And the test procedure as written, you know, that is not acceptable. So I don't really know how this should be covered.

MR. RIDER: Yes, Jeff. So the uninterruptible power supply or battery backup, battery chargers, are only subjected to maintenance mode requirements. So I'm not exactly sure what the other functions are and what the case

is that you are discussing here. We what we would be interested at the CEC in knowing is what are those other functions when the product is off. Because we are talking about maintenance mode, which is basically, you know, imagine your product is off and it is just sitting there and the battery is kept topped off by the power supply. And we would just be interested in getting more information on what the other functions competing for that maintenance power would be that you couldn't turn off. And I think it is much along the lines of what we've been discussing for a multitude of products today, about these extra features like networking and USBs, etcetera.

And so either you can work through Henry or you can call me or submit a letter in the docket. But I think we would be interested in more information.

MR. HAILEY: Absolutely. I will give you call later.

MR. RIDER: All right, thanks.

COMMISSIONER DOUGLAS: Is there anybody else on the phone who hasn't spoken yet and would like to comment?

MR. RIDER: Yes, we have Katt Fretwell on the phone. Just a second, Katt, I'm going to mute everyone and then unmute it so that way I can give you my undivided attention. Okay, you should be live.

MS. FRETWELL: Okay, thanks. My name is Katt

Fretwell, I work at Tektronix and I'm a Product Compliance Engineer. And I want to reiterate everyone's thanks to –

MR. RIDER: Katt, can you speak up a little bit. I can't hear you very well.

MS. FRETWELL: Sorry about that. Can you hear me better?

MR. RIDER: A little bit better.

MS. FRETWELL: Let me try switching to my handset. Does that work?

MR. RIDER: That's much better. Thank you.

MS. FRETWELL: Okay, great. Sorry about that. So I wanted to thank the staff and Commission for holding another workshop and for their availability to discuss the issues and their consideration of our previous comments. I did want to mention that I do share – I think it was Mr. Bartell's at Motorola – sentiments that, though I think you have addressed some of our concerns and put a redesign into the realm of possibility for very low volume industrial products, I don't think that we have yet addressed the issue of very high engineering costs that are not included particularly in the incremental costs of changes to these systems.

I also had a few, I think, pretty simple questions that I was hoping you guys could answer or think about. Has there been any thought been put into what needs to be done

for systems that are not actually sold as systems, particularly where you have a product that has a purely optional battery element? In other words, the product does not require the battery to function and is not sold with the battery or a charger and may not even be sold with an external power supply. However, you know, in some cases we offer them as an optional enhancement to the product so the battery would not be sold with the product but would be sold separately, the charger which is also optional would be sold separately. And in those cases we don't have any control of when something goes out.

As a system how would you determine compliance for that when the three parts of it could be sold at different times, some of them before the existence of the regulations? And related to that, how would you market as a system since the three elements would be sold completely separately? And finally, a question related to the test methodology. Is there any reason why – it seems that the battery charging system test methodology requires you to use an energy analyzer, whereas the external power supply testing methodology allows you to use a power analyzer. And this seems to me like you would have to buy additional specialized equipment where current external power supply testing setups could be used to gain the same information and not waste capital expenditures in developing new testing

systems.

So thank you very much.

MS. PORTER: This is Suzanne Porter, consultant to the IOU statewide Codes and Standards Team. Katt, I would be happy to address your questions regarding the test procedure and battery selection. To your first question, I think it would probably be best – I would encourage you to have a conversation either with the CEC staff or you and I one on one to talk specifically about your product and we could walk through how it applies at the test procedure. Based on the description that you gave here my sense is, without more detailed information, that the charger system that would be coupled with the battery would be regulated. And even though it is not packaged with a particular battery there is a protocol in the test procedure for battery selection. And there are other products – specifically this comes up with double A chargers – where the batteries are sometimes not packaged with the product.

So though the CEC's test procedure has a particular methodology, DOE's NOPR which came out last year on the test procedure modified that methodology slightly. So I would encourage you to look at both of those.

MS. FRETWELL: Point of clarification on that. We were not worried about choosing different batteries, it would actually have a defined battery. The question comes

up when you get into the issue of what is compliant and what is not. You know, you are selling a compliant external power supply that complies to all regulations for that. It is an optional accessory. It will eventually be part of a battery charging system most likely. But it's not being sold that way, other than by intent. You know, the actual act of selling, it is just the external power supply that is being sold.

MR. RIDER: Katt, this is Ken. Let me address that for a second. If you sell just a battery, that is not a battery charger system. If you sell just an external power supply, AC to DC, that is not a battery charger system. It's when you sell something that has charge control circuitry where I can plug in a battery or a battery is already hooked in. That would be the covered product that is a battery charger system. And if it comes with a battery or it has a specific battery that is associated with it that's how it's tested. But it's really once you include something that has charge circuitry, then it becomes the covered product. Does that make sense?

So if your product has an accessory – if it itself doesn't have any battery charger circuitry in it, it's not covered. If you sell it wouldn't be part of this regulation. If you sell an accessory that has that battery charger circuitry in it, that would be covered and the sale

of that would be covered. Does that make sense?

MS. FRETWELL: Okay, that clears it up. Thanks.

MR. RIDER: Okay.

MS. PORTER: Katt, I think you had a few other questions about the test procedure. And I would be happy to answer them. This is Suzanne Porter. But could you please restate them?

MS. FRETWELL: Certainly. The real concern here was that we have an existing setup for testing energy efficiency on external power supplies, which requires testing of your power essentially. It seems like the battery charger system methodology looks at a very similar output from the charging system but requires you to measure it as energy, which would require purchase of new equipment. Is there any reason why we could not do these measurements in terms of power instead of energy, thus not requiring us to buy some kind of battery analyzer, if you can control all the other elements of the measurement?

MS. PORTER: Right. I would be happy to talk with you offline about the specific piece of equipment you have. We are very familiar with this type of equipment with the laboratory we have at our facility. But just a quick answer is that the reason why accumulated energy is part of the test procedure for battery chargers is because there is a significant time component associated with the test. The

primary place where this is employed is the battery is fully discharged and then the battery is placed in the charger and then fully recharged over a 24 hour period. And the accumulated energy function on a piece of equipment is useful to sort of enable – to allow that to run for the 24 hour period and then come back and get the result.

The external power supply test procedure instead is a set of fixed loading points on the output. I'm sure you're familiar, but it's a very short measurement with stabilization periods. So the power is a lot more appropriate. So I think if specifically for your power meter if it has an integration function, which some of them do – it's called integrating over time – you can actually do that integration without buying a specific energy meter. So we could talk about that.

MS. FRETWELL: Okay, thank you.

COMMISSIONER DOUGLAS: All right, thank you. Any other comments from the phone?

(No response.)

All right, it looks like we do not. NRDC would like to come up and make another brief comment.

MR. DELFORGE: I apologize for these late comments. I had submitted a card but it seems to have gone missing. I will keep this very short. So two comments to respond. And, Ken, would you mind putting up the second slide of my

presentation, the one with the low efficiency products?

So in response to the comment about outlawing some of the nickel-cadmium chemistries, the products which are on this slide, which are some of the lower battery capacity products, I have checked the test data set and for every one of these products I want to clarify they are in the test data set products which are multiple times more efficient with the same chemistries. So not requiring a change of chemistries. In these four products here we have a variety of chemistries, including nickel-cadmium, nickel-metal hydride and lithium-ion, and in each case they are products that either meet the standard or are very close to it. Multiple times higher efficiency than this and with the additional engineering design changes that have been described today would easily meet the standard. I just wanted to make the point that this is not eliminating chemistries. I'm not talking about medium range products. Again, this is just low end.

The second point I want to talk about is the issue of having networking functions that would prevent meeting some of the standby requirements and which are necessary for users. The test procedure very clearly says that products should be tested without any networking cable or even Wi-Fi functions. And I would submit that these should not be part of the standby mode, they should be part of the network

standby mode and that the standard applies to strictly standby mode without any type of these functions. And the products which have these functions should also offer users a way to have a standby mode which does not require these networking functions to on 24/7 if users don't want to use them.

So I think, you know, whether this is by a hard switch or by a software configuration or other means, there should be a way to use these products in pure standby mode without having these networking functions that require more power than the standard allows. Thank you.

MR. PAUL: This is Chris Paul from Motorola Solutions. I would like to reply to the request that the networking functions be possible to turn off, that switches be added. Customers do not use these products in a manner that they would wish to or ever engage in turning off the networks. The networks are on 24/7 so that someone comes in with a terminal and drops it into the cradle the network is right there for them. There are multiple slot cradles that have multiple terminals, maybe one terminal is in there, maybe two terminals are in there, but the network is always up and operating.

What you suggest would be akin to saying that in buildings right now which are wired for use with computers and maintaining networks, that we have a switch on our

Ethernet sockets so that when we are not using them we could reach down under the desk and throw a switch to disconnect the Ethernet connection to our equipment. People are not going to do that even if you supply it. And if you did supply it you would be adding cost to provide a feature that they wouldn't be using. So I don't think that that's a particularly good idea.

MR. DELFORGE: Well, isn't that the case for power management where you have auto power down function that is not being used and could be labeled unnecessary?

MR. PAUL: No, because the network has to continue operating. And in fact what we do is chain these things so that there are a whole series of chargers. We don't have a hub in which they are wired from one point out to all with a star arrangement. We have a ring arrangement or a line arrangement in which, well, this unit may not be used but the one next to it is being used. And to support that technology the power must go through the equipment. And again, people are not going to turn this one off so that one can be used, that's not the usage model that our customers have. They want a facility that is ready to go and dropping things in. They are not going to turn off Ethernet switches even if you give them to them.

COMMISSIONER DOUGLAS: All right. I would like to thank everybody here for their participation. This has been

extremely helpful to me. I benefit a lot from hearing some of this point-counterpoint and it helps my understanding, so thank you.

Let's reiterate the deadline for written comments. The deadline is what day?

MR. RIDER: That would be May 31st, the last day of this month.

COMMISSIONER DOUGLAS: So we look forward to receiving written comments on May 31st. This has been extremely helpful to me. I'm sure the written comments will be as well. And so with that, thank you again. The workshop is adjourned.

(Workshop adjourned at 4:25 p.m.)