BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of,	)
	)Docket No. 11-AAER-1
Efficiency Committee Scoping Workshop	)
	)

Efficiency Committee Scoping Workshop:

Potential Topics for Future Appliance Efficiency Rulemakings

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

WEDNESDAY, AUGUST 31 2011

10:07 A.M.

Reported by:
Kent Odell

Commissioners Present

Karen Douglas, Presiding Member, Efficiency Committee

Staff Present:

Paula David
Ken Rider
Michael Leaon
David Hungerford
Paul Eilert
Galen Lemei

Also Present (*on phone)

Panelists

Panel 1:

Noah Horowitz, NRDC
Pierre Delforge, NRDC
Henry Wong, Intel
Stephen P. Dulac, DirecTV
Gary Langille, Echo Star
Doug Johnson, CEA
Brian Fortenberry, EPRI
Frank Sharp, EPRI
Ted Pope representing California IOUs, Energy Solutions

Panel 2:

Randal Higa and Michael McGaraghan, SCE and Energy Solutions With California IOUs
Konstantinos Papamichael, California Lighting Technology Center
Terry K. McGowan, American Lighting Association
Dick Upton, American Lighting Association
Alex Boesenberg, NEMA

Panel 3:

Noah Horowitz, NRDC
Steve Schmidt
Gary Fernstrom, PG&E with IOU's

Panel 4:

Gary Fernstrom, PG&E with IOU's
Ron Gorman, SDG&E with IOU's
Yanda Zhang, HMG

Also present:

Elton Sherwin, author of "Addicted to Energy"
Bernio Rosco, California Cable and Telecommunications Association
Jim Cardoch, Intel Corporation.
Charlie Stephens, Northwest Energy Efficiency Alliance.
*Francis Rubinstein, Lawrence Berkeley National Laboratory
*Bob Earnhardt

I N D E X

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P R O C E E D I N G S

AUGUST 31, 2011 10:07 a.m.

COMMISSIONER DOUGLAS: All right. It looks like everyone is ready to get going. Good morning. I'm Commissioner Karen Douglas, the presiding member of the Efficiency Committee. To my left is David Hungerford who's serving as my Advisor and my Advisor Galen Lemei will be here shortly.

I'd like to welcome everybody to the Efficiency Committee's Scoping Workshop on Potential Topics for Future Appliance Efficiency Rulemakings. It's good to see that we have a lot of people here. I'm sure we may have people on the phone and WebEx as well. So I look forward to hearing from all of you as we go forward.

Let me turn this now to staff to give—to Mike if you could kind of give people the logistics and so on.

MR. LEAON: Okay. Thank you, Commissioner. Good morning and happy to see that we have a good participation in today's workshop. A few housekeeping announcements. Restrooms are directly across from Hearing Room A. There is a little cafeteria opposite the stairs, underneath the white awning. There are some—we have a short lunch today, 45 minutes. There are

some restaurants close by straight down O Street, just two blocks down, at 11th and O there's a La Bou, there's a Mexican restaurant, there's also a cafeteria in the Secretary of State's Building which is also on 11th and O. In the event of an alarm, I would ask that you follow Commission Staff outside the main doors here and we'll evacuate to the park, kitty corner from the Commission, across 9th and P Street.

Okay. Regarding the agenda today, we do have a full agenda. We'll have four panels, a panel on electronics, lighting, and a panel on water and a catch-all panel, kind of an ad hoc panel to conclude. So we're going to have quite a full panel discussion for electronics and lighting. I am asking that you hold public comments until the public comment period. If we have some time during the panel discussion to take a few comments, we'll do that. But based on the number of speakers we have, I'm thinking we're not going to have much time during the panel discussions; especially during electronics and lighting to take questions. So I'd encourage you to also submit written comments to the docket.

Okay. Peter, if you could tee up my presentation please.

MR. STRAIT: All right, one moment. Which

presentation is it that you're--?

MR. LEAON: It's the one you just loaded up. I think it's on the bottom there on your list.

MR. STRAIT: This one? All right.

MR. LEAON: And if you could go to the next slide, Peter. And I won't take too much time on this. I'll go through this fairly quickly. The purpose of the workshop today is, of course, to take your comments and feedback on potential topics to include under a new scoping order for appliance efficiency standards. We'll hear presentations from various stakeholders today on those topics that we included in the notice.

In general, the questions that we're looking at for response as were indicated in the notice were what topics should be prioritized and why, what other topics from what we've already identified should also be considered and what topics should be eliminated and why. So that's the type of feedback that we're looking for. Again, I encourage you to submit written comments in support of any oral comments you make today.

Next slide, Peter.

Of course our enabling legislation for adopting appliance efficiency standards is the Warren-Alquist Act. The Act authorizes the Energy Commission to adopt regulations for minimum levels of operating

efficiency for appliances whose use determined by the Commission requires a significant amount of energy on a statewide basis. And efficiency standards must also be feasible, attainable and cost-effective.

Next slide, Peter.

Regarding the impact of the efficiency regulations, by 2009 approximately 31 percent or almost 18,000 gigawatt hours of California's energy savings were achieved through appliance efficiency standards. This saves about $2.5 billion electric bills annually.

Furthermore, the appliance labeling requirements in the State's appliance database also help form the backbone of utility rebate programs. In addition to setting efficiency levels, regulations also include requirements, reporting requirements, marketing requirements, labeling requirements and enforcement rules.

Next slide, Peter.

The Commission's main policy documented is the Integrated Energy Policy Report or IEPR. In the 2009 IEPR, a recommendation was included that the Commission continue to adopt appliance standards for consumer electronics, lighting, irrigation controls and refrigeration systems. These standards are key for obtaining several state policy goals including the

Commission's loading order in which efficiency comes first. Also, new and existing building efficiency goals under Assembly Bill 758 in Zero Net Energy Policy Goals set by the Public Utilities Commission and the Energy Commission. And also for helping to achieve greenhouse gas reduction targets under the ARB scoping order.

Next slide, Peter.

Governor Brown's recent eight point energy plan, the Governor also recognized the importance of appliance efficiency standards specifically Governor Brown recommended that the CEC adopt stronger appliance standards for lighting, consumer electronics and other products. And that the Commission should also increase public education enforcement efforts so that gains promised by efficiency standards are in fact realized. And, further, that the federal law should be changed to make it easier for California to adopt standards more stringent than federal standards as we have the authority to do with automobile emission standards.

Next slide, Peter.

So, again, summarizing the topics that we'll be discussing today, we'll be discussing electronics. This is an important quandary of products to consider under the new scoping order based on their potential energy savings. We estimated that we can achieve over

3,000 gigawatt hours of savings by adopting efficiency standards for the topics that are under consideration.

Next slide, Peter.

Lighting, again, we think that this is a fruitful area for efficiency standards. Again we think that this is probably on the order of 3,000 gigawatt hours or more. And a savings can be achieved through the lighting sector.

Okay. Peter, next slide please.

And finally, other topics that are under consideration include water using products and other appliances. These in, combination with the lighting and consumer electronics, we believe that we can save as much as 8,000 gigawatt hours through developing efficiency standards for these products.

Next slide, please.

Regarding our schedule for the scoping order, we're having a workshop today. We are encouraging you to submit written comments. Staff is going to carefully consider the testimony from today and any written comments that we receive and report back to the Efficiency Committee regarding the nature of the comments, the tenor, general direction and the overall type of feedback that we're getting from stakeholders. Based on that information and our legislative mandates

and policy goals, the Committee will consider the scope and schedule for a new scoping order and we're hoping that we can have a new scoping order adopted by October and have that posted to the Commission's website by November.

Next slide, Peter.

Again, through this process, once we have a new scoping order in place, we are encouraging new stakeholders to submit proposals for efficiency standards. We do have a process in place where you can work with staff to do that. We do have an electronic template that we can share. If anyone is interested in pursuing that, Peter, if you could go to the next slide.

I would encourage you to contact our program staff working on standards development. Harinder Singh is our lead person and his contact information is there. Also, we have Ken Rider and his contact information is there as well. This presentation will be posted on the website so you can access that information from the Commission's website.

And that concludes my presentation. Next on the agenda we have a presentation from Pat Eilert with PG&E who will be speaking on behalf of the California IOUs or Investor Owned Utilities. And Pat, if we can have you come up to the podium.

MR. EILERT: Okay. Thank you very much for the opportunity to speak. I'm presenting just a brief summary on behalf of the statewide Investor Owned Utilities and the statewide team includes PG&E, San Diego Gas & Electric, Southern California Edison, Southern California Gas Company. There will be a number of presentations later this morning and in the afternoon by various folks representing the IOU team. These people will include Randal Higa, Ted Pope, Mike McGaraghen, Gary Fernstrom and Yanda Zhang.

So all of the work that the statewide team is conducting under the auspices of the California Energy Commission, the IOUs submit plans to the CPUC and both the plans and the budgets are approved. CPUC also provides ongoing oversight. A number of folks have contributed to the technical content of what we're presenting including ACEEE Ethos, Energy Solutions, HMG, LED Consultants, Lighting Wizards and McHugh Energy Consultants.

All of the IOU team is very interested in feedback directly from industry. Feel free to contact any of the three folks at the bottom of this slide or anyone on the technical team.

Our agenda is in parallel with the CEC agenda. This is just a brief overview of what the statewide

codes and standards program contains. We conduct the advocacy for building codes and appliance standards. Most of our work is aimed at California Energy Commission proceedings but we also work with US DOE. We also provide technical support for local governments interested in reach codes that exceed state building standards.

We also provide support for compliance improvement to increase the realization rate for codes that are actually adopted. These activities lead to customer savings throughout the state.

Here I'm reemphasizing the long-term strategic plan that Mr. Leaon mentioned earlier because it informs our program planning and activities fairly directly. As stated here the strategic plan informs us that—to support expanded building and appliance codes and standards on an on-going basis and, more specifically, to do something about plug loads.

And here is sort of a graphic that provides a bit more information about plug loads. On top you see the residential energy use on the left. You see plug loads circled there are the largest load and on the right you see that it's also the one that's growing the fastest. And those plug loads include things like electronics. A little bit further down you see things

like televisions and set top boxes as well. The bottom two charts here show commercial electricity use.

And again, you see miscellaneous plug loads on the right as one of the fastest growing loads going forward as well as office equipment non-PC which includes things like servers.

Another sort of different look at this is how plug loads effect building codes and that's really important as that's one of the state's policy goals is to reach zero net energy in residential buildings by 2020. On the bottom, on the left hand column you see measures that are directly affected by Title 24 Building Codes.

In the middle, the blue, are the measures that are effected by Title 24 indirectly. And, on top, there's more than half of the building load is actually not effected by building codes. So what we're doing today effects whether or not we'll achieve zero net energy going forward in any cost effective way.

So shown here are approximately 22 different measures. The electronics and lighting trackers are pretty similar to what Mr. Leaon showed earlier with the exception that we're adding small network equipment such as routers and modems in the electronics track. In lighting the exempt lamps at the bottom we're adding.

And there's a number of changes in other products in the water tracker. For example, air filter labeling, power factor interactive effects and so forth.

We would urge the Commission to conduct parallel tracks in these areas. There's a lot of potential energy savings on the table. And as a matter of reference, 2004, 2005 and 2006 this is about the same level of work—because at that time there were 22 measures adopted into code at that time.

On this chart we're showing the potential energy savings estimates. In blue are the savings associated with electronics. Yellow are lighting savings. And everything else is shown in light blue. As you can see, computers, displays and servers stand out near the top for electronics. Multifaceted reflector lamps and dimming ballasts, LED lamps and so forth stand out in the lighting area.

So our estimate of the potential savings here exceeds 10,000 gigawatt hours or about four percent of the electricity use in California. From a demand standpoint, lighting sort of moves toward the top here in terms of potential savings from the topics we've actually done calculations for would lead to a reduction of about four power plants in the state.

Commercial clothes dryers, about 12 million

therms there and for water savings we're estimating that there's a potential savings of about the annual water usage for the City of Sacramento.

So here's the summary of—

MR. STRAIT: I apologize. We're having some technical difficulties. One second. Testing. All right. Our apologies, folks. We should have this resolved in 3-5 minutes.

MR. EILERT: All right. Thank you everyone. We were very close to being done before. So once again, here are the potential benefits for the topics that we've just done a very brief overview for. Again, we've covered the fact that there's a potential to eliminate four power plants, four percent reduction in California's total energy use. In the AB 32 energy efficiency goals there is an energy efficiency wedge and the savings here would account for achieving 33 percent of those goals. We estimate that the savings from these proceedings could lead to a potential reduction of more than $100 per year per California household. And we anticipate that there would be jobs created from these energy savings.

That concludes my presentation. We will, of course, in response to the proceedings be filling out the information templates as requested by the California

Energy Commission. Once again, going forward, we'd be very interested in working collaboratively with various industries here to work through various issues. Thank you.

MR. LEAON: Before we move to our first panel, any questions from the dais for Pat?

COMMISSIONER DOUGLAS: No. No, thank you.

MR. LEAON: Okay. If we could have our panel, our first panel, members come on up. We'd ask that you introduce yourself, name and organization. And also if you could provide your business card to the court reporter and we'll get started on our first panel discussion.

MR. RIDER: All right, folks. My name is Ken Rider. I work for the Appliance Efficiency Program. I'll be moderating this panel. Really glad to have everyone that we have here today. Think that it will be a very good discussion. I ask that when I introduce a speaker if you could give briefly a little bit of background and then go ahead into your presentation.

We're a little bit behind schedule so I ask that you keep it to 5-10 minutes. We have eight speakers in an hour and a half, I believe, to get through these. If you can keep it focused that would be really great. I'm going to go in rough order of the

speakers in the way they're listed on the agenda, I'm going to go in that same rough order. We're going to start with computers and servers and so I'd like to start with Pierre Delforge of the NRDC. So if you could go ahead and introduce yourself and give your presentation. Thank you.

MR. DELFORGE: Thank you, Ken. My name is Pierre Delforge. I work for NRDC. Before I start I'd like to let my colleague Noah Horowitz just say a few introductory remarks.

MR. HOROWITZ: Thank you, I'll be very brief. My name is Noah Horowitz. I'm with the Natural Resources Defense Council, NRDC. We're very supportive of the scoping workshop. There are roughly 20 products that are under consideration. We think that three clusters make a lot of sense as they're common stakeholders within the consumer electronics space, lighting and water using products. I think you're going to hear a lot of proposals out there. Some are more fully baked than others and we think that this is the beginning of a conversation. And we think that the savings estimates are based on the best available information and those will be refined over time but the magnitude is quite significant as Pat Eilert just mentioned. We're talking about billions of dollars of

savings here of more than a couple of power plants, millions of tons of CO2. So to put the consumer electronics savings into perspective, we're looking at once stock turns over the same amount of electricity that's used each year by all of the City of San Jose, San Francisco and Oakland put together. So that's just on the consumer electronics high end of the savings.

So I'd like to turn it over to Pierre who's going to talk about computer and servers and I'll speak later about set top boxes and game consoles. Thank you.

MR. DELFORGE: Thank you, Noah. If you could put the first presentation up please.

MR. STRAIT: Computers and servers?

MR. DELFORGE: No, the electronics one.

MR. STRAIT: I'm sorry. Hold on.

MR. DELFORGE: Thank you. So this is a very brief summary, as Noah mentioned, we have four recommendations for—or the top four recommendations in terms of electronic products. The first three are 1-2,500 gigawatt hours of savings. So very significant. It's a little bit less to the lower number of devices but very significant still. We're talking about half a billion dollars of savings from voided electricity costs for Californians and up to two power plants as Noah mentioned as well. Next slide, please.

So again, this just puts them in simpler manner but the same numbers as the previous slide. Next one, please.

So, I'm going to start with computers and servers and Noah will take set tops and game consoles. Next slide.

So in terms of the scope that we're talking about here it's desktop, notebooks, net books, work station. This does not include tablets. This is in line with the Energy Star specification. The graph on the left shows sales of these products. And there's a lot of talk about the pace of PC debt and tablets replacing PCs. The reality, and if you look at industry projections, it's still very significant growth. Growth may have slowed a little bit due to the advent of tablets but there's still very significant growth in the market. Desktops are decreasing a little bit but still around three million and projected to remain reasonably close to three million over the next decade, that's sales in California. Notebooks, on the contrary, are still growing very strongly. About 80 percent projected over the next decade. On the right, if you look at the projected energy use of these personal computers, this is around ten terawatt hours and it's projected to remain approximately stable. The growth of notebooks

offsetting a slight decrease in desktop and this includes some naturally occurring improvements without policy intervention so this is our baseline scenario.

So this corresponds to your approximate three and a half power plants and over a billion dollars worth of electricity costs for users. So how much of this can we save? Next slide, please.

I'd like to put the desktop and notebooks in perspective and compare them with tablets for a moment. The reason for this is because these computers already have different form factors and different utilities. They provide to the same extent the same functions, email, internet, word processing. And if you look at this chart, it shows the annual energy use of typical devices and in the other extreme, the desktop for example, is an Energy Star Category B desktop, it's not a high end energy—high end computer.

The magnitude of the differences between the devices shows that it's not in proportion with the difference in performance. It's much more. It shows that beyond the difference in performance, there's also a difference in terms of the efficiency of the components that are used in these platforms and in terms of the design of the architecture of these platforms. And, I think, the intent is not to say that desktop and

notebooks should use the same as the tablet but it's just to show the scale of the savings potential and from the cost effective manner, that we have between these tablets and that we should not just be aiming to save between 5-10 percent on desktop and notebooks but that we can aim much higher in the 50 percent range from a cost perspective manner. Next slide, please.

So next I'd like to show the main energy users in the energy platform. Power supplies remain one of the key energy users, especially when they're not what we call 80-plus which is a standard for efficient power supplies. But you also have a number of other components such as displays especially when they're integrated into notebooks and all in ones with graphics. I think the point, and there's many opportunities to save energy in each of these components and also from the system level by throttling the components or system down depending on application and user need but I think the main take away from this slide is not that—it's that beyond power supplies if we want to capture the opportunity for savings, we can't just rely on power supply efficiency. I think we have to go to other—to system level requirements in order to be able to capture the full cost effective opportunity in these systems. Next slide, please.

So what this slide proposed is four main elements. The first one is a prescriptive requirements on power supplies because it is the highest energy user in the PC and also because we have a well established benchmark metric and data set to do so. But to go beyond power supply, we also propose to set our limits in mode so that's a system level metric which will capture the other efficiency opportunities similar to what Energy Star does in the key modes not including active. We're not proposing to cap active mode but mostly idle, sleep, off and network standby.

We're also proposing to have a power management requirement to make sure that it's not just about capability but it's also about how operational savings in terms of how these platforms are used in the field. And a consumer labeling requirement to enable customers to make the right choice and be informed about energy using costs. Next slide, please.

So my last slide, I just want to illustrate how a power cap, a power requirement would work. So this is an illustrative graph that shows the distribution of platforms in the Energy Star five data set for one category. So on the left you have the most efficient system that uses less energy on an annual basis and on the ones on the blue area are qualified

Energy Star well below, roughly, 175 kilowatt hours a year. What we propose is to do something similar on the high end side of the system which uses the most energy to set a limit and require the systems to implement measures that will allow them to meet that limit. And, I just want to mention that this has a mechanism called capability adjustment or allowances that allows systems that do have higher capability from a performance perspective to have allowances a little bit more than the limit. It's flexible, it's performance neutral, it's effective item neutral and provides industry with the flexibility to find the most cost effective ways to meet the standard at the same time to capture the system level opportunities in the standard.

So that's it for computers. I'd like to switch to computer servers which are no longer the desktops or notebooks but they're the computers that sit in servers rooms at enterprise data centers all the way to separate closets in small and medium businesses.

The estimated energy use of servers in California in 2010 was around 6-7 terawatt hours a year so about 2/3s of that were PCs but they're growing much faster due to the data and computing explosion that we see now in everyday life. They're projected to reach about two folds of that by 2020 without policy

intervention. Next slide, please.

One of the biggest opportunities to save energy on servers is what we call power proportionality which basically means how much power a server uses when it's idle or when it's running at a very low load or at maximum power. This graph shows a number of server profiles depending on the load of the server. So on the horizontal access you have the load from the 100 percent and on the left you have the amount of power uses compared to maximum power so it's normalized 2:1. The red line, for example, is a server which uses up to 65 percent of its maximum power when it's in idle or doing very little work where the best in the market are around 20 percent of maximum power which—and this is important because most servers in data centers actually use—run between 0 and 30 percent loads. They are selected by customers based on their maximum capacity so that they can run the applications that they are designed to run or intended to run over their life they spend most of their time and energy at very low loads and if they are not power proportional they end up spending a lot of time doing not very much work and energy not doing very much work. Next slide, please.

So this slide just shows the power proportionality is not well correlated, is not

correlated at all actually, with the powers with performance of the servers. If you need a very high end server, you can find a server with high end proportionality as you can find servers with low end proportionality and the same with the very low end. And it shows how we could set the standard limit with .4 to eliminate the servers to have the lowest power proportionality or at least to force them to be power proportional. It's a little bit more complex. It has to be done within categories in terms of workloads, in terms of liabilities. There's some work to do to find the categories but the benchmarks, at least in most categories of servers, exists with respect to power in others.

We have data available so it's—there's a lot of limits that we need to set the standards up there but we just need to work with industry to find the best way to implement this. There's some other possibilities like actual efficiency, transactions per watt so this is just one example of how this could be set to achieve the energy savings. Next slide, please.

So I'm going to skip on this one because there's basically similar opportunities as we have on computers in terms of power supply, memory, disk, motherboards, etc. Next slide, please.

So the key elements in the standards that we propose are a prescriptive requirement on power supplies to eliminate the least efficient ones in the market. And then a number of options that will have to be discussed with industry which either direct a requirement on power proportionality or leverage the Energy Star spec for Version 1 which is currently enforced or event collaborate with EPA on the current spec in terms of the current development of Version 2 which uses a performance benchmark.

Next slide, please.

So just as a summary, I wanted to show the different savings from looking at different metrics. Are we talking about hundreds of millions of dollars of cost savings for each of these opportunities. On a unit basis are we talking about several hundred dollars on the lifetime of the equipment for the impacted devices and I think we've covered the others in the overview so I'm going to stop there in the interest of time. Thank you.

MR. RIDER: Thank you very much. Thank you. To keep you on the computers and servers subject, I'm going to move onto Henry Wong and then we can circle back to Noah's presentation. So Henry if you're ready, go ahead and introduce yourself and give your

presentation. Thank you.

MR. WONG: So the presentation is listed with—

MR. STRAIT: One second. We're going to try to re-enable the WebEx really quickly here. This will just take a couple of minutes.

MR. WONG: Okay.

MR. STRAIT: And which presentation was it?

MR. WONG: This was the ITI.

MR. STRAIT: ITI? All right.

MR. WONG: Of the CEC Workshop.

MR. STRAIT: I can give you this—let me just start this and I can give you this so you can advance the slides.

MR. WONG: Excellent. Okay. Thank you. My name is Henry Wong. I've been in the computer industry developing new technologies for close to 26 years so far, mostly with Intel. And what I'm going to be presenting today is an overview based off of our understanding of the market. What I'm representing is not only Intel but also the IT industry as well as some of the companies within organizations such as the Green Grid which comprises not only of industry manufacturers and service providers but also end users and research facilities, all of whom are helping us understand the market a little bit better so that we can achieve higher

gains of efficiency.

So I'm going to go ahead and cover some of the basis of computers and servers and just to remind folks that computers and servers are the very technology that we are relying on to achieve higher levels of efficiency throughout our economy. When I say efficiency, we're also talking about productivity over the energy consumed. We don't go ahead and provide sufficient resources for this key attribute on the computer industry it'd be very, very difficult for us to achieve in the economy higher gains in efficiency both economically as well as from an operational standpoint within the industry.

Again, as another reminder of how fast the pace technology is in our everyday lives, we're looking at items that—or activities we would normally do with more carbon intensive activities—going to the bank, doing transactions, living out your daily lives and all of those activities have become much more efficiency given the IT technologies that have been progressing. In fact, there's a lot of discussion early on probably 2-3 years ago or even further before that, that marveled at the computer industry and asked why can't other industries gain the levels of efficiency in their particular industries the same way that computers have.

One of the things that I want to make sure that we leave with today is that the notion that the keys to energy efficiency is indeed higher productivity. We have to support the activities of the people of the State of California as well as the nation, we have to go ahead and find a better way of running our economy and our lives with the least amount of energy consumption. So higher productivity, lower energy consumption. And I'll cite some of the historic examples. We're really looking for the computer industry to achieve the same kind of efficiency that we've been able to achieve in the past. A 10:1 improvement on economic achievements versus energy consumption along with continued path along those guidelines.

But it's not without some challenges. So what we face in the industry today is this growth in terms of technology dependence. We're getting more users, we're getting more productivity, there are more computing devices and there's actually a lot more data to handle; not only from an entertainment or social responsibility standpoint but also to meet required regulations in terms of accountability of the data that's their personal data, financial data and safety information that is required by us all.

What we've been able to go ahead and do,

especially with PCs, is look out into the future in terms of where we're headed. We know that resources like energy are not going to be limitless. As a result, one of the things that we focused on, especially in the PC industry is to make sure that we can grow the productivity while maintaining a fixed level in terms of the energy growth and energy demands. Trying to provide exactly that idea of efficiency, of greater productivity for everyone with the least amount of energy consumed.

What we see for between 2007-2014 is indeed a growth in terms of the number of devices but the number of devices and the energy consumption of the second billion PCs pale in comparison to the compute capability, the productivity of those devices.

We expect to get a 10x improvement in terms of the computer capacity, consolidating activities in the economy while not overburdening the energy consumption required. Basically using half the energy the first billion used.

In the computer and server industry, what we're seeing is the voluntary programs and market demand is already driving energy efficiency and one of the things that we'd like the Commission to really pay attention to is the business as usual case and, in this instance, especially for computers and servers, the

rapid improvement in energy efficiency without having to go ahead and come up with regulations. We think that programs, voluntary and incentive programs, are the keys to doing that transformation in the industry. And it will actually be consistent with some of the developments the industry already has been undergoing. This is a chart, and I won't read through it, regarding energy efficiency in computers in general as well as specific instances of what we're trying to do in personal computers in addition to what we're trying to do in servers and data centers. These are some of the programs and practices that are already underway within the industry with some of the organizations that I had previously mentioned. It's not just manufacturers. These are users and researchers that are all focused on these activities.

MR. RIDER: Henry, you had two minutes or so.

MR. WONG: Let me go ahead and try to rush through this then. This slide just describes some of the base improvements that are going on in the computer industry over the past 30 years and we continue to do so.

This foil set is an example for the progress that we've made on PCs, understanding not only our market but also the end user. One of the key items here

is that we really want the keys to transitioning to energy efficiency on PCs is adopting power management and refreshing the equipment. We've found, even when working with the Australian MEPS program as well as with the European programs on energy efficiency, the key answer that no one ever wants to listen to apparently is that the way to transition to higher efficient set of equipment is to just simply refresh it, and follow along the path that the industry has already provided.

Same thing goes even on servers. And we're finding that in the State of California too. Recently there was a publication on an activity that one of our industry colleagues, HP, did with the California Department of Water Resources where they've been able to realize what I'm showing here which is that the newer systems and components along with consolidation activities and virtualization activities are able to go ahead and achieve significant gains in energy efficiency in the data center. And it's really the data center, not necessarily the individual servers, that are the most important because that establishes the footprint.

And in the case of the California Department of Water Resources, California was able to realize a reduction of servers from 600 to 160 servers. And they were able to consolidate their footprint on their data

centers, now this was not done via regulations. This was done through these organizations that we've worked with, the Green Grid, the member companies such as HP and so forth, along with the baseline technologies that I'm showing here today regarding servers.

And this is basically the realization that California was able to see. It's not just a simple marketing foil, per se, but this was reality.

MR. RIDER: Henry, if you could wrap it up here. Thank you.

MR. WONG: The last item that I'd like to make sure about is that if we're going to create a program, and I don't like the use of regulations, but if we're going to create a program one of the things that we have to concern ourselves with is unintended consequences. With all of these advances and with what we've already achieved, I don't want—or we don't want from an industry standpoint—a program that will either stall the current efficiency activities or prevent it from happening. That's going to hurt both the public as well as the industry. And that's what we see that may occur if regulations are deployed. One of the key items on the computers that I have an example of, and I won't go through, is the increase of annoyance modes. Folks really don't understand this concept of if you make

sleep or inactivity annoying, it doesn't wake up in time, you're bound to go ahead and force consumers which is really where the energy savings will come about, to increase their energy consumption by going into the non-annoyance modes and actually prevent the industry from migrating consumers to a more efficient system.

Now it may be a little difficult for me to describe without going through that foil but I do recommend that you do go through that foil following this. Understand this issue of annoyance modes. We're really looking at what does it take to transition the consumer base to something more efficient.

Same thing goes for servers and we've worked with, like I said, end users including California the DOE, the US DOE in Washington, looking at their own data centers and doing audits to make sure that we drive energy efficiency throughout the data center and to reduce or hold flat the energy footprint in that data center while maintaining productivity.

And it's the crying baby syndrome. That's the annoyance mode.

So it's not piece part, it's the system. So even though we may want to go ahead and put constraints on individual pieces of the computer system, it's the system itself and its interaction within all the

different pieces that will achieve energy efficiency. The unintended consequences is if we constrain one particular piece, we may end up having a family responding to that crying baby.

MR. RIDER: Henry, we're going to have to move on to the other presentations.

MR. WONG: Okay. That's fine. I'll go to the conclusions and recommendations. There's voluntary measures to provide incentives and help us transition the markets. We also recommend that if we're developing a program, a comprehensive assessment of the market with verifiable data be used as a basis for developing any regulation once so ever. That's it. Thank you.

MR. RIDER: Thank you, Henry. We'll review the full presentation. We're going to kind of switch gears into the set top boxes. Noah, are you ready to present on that? Okay.

MR. DELFORGE: If you just switch back to the previous deck, the electronics—

MR. STRAIT: Would you like the use of the remote? So again, number three?

MR. DELFORGE: Yes, number three.

MR. HOROWITZ: So to follow up where we left off. Again, Noah Horowitz with the NRDC, the Natural Resources Defense Council. We've done a lot of work

with help from our consultant, ECOS Consultant, trying to understand the energy usage of set top boxes and its various modes.

We'll quickly go over what we found from our most recent study and give some potential recommendations for the CEC to consider if it's going to move forward with standards for these products which we hope they do.

So you need to go all the way to the—okay. There we go.

MR. STRAIT: My apologies.

MR. HOROWITZ: No problem. So there's roughly 11 million customers or households if you will that subscribe to some form of paid TV in California and the majority of them subscribe to cable, the rest satellite and increasingly, it's a small number-it may potentially grow, some people are getting their service from the phone company. And each system has its own implementation.

Going to the next slide. On the Y axis is how much power the device is using. On the X axis on each of those bars is an individual model that we tested. You know the Motorola box 123, the Cisco box, the satellite box and so forth.

If you go from the left side to the right, on

the left is a basic box, a standard definition box, as you move to the right, the next cluster are high definition boxes and they consume a little bit more power. Then you go to—on the right hand side, the DVRs which are increasingly popular and, as a result, the whole category is having increasing energy use.

The circles are how much power the device is using while it's on-when the user is watching TV, recoding a show, playing back a show. And that's interesting, I think, the big opportunity here is the bar underneath is how much power the device is using if it has an on/off button and you turned it off. There's little to no difference in the power draw, whether you're using the device or not. Next slide. Thank you. You're right on schedule.

So here's an example, this is not meant to pick on the Motorola box; this is pretty representative of the industry. You can see over time there's a very little difference of the power consumption of these devices. It might go up a watt when you're watching a show and when you've turned it off; the power goes down a half a watt or a watt. What happened, it dimmed the clock and nothing else.

So here's the big opportunity. How do we reduce the amount of power these devices are using when

the user is indeed not watching TV or recording a show? Next slide, please.

So we did some modeling on the national basis and the savings would be proportional for California but in general graphically two-thirds of the energy being consumed by these devices per year is when they're not being used. It's about nine power plants worth of energy or electricity being consumed in the U.S., it's about $3 billion a year that consumers are paying to run these devices, $2 billion of that when they're not watching or recording a show. And that's the big opportunity for both the environment and people's pocket books. Next slide, please.

So this is getting into a summary of some of the points I've mentioned already. I think it's important to note that some of the DVRs, in terms of KWH per year, the annual electricity use is greater than the big screen TV that they're connected to. So we've done a great job with the industry's help and the state regulations in driving down the energy use of big screen TVs. Now we need to work on the things connected to those big screen TVs. Another way to think about it is that not all homes but many homes have a DVR for their main TV and a basic box on the second TV. You add that up, it's equal to a new Energy Star's worth of

electricity a year.

Next slide is information presented graphically. We'll leave it for the record but we don't need to go over it now for the spirit of time.

Earlier I showed you data in terms of watts, the draw of on and standby mode. If you convert this to kilowatt hours per year, you'll see that there is some difference between the cable and satellite products. You'll see that some products are more efficient than others. And, in addition, of the DVRs, we're looking at 2-300 plus kilowatt hours per year. So these are not benign products in terms of their electricity use.

Moving to what could California do? We don't have all the answers for you today but we do have a couple of potential proposals to start the conversation. We think, in particular, that the low hanging fruit is making sure that these devices go into a low power mode while still providing a good experience for the consumer. To Henry's point, we don't want these to go to sleep and frustrate the consumer. We think that there are ways to go into a low power mode and still be able to wake up and record Desperate Housewives or Monday Night Football and then go back to sleep.

So a couple of opportunities to consider. Energy Star has two levels, the first one called Energy

Star 3.0 that provides an annual budget for these products in terms of TEC, total energy consumption, that might be one way to go. Another one that's very simple and easy to administer is what if we said that all new boxes shouldn't be capable of drawing more than five watts when they're turned off or asleep. That should provide sufficient head room for the system to talk to the box, to wake it up, to make it do things. Many products are down to less than 1 watt in terms of standby. We understand and expect that we'll probably hear that there are some unique needs from the cable and satellite industry and we're willing to work with them on this.

We also want these boxes to automatically power down. If the consumer doesn't turn it off with a remote, if they don't touch the remote for 4-5 hours, they're probably not watching TV and there's a way to power it down as well.

A good analogy is everybody's smart phone. Same thing, it's a subscription basis. There's security needs. You always want to be able to receive a phone call. You could even watch TV on your smart phone. Those things use tenths of watts or hundreds of watts when they're not being used. Let's get some of that smart technology into the set top boxes.

So, last slide, if we went from an average of 35 watts to 5 watts just for the DVR when they're asleep and we see similar savings for the basic box, here's what it all adds up to and it's hundreds of millions of dollars; roughly half a power plant. A lot of tons of CO2. We think that this is very ripe for potential savings and we think that the state should consider moving forward on standards. Thank you.

MR. RIDER: You still have about three minutes. Do you want to see if you can get through the game consoles as well? I mean, since the presentation is queued up. I don't want to go back and forth a bunch of times because we're short on time. Is three minutes enough time for you to get through that?

MR. HOROWITZ: I hope so.

MR. RIDER: Well—

MR. HOROWITZ: Four at the most. Now I'll shift to video game consoles. Again, another device that's connected to the TV. So we're seeing growing numbers of video game consoles and by that we're talking mainly about devices like the PlayStation III from Sony, the Xbox 360 from Microsoft and Nintendo's Wii and its successor product the WiiU. We're not talking about handheld PSPs and other players like that. Next slide, please.

So we've taken some measurements. The industry has done a good job at reducing the amount of power these items use when they're in use. It's the other modes where there's significant saving opportunities. We did a study that we'll share with the CEC and available online. The "Ah-ha!" moment for us is if the user is done playing a game and the game is loaded, that box will continue to draw roughly 90 watts 24/7. And there is an auto power down feature in these boxes the manufactures ship it disabled. You could probably count on your hand how many consumers know about that feature, go in and turn it on. So many of us and our families, you turn off the TV; you forget or don't think about turning down the game console. You want to make sure that these items do go into a low power mode.

The good story here is that the industry has done a good job. If you do indeed turn it off or your child or roommate does, it's drawing less than a watt. That's where it should be. How do we make sure that we go from these 90 ish watts down to 1 watt?

In addition, if you pause something or if it's just staying at the main menu, it's drawing 70-90 watts again. So you're not playing a game but you're near full power. So just like Pierre spoke about for

servers, we need power scaling as the device should only work as hard as the task at hand. Next slide, please

Another big opportunity and concern for us is increasingly some consumers are using their game consoles to watch a movie. That's potentially a great thing and very convenient for the consumer. The concern though is that we took a Spiderman 3 BluRay disk, played it on a PlayStation three and it drew about 70 ish watts. If you took that same movie and played it on a standalone Sony BluRay player, it's drawing about 10 watts. So why is it taking seven times more power to display the exact same movie.

On the Wii you can play a movie on streaming and it's about 12-14 watts. We want to see the movie play power reduced and we think that there's multiple ways to get there.

So the Wii consumes a lot less power to play games than the other devices. But on the annual energy use, there's one thing that could cause the annual energy use to go up dramatically and that's a term called network standby. So if you enable a certain feature on their box instead of using one watt when you turn it off, it continues to draw 10 watts of power continually. We think that there are a lot of opportunity to bring down that network standby power.

Next slide, please.

So the opportunities as we see them is that we want to see these consoles go into a low power mode when they're not in use and there's multiple ways to drive down the power usage of these devices and make them more efficient. For example in movie play, power scaling is the way to go and also since if you turn off your TV over time, we would like to see the game console power off as well automatically and vice versa.

So a potential standard for our current thinking is that we'd like to see—these devices already have auto power down capability. We want to see that chip enabled by default. We shouldn't have to rely on the consumers to find this feature. We think that there should be testing or reporting of the various energy use in the various modes. Consumers have no way of knowing the power use and the cost of operating these devices. We think there should be power caps or limits for media playback, the navigation mode and the network playback modes. To be very clear, and we're very sensitive, we too do not want to stifle innovation or consumer experience. We're not proposing a cap on gaming so when you're playing the device, you can use as much power as you like. Hopefully the industry will continue to drive that down but when it's not in use or playing a movie,

we figure there are dramatic savings opportunities.

So the next slide is just a summary of what the savings would be and I'll leave that up there in the spirit of time.

MR. RIDER: Thank you very much, Noah. You're right on time within a few minutes. We'd like to move on to DirecTV, Mr. Stephen Dulac.

MR. DULAC: Du-Lac.

MR. STRAIT: One second while we do. We're going to try and re-enable the WebEx portion of the presentation and try to rebroadcast.

MR. DULAC: I guess I'll just say a few things while we're waiting for the slides to come up. I'd like to talk a little about DirecTV. DirecTV has very close ties to California. We are a California-based company, founded in 1990, based down in El Segundo. We are currently the largest paid TV operator in the world. We have 30 million customers in the US and in Latin America. We are also the 14th largest employer in California I was told currently, and still growing. I think one of the reasons we're still growing is that we're an innovative, California-based company that we really do like our customers. People are proud to say that they have DirecTV. I can't say what Henry was saying about the fact that his industry increases

productivity. I think that as paid TV providers, along with the game console providers, are maybe doing more to decrease productivity in the world than increase it. But still, our couch potatoes love us. We want to make sure that we delight them all the time.

MR. STRAIT: All right. We're going to go ahead with this presentation and, hopefully, we'll get the WebEx portion established after this panel has concluded. The slide is up.

MR. DULAC: Yes, you can jump right past that and I also talked about California. So, right now DirecTV is very big on Energy Star. We think that our customers recognize that label and we have been producing Energy Star boxes since the Energy Star set top box program restarted only in 2009. It's a brand new program, really. We're able to serve both as a provide partner and a manufacturer partner because we actually make our own boxes. We've actually received awards from Energy Star both last year and this year for excellence on our energy efficient product designs, something that we're very proud of. That picture there is from a *TIME Magazine* ad that we put out.

By the end of this we will have put out 30 million Energy Star qualified receivers to our customers. So they all have the little Energy Star logo

on there. And we're very proud of that, we think it's an excellent program. Next slide, please.

The trend in network TV in terms of our set top box power use is shown in this chart. There are three different categories shown, just like Noah had shown before. There's an SD, HD for high def and then our newer high def DVR products. So when we first launched our current generation of SD box in 2004—

MR. STRAIT: One second, I apologize for that. Please continue.

MR. DULAC: Okay. It had an energy consumption of about 150 kilowatt hours per year. It's dropped to a fraction of that with the products that we're producing now in 2011. The same is true for our high def box. We really revolutionized high def in the middle part of the last decade when we announced we would have 100 channels of high def and it took a whole new technology introduction with something called MPEG-4. When we did that, those first boxes that came out used a lot of energy. That same capability, in fact a more capable HD box today is, again, only using a fraction of that energy and it continues to drop. The same is also true for our high def DVRs. Introducing a box that is capable of both high def and a DVR which, by the way, our customers are crazy for; they love these

things. Once they get them, they—you know, well, my wife is a good example of this. She would get rid of me before she got rid of her high def DVR, I think. So this is something that we absolutely do because it delights our customers so we want to make sure that we have more high def DVRs available to our customers and in more rooms. I'll get to that later.

Also in this chart you see where the Energy Star process has gone. Version 2 which is when the program re-launched in 2009 shown there and our boxes from '04, '05, '06 they were nowhere meeting those limits. When Version 3 which kicks in tomorrow, by the way, starts we will just barely be inside those limits and, I'm happy to say, we'll still be able to participate in the Energy Star program.

Version 4 has also been put out as a draft for 2013 and you see the limits on this chart as well. Our current, really state of the art product line is not version 4 compliant.

One—just one last thought on this chart which is that we do have all of this data available. It's actually available on the Energy Star website in terms of the trends of the boxes over time. One of the bits of information from the studies, I would like to see the study that the NRDC did to show those same products on a

timeline. I think you'll see the same trend across all manufacturers not just DirecTV, everybody. The boxes that were designed back in the middle part of the last decade are much less energy efficient than the newer ones.

I also want to talk about multi-room architecture so next slide, please. And this was something that we were actually able to demonstrate here last night. I hope that some people got a chance to go over to the Senate Office Building and see this. This is the next great thing that we're doing in terms of energy efficiency and delighting our customers, to be honest with you. We're doing it for very selfish reasons because we want to make our customers happy.

So we're coming out with a new smart box technology. And what this box does, and you can see a picture of it there with a Samsung TV, it uses this new RVU technology. One box is able to actually provide high def, DVR service to every TV in the house. That's important because it makes our customers even more happy with our service and we're using one box instead of deploying four.

Today if someone wants high def and DVR, and we're in their house, they actually need to deploy a mix of high def DVRs and high def boxes that's much more

energy consuming than this technology. Again, referring to the NRDC report, not the charts today, but the majority of that report does talk about multi-room architecture and the gains that are possible with that. We're very excited about this and I was very happy to see this in that report. We hope that that can be a focus as the conversation continues. I'd love to do everything we can to promote the uptake of this technology in California and everywhere.

The way that this works is actually the Samsung RVU capable TV that you see there is able to run a software application that effectively acts as a client. It's sort of like any sort of app you see on connected TVs these days. And so with our box, it will recognize the TV, be able to deliver the DirecTV video, high def video, audio, all the DVR services and our look and feel which, of course, is very important to us, to that TV without having a set top box at that TV.

So, again, I think that's an area where we really want to go with this. One quick comment about standby and then I'll be done with my comments which is that we see standby having merit in this multi-room architecture because they TV could go on standby or if we have to have a thin client box in the home because the TV doesn't happen to be RVU capable that client can

go into standby and the customers experience is not diminished at all. There's no annoyance factor like Henry was talking about because it would just be the one server that's collecting all of that necessary information, all the recordings, everything to give that customer the experience that we want to make sure that they get. The instant on viewing experience that everyone expects from their paid TV services.

So we're keen on multi-room, that's really the direction we'd like to talk about. We're very happy to continue this conversation. I'm based down in LA, I'm happy to come up as much as anybody needs. And thank you for your time.

MR. RIDER: Thank you very much, Stephen. Next on the agenda is Gary from EchoStar.

MR. LANGILLE: Gary Langille.

MR. RIDER: Yeah, I didn't even risk it. Thank you.

MR. LANGILLE: Where's the driver?

MR. STRAIT: Which presentation would you like me to load?

MR. LANGILLE: It should stay EchoStar.

MR. STRAIT: This one?

MR. LANGILLE: Yeah.

MR. STRAIT: Okay.

MR. LANGILLE: Okay. First of all. Thank you for asking us to come contribute. We're based out of Colorado. I'm here both representing EchoStar Corporation which used to be a single company that included our national satellite TV service but has since been split in two so I'm also here representing DISH Network which is the large, TV service provider. Along with DirecTV, we compete to bring the best service and value to our customers.

I was extremely surprised by the impact of jobs we have on California but we do actually impact over 7,000 positions. We have close to 700-800 retailers and that most of their livelihood is dependent on reselling our services. We recently purchased Blockbuster which turns out has a lot of employees based in California. So our total job impact in the state is quite large.

I did want to also tell you a little bit about myself. I am a co-chair of the CEA Standards Committee on set top box test procedures. I also did a very large contribution to the Canadian standard for set top box measurement. And I actually wrote a lot of the IEC standard for set top box measurement so I'd be more than glad to contribute my knowledge and to help California move forward in this process.

Next slide, please.

I thought I'd talk a little bit about what is referred to by the FCC, who kind of regulates us, is multi-video program distributor. That's generally what people like DISH or DirecTV or Comcast or others are called. And I want to talk a little bit about the milestones or the issues that have happened in the last 7-8 years. One of the big issues, like Steve commented and Noah commented, is digital video recorders.

You know, they came out in about 2005 and they have been extremely rapidly growing and very much in demand. They've gone from actually 1 percent to 35 percent of homes today. In the process, they have replaced millions of VCRs and optical recording devices. And I hope you have an appropriate place to get those VCRs unplugged and out of people's houses because nobody uses them anymore.

So that is one thing that has definitely impacted household energy use. It's something that customers want and we'll talk a little bit more about that. The other major impact on this industry has been the digital TV transition. I'm sure you all remember, I think it was finally done in June of 2009, where the whole broadcast industry shifted from an analog format to a digital format.

Well that had a very big impact on service providers and the whole industry. First of all, we were required by law to support everyone's old TVs as well as the new TVs. So basically everyone was faced with doubling their capacity of the networks and the ability to provide. So everyone had to expand their infrastructure, not within the home but within the ability to deliver content to the home.

Many of us have adopted advanced coding which ended up increasing power consumption on set top boxes. Many of us didn't have our systems built out across the whole country so we had to provide the ability for the people to put up a regular old antennae to receive our broadcasts. Many of the set top boxes had to include that feature.

The whole cable community, in order to expand and handle the capacity, had to add digital tuners. We were required to support the new HD TVs as well as the old analog TVs, to be able to broadcast in both standard definition and also to be able to broadcast in high definition. So this, obviously, was a huge investment by the industry to handle all of this. It had to be done very quickly. The adoption of HD TV actually happened a lot quicker than most people projected.

Despite the bad economy, somehow everyone

managed to go out and buy an HD TV. I can't explain it, but it's happened. So what you see today is from about 2009 to today, this new services being offered. Basically, everyone strived to complete their build out so that they can deliver the hundreds of HD channels across the country and all the local channels in HD. You've seen cable systems convert over to digital. In fact, I just read last night or saw on the news that Sacramento is going through that transition right now with Comcast.

New providers come in through the Telcos and also there's a lot of new content available through video On Demand, IPTV; there's many, many new channels that are being offered.

So all of this does impact the industry. One of the points on this slide is that we're very concerned about the data that's being captured. I did go back and look at the PG&E data that was captured in 2004; and you can see, that's just before—it was a big change that happened in the industry.

I also looked at the NRDC data and frankly most of that was captured devices that was just in that US digital transition whether it was excessive new functionality that wasn't integrated yet. I'd like to see us get better data, if at all possible. As much as

it looks recent, it's not really recent enough to really make a solid assessment.

The other point is that a lot of the effort that has to be done in this industry is regulated by the FCC. We have to sort through things like emergency alerts. Set top box has to be able to catch an emergency alert and immediately make that available to someone watching the TV. There's parental controls, access issues like closed captioning. All of these features have to be built into a set top box and as new regulations from the FCC, we have no choice. By law we must put these into the system and into the set top box in many cases. Okay. Next slide, please.

So if I look at the trends from our perspective, obviously things would tend to push household energy usage upward. Obviously, DVRs. They're now in 35 percent of households and the projections is that they'll go to 52 percent of households. One point about the DVR is that the way that it's been implemented so far is that it's been implemented as a piece of hardware, as part of a set top box, which uses household energy. In a second—you really want to think about it as a function, the ability to record, fast forward, back up and do those kind of things. How it's implemented is going to get changed

very quickly.

High definition TVs. Obviously, the figures vary but a lot of what I've seen is about 67 percent today, scheduled to go to about 71 percent. TVs per household, we've finally done it. We finally have more TVs more house than people. So we have 2.9 TVs in a household and I think the US average is 2.5 people. That's just the way it is.

What's worse is that there's 3 TV households or 55 percent now. The 1 TV household is almost going nonexistent. Those are things that as a provider, we're just—customers want that. They want to—there's not a lot that we can do about these trends unless we start restricting how many TVs people can own and things like that. So we have to respond to that.

So the trends pushing household energy use downward. One is technology integration like when we went through the digital transition and we had to incorporate all sorts of new capabilities into these set top boxes, it was sort of done piecemeal. I mean, there were separate devices and integrated circuits for functions. It wasn't very energy efficient. But there's been huge improvements in that and we see a 20-30 percent reduction per generation. So even boxes that we put out today is something like 30 percent less

energy use than the exact same featured box that was put out in 2007.

Home networks. It's a huge advance. It allows us to do things like Steve was mentioning where you have a single server. You can have a very low power or no clients at TVs and allows us to really look at reducing household use, especially the fact if TVs per house keeps growing, it becomes even more important to do that.

Digital-over-the-air-tuners not needed anymore. We've been launched satellites and trying to have enough capacity to offer local channels into every market across the country. People don't need that feature anymore. It's a very power consuming feature. In some cases, that one feature added 100 kilowatts a year to a set top box. So the boxes that you see today usually do not have that capability. It's not needed by the majority of customers today.

High speed internet access. The more that that becomes available, the more that we can reduce the household energy consumption. If people have high speed internet access for example on DISH Network service and they're willing to connect it up which is another whole problem, then they can access movies and additional content directly over that internet connection. It

allows us to have more flexibility on how we manage power in the household.

One thing to keep in mind, that is a little bit different for satellite providers like DirecTV and DISH Network, is that it is a broadcast system. It's one way. In other words you can't say that a cellphone can do this because a cellphone when it comes up, it calls back to the system and says, "Okay. I've been dead, what did I miss? Send it to me." When you broadcast one way and you have no return path, when you want to send a message to all 30 million set top boxes across the country, you basically send an Okay message, number 1, 2, 3 and you could through all 30 million and then you authorize it to do it again. That could take two week for the box sitting there, waiting to get its authorization signal or its update signal.

So it does affect things a bit for satellite providers but it's something that has to be considered, obviously, as part of any regulation.

MR. RIDER: Gary, could you wrap it up?

MR. LANGILLE: Okay.

MR. RIDER: Thank you.

MR. LANGILLE: Okay. Let me move on to the final slide, just to summarize. The industry has a lot of incentive to lower household energy consumption.

Basically the industry, one of the primary factors that dictate our profitability is called subscriber acquisition costs, or SAC. So for instance, the concept that people are going to put a DVR in every room and we're going to have to build tons of power plants, it's just not going to happen. It's not affordable, we can afford to put multiple DVRs in a room, customers don't want to pay for multiple DVRs in a room so DISH Network, just like DirecTV, is going to a client server situation where you have one device in the house that basically has all the control, communication, does all the storage and allows the clients to power off and do a lot of energy savings. And we think that by using that technique we can keep the human energy consumption certainly flat in the short term and probably start to go down a little bit into the long term as we start to get better integration.

Energy regulation of set top boxes is challenging. There's so many different varieties, so many different features, it's a very fast moving business. The whole multi-room system we need to learn more about it, how people use it, how often people use secondary TVs versus primary TVs so we get good estimates.

And the other big thing is that this industry

reuses a huge amount of product. Every month, we have this thing called churn rate. Every month, between 1-2 percent of people decide that they're moving or they're switching to someone else. So we have 10 million customers, we have 100-200,000 pieces of household equipment back. We reuse that because that keeps energy use down and obviously it saves the environment by a huge amount.

In some cases re-manufactured product consists of 20-30 percent. Every re-manufactured product actually keeps the energy use down because if you have customer that just has a standard definition TV in a third bedroom that they don't use very often, you don't want to put a brand new HD capable box which actually draws more power because it has a lot more capability, we just use a standard definition box which is much less power.

And the Energy Star program. We are a qualified manufacturer. We feel that the program and the testing are very complex. There are allowances for different features but it is workable. And we think that industry is adopting it. I actually talked to Kathleen who runs the EPA Program because I asked her about the new program that's supposed to start tomorrow, "Can you tell me anything?"

Tomorrow when they do put the list up, it will actually have already 14 new set top boxes that do meet the Version 3 program from four different manufacturers and that's even before the program has started.

We plan to follow that. Our customer in Canada has 100 percent of their products are Energy Star and DISH Network in the US is also looking at that as far as joining the program for the newer products as they roll them out.

MR. RIDER: I think we're going to have to move on. I appreciate your presentation. Next on the agenda is Doug Johnson from the CEA. Go ahead and give your presentation, thank you.

MR. JOHNSON: Thank you, Commissioner Douglas and Commission staff for the opportunity to present this morning. CEA is a high tech trade association with about 2,000 member companies that span the breadth of the consumer electronics industry including not only device manufacturers but also component suppliers, retailers, distributors and service providers. Next slide, please.

The product categories represented by CEA really include all of the consumer channel products that we're talking about in this first panel this morning. Next slide, please.

Our industry's approach to energy efficiency has been very comprehensive for many years, and research and analysis has been a part of that. I'll talk about that further in a moment.

Public policy, initiatives such as Energy Star go back as far as 20 years now. Industry standards have been important in the development of standardized test procedures, we pursued consumer education initiatives and we've also leveraged our industry's largest trade event, the International CES Trade Show in Las Vegas as a platform for promoting and recognizing energy efficiency achievements in our industry. Next slide, please.

A precursor to today's workshop was a recent CEC staff draft report on buildings that was issued this summer and we saw some statements and themes referenced there that we've also heard in earlier presentations today that raised some concerns for us. One of those is the assumption is the ever increasing number of electronic devices.

We would question that especially since research shows that the number of consumer electronics in the home has actually been flat in the past five years. The perception is that we have an ever increasing amount of electronics in the home but the

reality is that the average number has stayed flat for the past several years.

We also see a statement in that report on buildings concerning unregulated energy use constantly climbing. If energy use of unregulated products is climbing, we would also ask that we recognize the energy savings offsets. As you've heard in a couple of presentations this morning, the power consumption of consumer electronics may actually be saving energy in meaningful ways in other industry sectors. That really should be accounted for so that we have a real holistic understanding of how power consumption or of power consumption in the economy, in particular the consumer electronics sector.

Finally, we see the statement in here and echoes of it this morning, that appliance efficiency standards are critical for achieving energy savings. We would question that as well given the accomplishments and initiatives of industry and other stakeholders to date in a number of different ways that relate to consumer electronics.

Appliance efficiency standards have been a tool in the Commission's word but I think it's being looked at now as the only tool and it really needs to be reconsidered as one of many potential tools and I'll

just speak about this further in a moment. Next slide, please.

We also saw references in the draft report on a couple of things that we strongly support such as the idea of data driven policy and the importance of gathering and synthesizing good, raw data. I think this is fundamental to understanding where we are at today as an industry in these product categories but also the trends over time and also the energy saving opportunities that are out there. Next slide, please.

Here we go. Lessons learned from the rulemakings on electronics. So, we've witnessed several rulemakings at the Energy Commission concerning electronics. Only one of those has been focused on the end user power consumption of a product, namely televisions in the on mode. And there were a lot of lessons that I think we learned and issues that came up during that rulemaking that are really important to keep in mind if the Commission is to pursue any new policies or programs related to consumer electronics today.

Fundamentally, as I mentioned, we have to get a handle on what is happening and that depends on good data. It also is really important to understand trends. The statement was made earlier that we have now assumptions of savings but we need to refine these over

time but nonetheless figures were put out before you this morning to suggest so many gigawatt hours of savings can be achieved here but we would question that based on similar statements that we saw at the frontend of the proceeding on televisions. And as that proceeding moved forward, we recognized that these savings calculations and assumptions did not take into account the impact of existing programs, particularly Energy Star which has had a huge impact on the transformation of the TV product category.

We also find an overreliance on the input from stakeholders with vested interests. We know that the utilities are genuine partners in the efforts to advance energy efficiency but we also know that they have an interest in advancing regulations as well. To the extent that they're responding to a policy framework which may predispose certain parties to pushing that, perhaps that framework should be revisited. I think we need flexibility as we look at the electronics industry. This may be different than the Commission's experience with our product categories namely in the appliance industry in the past.

Finally, I think it's very important, as I've said earlier, to account for the impact of Energy Star. One of the big, I think, shortcomings on that proceeding

on televisions was the failure to account for the impact of that program over time.

At the national level, not too much has been said this morning about initiatives that are underway that impact some of these product categories. And we just don't have the time, I think, to get into a lot of detail here. But Energy Star at the national level, at the international level really, is more active than it ever has been in terms of revising, refreshing its specifications concerning electronics. There are specifications underway right now for televisions, set top boxes, computers, displays, imaging products, AV products and so forth. These initiatives are important I think as the program itself has been key to market transformation for the sector so I think it's very much important for the Commission to engage in that process as an interested party and stakeholder.

We also have at the national level something that CEA feels strongly about which are energy disclosures for consumer electronics. This is a result of the Federal Trade Commission's Energy Guide Labeling Program which has been expanded through a new authority given to them by Congress a few years ago to now address several categories of electronics beginning with televisions. And we now have in the marketplace

examples of the new Energy Guide Label for televisions and on the list of products that the Federal Trade Commission will be examining are set top boxes as well as standalone DVRs and computer monitors, and potentially other products as well. The Federal Trade Commission has the authority to consider other categories.

We think that the national level is certainly the appropriate place to have an efficient and effective labeling program built on the experience of the Energy Guide process.

We also at the national level have rulemakings underway at the U.S. Department of Energy concerning battery chargers external power supplies, recently set top boxes and also televisions particularly in an effort to establish a national test procedure for TVs.

So we would encourage the California Energy Commission, given its general interest in advancing energy efficiency to be an active and collaborative stakeholder at the national level through these processes. We would not like to see a redundant set of rulemakings here in California. I think that that's especially a concern given the budget constraints and the issues the state faces.

We've heard this morning but unfortunately

have not had the time to go into the time to go into the number of industry and company initiatives that relate to these product categories. I think that you could easily have a workshop to examine each one of these product categories and I gather from statements made earlier this morning by the Commission staff that the Commission is considering further workshops on various topics so that we really can get into the details that we don't have time to cover for the eight product categories that are listed under consumer and office electronics today.

I would also like to mention the contribution of data the CEA 2011 Revisions of Energy Use Study. This is due to be released later this month—I'm sorry, we're at the end of August. It will be released in September. This is a revision of our 2006-2007 essentially a census of energy across our industry and we look forward to contributing the results of that study with the Commission as it touches each one of these categories on today's agenda.

Finally, we would urge the Commission to recognize Energy Star and the EPA's own accounting of its energy saving accomplishments from the specifications that I mentioned earlier.

So to wrap up, we believe that it's really

important for the Commission to have the flexibility and the tools in its toolbox to address consumer electronics in ways that may be different or more creative than the approaches its used in the past concerning appliances, commercial and consumer appliances and equipment. We also know that it's very important to have adequate test procedures and certain stakeholders at the table have made important contributions to the development of standard industry test procedures so that we can measure a product's energy consumption in these different categories and then track that power use over time.

We cannot have enough good data analysis and again we're happy to see mentioned in this earlier staff draft report the importance of having that good data. We do recognize the shortcomings during the TV rulemaking, with respect to good data and analysis. We certainly hope that as the Commission examines these product categories that we can start off with a better foundation.

Finally, there are always opportunities to educate consumers. I think one of the most important initiatives is the energy's disclosure requirements going on at the federal level but there are also simple ways to educate consumers through existing channels that are managed by both government, utilities, industry has

done its part to get the word out but there's also collaborative opportunities that we all have for educating consumers on the use of consumer electronics and ways to save energy. Thank you very much.

MR. RIDER: Thank you, Doug. We have next up is Brian—do we have Brian, yeah with EPRI. If you could go ahead and anything you can do, we're about 15 minutes behind schedule; anything you can do to speed things up would be appreciated.

MR. FORTENBERRY: Thank you. Good morning. My name is Brian Fortenberry. I'm with the Electric Power Research Institute. In addition to generation research, transmission and distribution research, we also engage in a lot of end use research. Today I'm going to talk about power electronics and consumer electronics and I'm going to talk about power factor correction because we see an opportunity for some pretty significant savings there.

So to begin with, I'm going to begin with an example to clarify what it is that we're talking about, and the mechanical guys are going to love this because I'm going to use force vectors instead of a bunch of sign waves. Most of the electrical guys will always put sign waves up there. But if you just imagine a cart on a track or on a road, the force that's labeled F1, if I

apply that in line with the wheels I can accomplish some work because I can move the cart.

The other extreme is the force labeled F2 which is transverse to the wheels or the track and if I apply that force, I cannot accomplish any work because I cannot cause any movement. So I can extend a lot of effort but I can't do any work. Work is defined as the force that's in line with the track times the distance it moves.

Now anywhere in between there, you see this resultant force, FR. That has a component that's inline and a component that's transverse so there are going to be some losses in the effort extended because you're not going to get the maximum amount of work done. So the analogy there is similar to voltage and current. When we apply a voltage to a device and the device draws a current that is not in line with this voltage, then we don't get the maximum efficiency in the delivery of the power. Basically what happens is that we increase the amount of current required and we create losses in the wiring that supplies the power to the load. So it is load dependent. It depends on what type of load you're trying to supply power to. The perfect score when we calculate this is unity. Anything less than that means we've increased that angle between those two forces in

the prior example.

What usually causes this is a displacement between current and voltage that's caused by inductive loads like motors, very common. Another example is harmonics that's caused by the nonlinearly of the electronic loads. Computers are a perfect examples and I'll come back to the computers in a moment.

Basically though the losses in the building power system, whether it be residential or commercial, are proportional to the resistance in the wire and the square of the current. So if I have an increase in current, I have an increase in losses.

So every electronic device has a power supply in the front end. We all have these in our homes. We have these in the commercial space too. We have to convert the AC to the DC to supply the chips on the board. In this example, it's a computer but you see the power supply in the picture in the middle that's removable from this computer but it's the conversion device that supplies DC to the circuits inside.

When we look at residential consumer electronics over 2005-2030, this is an example that shows the growth rate that is project by the Annual Energy Outlook from the Energy Information Administration of the Department of Energy so it's the

AEO from the EIA from the DOE. But this is data from their projects out to 2030 and it looks as if these loads are going to grow. These are plug loads and TVs and PCs and so on. So with that kind of growth rate, we feel like we need to pay attention to these things. Another example of that from 1972 to just last year, and I like this picture because it looks a little like my house, when you go back to 1970 you may have had just a few devices that had electronics in them or that we would consider plug loads but today, as you can see, the proliferation is significant.

So previous work that we did for PIER, showing how power factor correction in computers could save energy in building power distribution systems. It's showing in this graph we're studying 80 plus power supplies in computers. The study shows that there's a significant savings from the 80 plus power supplies increased efficiencies and we show that in the red bars and we normalize that to 100 percent. What we want to show here is the piece of the bar chart that is blue that shows the additional energy savings achievable through this power factor correction. And this is an easy thing to do in the power supply. It just takes a chip and controller and they can correct these things at a fairly reasonable cost. When you put that into the

picture, the examples that we show go from a 40 foot circuit out to a 200 foot circuit to look at examples from residential through commercial space. When you look at the 100 foot example just as a nice, typical circuit length in a home or a commercial space— commercial building, the additional savings on top of the efficiency savings are about 20 percent more. So we get another 20 percent savings on top of the savings we got from a more efficient device. This resulted in the Energy Star spec in 2007 that shows for computers, desktop computers, to be 80 percent efficient across their load factor and to include power factor correction up to 90 percent. And so that is a significant result and we think that there's more opportunity.

What's the opportunity? That study showed about 300 million kilowatt hours for California in savings for computers alone. But if we include PFC for all electronic devices, we could get nearly 2 percent of all the plug load energy in California. And if you assume 10 percent of the QS load, that's 10 times more for the US. So it's nearly half a Rosenfeld which is a 500 megawatt power plant and so it's 1.4 billion kilowatt hours for California automatically.

Some other research that's we're doing for PIER currently that will inform this process includes

the TVs, motor drives. We're looking at induction cooking, home audio, multimedia computers, kiosk computers, low end computing devices out there in the commercial devices. You'll find them everywhere. That can be a good opportunity for savings there. We're going to analyze those and find out what that opportunity is. Adjustable speed drives. Speed control in motorized appliances is slowly growing in the market. We want to study those opportunities and look at ways to make them more readily available and ways to make them demand responsive. So to get some communications built into the drive would be key and would make it easy to send a signal to those devices and create some load check.

Finally, we're going to look at the electronic devices that currently lack power correction factors and study what the opportunities are there. So basically, these are just some nice examples of those other projects. The last one is the one that I want to key in on today because we're going to do a study that will define what the typical residential and commercial circuit layouts look like, we're going to define what those table sizes are, we're going to look at lab testing and field testing for the electronic devices and the losses they cause in this building wired and then

we're going to identify what the savings potential could be from including power factor correction and we think that will inform the process that we've talked about today. Thank you.

MR. RIDER: Thank you very much. So our last presentation is Ted Pope from Energy Solutions I believe who is presenting on IOUs.

MR. POPE: Thanks, Ken. Again, Ted Pope with Energy Solutions on behalf of the California IOUs. Commissioner, advisors and staff, thank you for the opportunity. Frankly a lot of the wind has been stolen from previous conversations so I think that I can push through this rather quickly.

I'll be just quickly hitting on just 5-6 electronic categories including computers, servers, set top boxes, game consoles and imaging equipment and I think that's my list right there.

Just generally we've heard comments from industry and NRDC and others on all of these topics so there's not a whole lot of materials here so if we could slip down several slides.

Okay. Since we've already seen three different interpretations of the EIA data, we're going to throw in another one. This is another view showing on the horizontal access the short term increase in

energy use from various different end uses. On the vertical access is the long term 2008-2030 forecast in terms of annual growth rates. So you can see a lot of the products on our consumer electronics list are in the high right corner there, meaning they had significant near term or recent growth and also are forecasted for quite a bit of long term growth in terms of aggregate energy use.

First product, computers and serves. Fairly similar to what Noah and Pierre discussed. The IOUs are looking at standard solutions that involve maximum energy requirement, more efficient power supplies and looking at power proportionality in servers.

As far as the saturation of products, we're looking at about 2 widgets per household in California using about somewhere in the neighborhood of 5 percent of total California for those product categories. Based on the modeling we've done so far, and this is very preliminary, and as a nod to Doug this is a very simplified, technical potential analysis not looking at the natural market adoption but if you magically turned a switch now and switched over to efficiency level being modeled you'd be looking at savings on the order of one percent of total energy use in California. All for a present value on the order of $50-100 per computer or

$200-600 per server so substantial economic benefits. Again, it's a more complicated model to look at attribution between the various different market changes, whether it's Energy Star or the standards that we're discussing natural market adoption.

So again we're looking at power supplies, proportionality in servers, power management and enablement is a huge issue. A lot of the manufacturers are including power enabling in their products but it's a question of getting that set to factory default for when it comes out of the box in that mode. And we're also looking forward to engaging with industry on identifying ways of setting limits on different performance modes as a means of saving substantial energy of where it's not actually providing a lot of productive value.

Key considerations. A lot of components of computers and servers have opportunity for efficiency improvements so it's not just power supplies for example. There's more efficient memory drives and so forth. There's a lot of examples in the marketplace already of the efficiencies we're talking about pushing forward on a standards basis so this isn't rocket science for the most part.

In particular, the power management enablement

we're talking about generally has fairly modest or no cost associated with it. In put as far as what we'd be looking for from other stakeholders in this venue would be feedback on power limits by mode and if we were to go down that path, power management enabling data. We know that the amount of out of the box enablement is increasing over time and it would be good go have better data as Doug is suggesting. It sounds like CEA is planning to come to the table with a lot of good data, starting with their report in September and we look forward to more specifics beyond that. And then there may be other standards approach that make even more sense or make it more cost effective in achieving the end results that everyone is looking for.

And as far as set top boxes, currently our thinking is along the lines of standards for the set tops box family and then test and list for certain small scale network devices such as the Internet modems and optical modems.

Here we have data estimating that there is approximately 17,000 of these STPs in California including the primary box as well as the peripherals around the house for the second and third TVs. Energy use, using on the order of 1 percent of energy use in California so it's still a pretty significant standalone

use savings opportunity, according to our modeling it's on the order of up to half a terawatt hour a year and that's on a stock turnover basis.

We don't have a find beat yet on incremental costs but it looks pretty cost effective compared to what we've seen so far. Per unit basis, lifetime avoided costs on the order of $7-21. I'm sure that number will be refined even as we move forward in the next few weeks but it adds up over almost 20 million products to be quite a bit of energy.

So as far as STBs go, I mentioned, and we're talking about test and list for the small network devices but for the boxes themselves, looking at the total energy use allowance.

I guess I've hit those points. Key trends, I think everyone here understands for the most part it's a complicated market. You've split incentives between the provider of the boxes and the customers that are paying the energy bill. There's issues between the head end of the system at the service provider and then how the boxes perform so it's complicated but there's a big opportunity that need to be looked at closely.

As far as requested information, we'll be looking at two other stakeholders to help provide the most current statistics on what the STBs are actually

using in the different power modes and I think we heard some very interesting comments today from several folks as far as the future trends and multi-location boxes and those issues are going to be very important to fold into this savings analysis.

As far as displays and computer monitors, this is another very large opportunity that the IOUs are looking at on the order of two of these products per household in California. Energy use is very large. Again, over one percent of total use. I should mention that in our mind we're looking at computer monitors, professional displays in the 30-60 inch category. We're not including, so far, in our analysis the very large billboards you see. And then on top of that, the digital photo frames that have become ubiquitous in households.

The savings opportunities to us appear large, looking at about a terawatt hour a year once the stock rolls over. A fairly modest incremental cost based on what we've seen so far. An on average of $30 per widget and again on a scale when you have so many products and services, it's a big number in terms of dollar savings for customers.

And looking at active, standby and off mode efficiency in the approach that we've been looking at so

far and also we've been looking at illuminants and automatic brightness controls. Key considerations include reducing power level due to more efficient backlighting for those displays, particularly when equipment is not in use. A growing use of displays in residential, consumer settings that does appear to us to be a category where there is a lot of growth forecast in terms of products and total square footage and surface area deployed. And then complicating the equation a bit, as is common in the consumer electronics field, is the convergence of technology with televisions and refrigerators and such. Requested input from stakeholders, functionality versus the power relationships. Where do you really need the power to deliver the customer value? And then again, trying to refresh and develop a pretty sizable data set in terms of energy use and by performance level.

MR. RIDER: Just about a minute left.

MR. FORTENBERRY: That's perfect. Just wrapping up. I don't have slides on the last two. The game consoles are addressed pretty well already. But the Investor Owned Utilities are very interested in looking at options from the standards approach on those products and then imaging equipment is something else that I don't have the slide for here but scanners,

multifunction devices and other related imaging equipment is something that investor owned utilities are very interested in the savings opportunities in this proceedings so we'll be looking at that and providing more specific data in the weeks ahead in terms of templates and I think Pat mentioned earlier this morning. So with that, I appreciate the opportunity.

MR. RIDER: Thanks, Ted. So that wraps up the electronics panel. A lot of good information and a lot of opportunities out there. And we'll look forward to getting more detail in the public comment process. I think it's lunch time.

COMMISSIONER DOUGLAS: Are we back at 12:45? Is that right?

MR. RIDER: That was the original schedule. Would you like to—do you have a 5 minute more?

COMMISSIONER DOUGLAS: Let's come back at—yeah, let's do 5 minutes more. Let's come back at 10 minutes to 1. I'd like to thank everybody. I know a number of panelists traveled some distance to come here and we appreciate your being here and your participation. Thank you and we'll be back at 10 minutes to 1.

[WORKSHOP BREAKS AT 12:15 P.M. and RECONVENES AT 1:02 P.M.]

MS. DAVID: Good afternoon, everyone. Welcome to the afternoon session of the Appliance Efficiency Program's Scoping Workshop. Commissioner Karen Douglas is the Presiding Member of the Efficiency Committee and we are all happy to hear your comments on what you think are—what you would like to recommend for our priorities, suggest other topics and offers of assistance as we look at possibly doing regulations in the future.

This afternoon's panel is the lighting panel and we're going to go in order of speakers as they appear on the agenda. So first to start out is Randal Higa from Southern California Edison.

MR. HIGA: Thank you, Paula. My name is Randal Higa. I'm with the Codes and Standards Program with Southern California Edison. And thank you for allowing us to speak today.

So there's going to be two of us talking about the lighting proposals at the statewide codes and standards program has to propose. So it'll be a tag team between myself and Michael McGaraghan of Energy Solutions. So as you can see in the agenda, we've got dimming ballasts, multifaceted reflector lamps, LED lamps, outdoor lighting, lighting accessories, linear fluorescent fixtures and ICA 2007 exempt lamps.

I'm reading that because the power point isn't

up yet.

MR. STRAIT: Is there any presentation that you would like me to load?

MR. HIGA: If you could just go to the IOU presentation.

MR. STRAIT: All right. Here we go.

MR. HIGA: So just as a way of introduction, we'll soon get to---let's see. As this slide indicates, lighting is a substantial fraction of the state's energy demand, 22 percent residential and 35 percent of commercial energy. So one of the things that—so it's a big slice of the pie that we're addressing here and that we want to address here.

MR. STRAIT: I'm sorry. There's one issue. I'm just going to have to change something. I'm sorry. Desktop sharing was not enabled. It is now enabled. So now people attending remotely can now see the slides.

MR. HIGA: Okay. Thank you. One of the overriding sort of drivers for reducing energy use is AB 1109, the Huffman Bill, and as you can see there the goal is to reduce 50 percent of residential lighting, energy use by 2018 and 25 percent commercial indoor and outdoor energy use by 2018. And I think the baseline on this was 2007. This is not per household, this is not connected lighting. This is actual lighting use. It's

not just a matter of reducing lighting wattage. It's a matter of actually making sure that lights are as efficient as possible and they're off or dimmed when possible.

And with that, I'll just get started with the first proposal which is dimming ballast.

MR. STRAIT: If you'd like, I can advance the slides for you.

MR. HIGA: Okay. No, it's okay. So this proposal is for fluorescent ballast to propose energy efficiency standards for dimming ballasts when—and possible limits on standby energy use. So this ties in with the Title 24 proposal that the utilities have to increase the usage of controllable ballasts in non-residential buildings. So while the market penetration of dimming ballasts may not be as high, we believe that the Title 24 requirements that's being proposed for the 2013 Title 24 standards will greatly increase the use of dimming ballasts. So we feel that the energy savings potential is, therefore, going to be a lot higher. And that's why in the first item it says California stock and sales projected to 2014. So that's where we are now. Or that's where we will be in 2014, I think, is the way the numbers are. So after the code goes into effect.

And again, just to be clear, this proposal doesn't state when dimming ballasts are to be used or how they are to be used. This just says if dimming ballasts are to be used, they're going to be---there's going to be an efficiency requirement for that. I want to make sure that we're clear on that.

If you look at the incremental costs for example, $0-10 we've heard reports that there may not be any increase in costs going from a standard dimming ballasts going to an energy efficiency ballast, a dimming ballast. So again, we're going from a dimming ballast to dimming ballast. This is not from non-dimming to dimming. This is from dimming to dimming. So I want to make sure that we're clear on that, so that's what these numbers are based upon.

We're looking at right now trying to determine what is the best metric to use, whether it's relative system efficiency, RSE, or ballast luminous efficiency, BLE, metric. I think most of you know that BLE is the one most recently adopted by the DOE and that seems to make the most amount of sense but we certainly welcome all of your input on what would be the right metric there.

As noted, the key consideration, we expect, a dramatic increase in dimming ballast usage because of

the Title 24 proposal. And as far as other stakeholders, we would like to get input as far as other test methods, any feasibility concerns and standby wattage data.

So I'm going to, for the next few, let Mike take over.

MR. MCGARAGHAN: Thank you, Randal. Mike McGaraghan with Energy Solutions, representing the California IOUs as well.

The next topic here, multifaceted reflector lamps, the proposal here—well first, a little background so everyone is on the same page. Multifactor reflector lamps, more commonly called MR lamps, and the most common type is the MR 16 lamp. It's a low voltage, high luminous intensity lamp. It's typically used in track lighting. It has a lot of control over the beam spread so it's a great application for retail art galleries, often also a residential sector lamp.

The current baseline product is a halogen MR 16 and it's sitting at about 12 illuminants per watt and there are a lot of opportunities to go beyond that. Baseline products are usually 50 watt, 35 watt or 20 watt products. You can improve on that with halogen infrared technology, getting up to easily 16 illuminants per watt and with better halogen infrared you can go

beyond 16 watts.

And then, of course, best in class now you have LED MR 16s which I don't even want to put illuminants per watt on them because whatever I say today is probably going to be better tomorrow as they're improving so quickly.

Shipments here. There's a significant amount of shipments at 9 million. And what's notable, one of the notable things about this product class is that it seems to have sort of escaped standards so far. There are federal standards for other reflector lamps, par lamps, R-lamps of slightly larger diameters. In fact, there's new federal standards coming into play in 2012 but MR lamps have been uncovered and so there's a great potential for standards here. Also the European Union is developing directional lamp standards that will include MR lamps.

A standard here would drive the market towards high efficiency MR 16s. It would potentially also require minimum light quality and performance specifications which I'm going to talk about in the next presentation. And we could also look at tiered standards and the reasons for that is because as I mentioned, there's basically two main steps. One is to HIR and one is to LED. I think as of a year or two ago, LED wasn't

even ready to being the discussion for lamp standards here with MR 16 but even just in the last two years, illume output has doubled, CRI has come up from 50 and now you're approaching 90 and other concerns about LEDs a year ago in this application seem to be going away rather quickly with all the progress that manufacturers are making so we didn't want to rule it out of a standards process. We think that by 2014 or if we were to do a tiered approach in 2015, 2016 there might still be potential there to push that far forward based on the progress that lamp is making.

So requested input. Primarily product development trends and the market potential and with the progress of the various high efficiency lamp types, what kind of progress is forecasted over the next few years. Also feasibility concerns, we want to work through some of those. Especially, making sure that we can still dim these products and that existing transformers are going to work with the retrofit products.

And also, I didn't mention this at the beginning, but MR lamps include MR 11s which are a less common product than MR 16s but we'd be interested in getting some more feedback from industry on that product type.

So, as I mentioned here, the next presentation

is going to touch more on performance requirements. The standard here is a proposal for LED lamps and potentially looking at all three of those LED lamps, A-lamps which are just your sort of basic household lamps, directional lamps like the ones we just discussed and/or linear LED lamps. And I want to be clear that we're proposing any standards that would require LED. We're targeting in on the LED lamps themselves. The standards we're looking into here would set minimum performance requirements such as dimming and lamp life, also minimum light quality standards like CRI or color temperature specs as well as modest efficiency requirements in terms of illume per watt requirement for LED lamps.

As you can see the first order savings is relatively small here, 7 gigawatt hours and that's the direct savings resulting from a slight increase in LED efficiency in a standard.

What we're really getting at with this standard is really what we're calling the second order savings. The goal with the standard is more to ensure LED lamp quality. I think the example of the CFL comes to mind here where a lot of poor quality CFLs hit the market very quickly. Products often initially didn't dim well, products burned out, products didn't necessarily provide the light quality consumers were

looking for and even though those things had now improved significantly, consumer confidence in CFLs has taken a while to recover. So the point here is to ensure that quality LED lamps are hitting the market and to try to preserve some of that consumer satisfaction with the product class and speed of adoption of the technology.

So this would definitely take some significant collaboration with the industry to figure out what are the optimal lamp performance features that we want to look at here, what are reasonable light quality standards, what can be achieved in 2014 and at what cost. We don't want to keep that cost high forever but there may be certain features or performance features that can be done at reasonable cost.

So that would be the main request of input too, cost forecast for these various performance features.

In the next slide here, it shows a little bit of what we're talking about in terms of second order savings. 2018 some forecasts put LED lamps at 5 percent market share. So if we can ensure only good quality LEDs are hitting the market and consumers understand what they're buying when they buy an LED, that could increase the rate of adoption. So there's some savings

potential there if you were to increase from a business as usual 5 percent to something like 7 percent, 12 percent or 20 percent market share by 2018 then we're looking at savings of on the order of 80, 200, 70, 600 gigawatt hour savings. That's really the aim of this standard.

And there at the bottom, just noting that directionalities in linear LEDs have smaller market shares right now but standard levels could exist for that product class as well.

MS. DAVID: Two minutes.

MR. MCGARAGHAN: Okay. I'll try to speed up here. Outdoor lighting is based on a negotiation that happened in 2009 between manufacturers, NEMA and energy advocates and utilities. It set performance requirements based on bug category which is backlight, uplight or glare categories. Those category levels were agree on and then never made it into the federal energy bill. The federal energy bill didn't pass last year so this proposal is or more or less taking that work which was started and moving it forward. I think there's been some efficiency gains in the last few years so we could probably push farther on the efficiency levels that were agreed on and take a look at the controls ready requirement for certain street lighting, roadway or

outdoor lighting.

I think I need to be moving a little bit more quickly here. I think I hit the key points there. This is again the controls ready requirements. This is something that we need to work with industry on to get that right, to make sure we're future proofing these fixtures.

Moving on here, lighting accessories. These include night lights, decorative string lights and illuminated house numbers. Essentially for all three of these, we're proposing a minimum energy use standard—I'm sorry, a maximum energy use standard or a maximum power per volt standard. All of these, the baseline is still an incandescent lamp of some sort. Generally, each of these have several different efficiency options to go beyond that whether it's more efficient incandescent or CFL or LED.

Key points here for nightlights where often these lights are serving an important safety feature and you need them to provide light so we're looking at basically we're looking at an energy metric so we're trying to require them to be turned off with a photocell or an occupancy sensor.

With the other two, decorative string lights and house numbers, the focus is more on power per volt

requirement rather than an energy use requirement. I think that that wraps it up for that slide and so I'm going to turn it over to Randal to cover the last topic that the IOUs going to propose.

MR. HIGA: Okay. This proposal is to address those light bulbs that were not addressed by the federal government in the ICCA legislation. There were certain lamps and bulbs that were excluded and so we're looking at all of them to see if there is—what the benefit would be to look at the regulation of those. Because we're sort of—this one is less developed, so we don't have hard numbers here but we're specifically choosing or looking at three-way lamps in the 26—above 2,600 to 3,000 lumen range and maybe some of the special purpose like shatter resistant, heavy duty although those may be less viable, and then the candelabra base and the intermediary base. We're looking at all of those types of lamps. We think that there may be a possibility of gaining efficiency since all of them can accommodate the halogen capsule for greater energy efficiency.

So we're looking at a proposal that would sort of line up these exempt bulbs with those that are already covered which is approximately 30 percent lower in energy use. Some of these products are available today in the market and we think that there's some

potential for pursuing this so again we would like to hear any input you have on that specifically sales data on candelabra and intermediary base lamps.

Last one I'm going to cover is linear fluorescent fixtures. We are aware of the federal regulations regarding ballasts and lamps. Title 24 is also getting more stringent so we don't see huge opportunities in terms of actually having an efficiency standard for this but we're rather looking more at a test and list requirement. The primary purpose of that is to provide more information to lighting designers so they could make better choices and save energy in that way. We're looking at using the energy effectiveness factor and the efficacy rating value as some of the metrics for determining that. So again, any input you have on that would be welcomed.

And that's true for all of the proposals the investor owned utilities have. Again you saw the email contact information for all of us; again we welcome your input. Thank you.

MS. DAVID: Thank you, Randal and Michael. Next is Konstantinos Papamichael from the California Lighting Technology Center at UC Davis.

MR. PAPAMICHAEL: Good afternoon, everybody and I'm happy to be here and give the perspective of the

California Lighting Technology Center representing also Michael Siminovitch. I will talk about LED lamps focusing on the displacement lamps. The comments that I will make have to do with, in general, all light sources not just LEDs but we see with LEDs an amazing opportunity, similar to the one we had with CFLs and we failed with those, and we think that this is going to be a unique opportunity and that we should take advantage of it.

If we go to the next slide, I tried to put together a list of what we have heard from people on why they didn't embrace, if you like, the compact fluorescent lamps. And, as you can see, nobody had any problems with energy efficiency with lumens and with watts. Most of the problems that they had, see the left column, was mostly the lighting. The direct service that these lamps are supposed to provide.

So they had problems with low light color and appearance, the color of the light itself, light color consistency, 2 CFLs from the same box would give slightly different color, one with little bit pinkies and the other with little bit greenies, etc. Color rendering was a big one. Color rendering is the ability to render color on objects. At the time of full brightness, you turn the light on and you have to wait

for quite a few seconds if not half a minute or more to get the full brightness. Flickering, dimability, many of those were not even safe to put on a dimmer. Another pretty interesting thing that I heard was the lack of drama. People used to fluorescent lighting and incandescent lighting being a source of producing sharp shadows. They didn't get those sharp shadows with an area lamp. And on the right side, there is mood lighting issues. And I put these in chronological order as I remember these coming to us and also myself experiencing them. I remember the first ones being really huge area of sources; they need to have area in order to produce the light. The shape, many people didn't accept it aesthetically if you like. Now we are hiding it, it is much more effective. Buzzing from many of fluorescent lights. Even as I lose my hearing I can still hear the buzzing when I put some in the kitchen. Health is a big issue and we all know about the mercury issue which is also related to the disposable. So you buy a CFL and then something happens and you don't really know what to do with it. I'm pretty sure we're all had this problem.

Another thing that we have not been addressing, mainly because it's a relatively new—about 12 years, the effects that light has on circadian

rhythms and our well being. During the night, the body doesn't want the light in the blue part of the spectrum because it interferes with the process of the body trying to get ready for sleep. As we all know, CFL threw a blue spike into them and risked maybe another reason for people not clicking to them without even knowing it.

And finally, the longevity is interesting because I tried to sell CFLs on the longevity argument and when I persuaded my wife with better CFLs to change all of the lamps in the kitchen, I lost all of them in 6 months because these locations weren't designed for CFLs. They got warmed than the manufacturer's expected and they didn't last. And at the line at the bottom is truly the value that consumers see with these type of argumentation because they ended up obviously paying more for less or, if you consider the life cycle cost, paid more again for less. We think that these are the main reasons that CFLs didn't really make it.

And the learning from that is that we can do better with the new sources, the LEDs.

If we go to the next slide, and I'm not going to stay much on this, these are the LED lamp issues and you can see that many of those are pretty much the same issues that we had before. Light color appearance,

light color consistency. With LEDs we have it not only over time but among same light color lamps. As the lamps age each lamp takes its own path and the colors change. Color rendering is again a pretty interesting one. Not only for consumer acceptance but we also believe that we may be missing a savings opportunity. Lower lumens provided doesn't necessarily mean more energy or less energy savings. There have been studies that have shown high color rendering sources provide the conception that higher brightness which may mean that it's a balance of luminous efficacy and color rendering that we should be considering. Dimability is still an issue to make it close to what people expect. Longevity I expect may again be an issue if we put LEDs into places where incandescent felt very comfortable like where my CFLs failed in the kitchen. The health is still an issue with LEDs. The white projects a huge white light with a blue spike so I think that we need to address that. It's not a hard issue to resolve once you acknowledge that it's an issue as we can try to take the blue out. And finally, the cost we're going to have to make sure that people are seeing value in what they buy.

Which brings me to the next slide and the last slide of this presentation on the opportunities. We see tremendous opportunities with a huge energy savings

potential. The LEDs are five times more efficient even more at this point than the LED price lamp was 93 lumens per watt. Also the fact that they are controllable pretty easily with photo sensors, with occupancy sensors. So the combination of the source efficacy and the extra savings from controls truly have the potential for huge energy savings. Another interesting one is the extensive DR. As solid state lighting, it lends itself nicely to communications and truly if you can imagine millions of controllable LED lamps where with a press of a button I can make them reduce their light output or power consumption by 20 percent. We think that's the future of the distributed power plant. That there is a lot of potential there.

And, finally, even thought that we have the blue spike that I mentioned before which is an issue on the health, it can also offer a great opportunity because we can use them to provide dynamic spectrum power in distribution and change the color of the composition of the light to have the blues during the day which we want and our bodies want to wake us up and keep us alert and then take them off during the night to allow us to go to sleep. And something like that, I can see that's the last sentence there, I think that's the first time we're going to see inherent value lighting.

So far we're trying to sell them based on economics and payback periods, etc. which is an obvious statement that we don't see inherent value in energy efficiency. Positive health and well being effects, I see them as having inherent value for ways mom and dad will pay a lot of money to make sure their kids get a better sleep during the night and study more effectively during the day. Thank you very much.

MS. DAVID: Thank you, Doctor Papamichael. Our next group, tag team from the American Lighting Association is Dick Upton and Terry McGowan is on the phone. Great, thanks Dick.

MR. STRAIT: Let me find and then unmute Mr. McGowan. On second.

MR. UPTON: Thank you. I'm Dick Upton and President and CEO of the American Lighting Association. Our Association represents people who design lighting, manufacture it including lamps, fixture manufacturers, ballast manufacturers, dimming manufacturers and others. The manufacturers, representatives, the independent retailers are located in the United States, Canada and the Caribbean. So we cover a broad gamut and some days that makes my job rather interesting.

I had the opportunity to come in this room and participate in a previous discussion about five years

ago. And the question that was before you was what can we do with portable lighting. And the original conversation was let's put in a dimming product on it. And I said at that time, because we didn't feel it was a good decision to get quality of light or to get a successful acceptance by the public but we also had a question of what was really doable with that. I said at that time; let's work together because if the government and industry and advocates all say three different things we'll no acceptance for transition whatsoever.

And out of that we spent a bit of time and we get some help from Pam Horner who's here today with the thought, we ended up with bulb in a box. And we've got five different pathways that manufacturers can achieve that in for what they want to do to get portable fixture successful and that's been very helpful to our industry and we think that you're saving more energy than if we had put a power limiter one because we know there would have been less product choice in the marketplace.

I come to you today anticipating a little different format. I thought we were simply going to have a roundtable and we'd be sharing and discussing some ideas but happily I made some notes while I was on the aircraft. The unfortunate thing is that I have to read my own writing.

[LAUGHTER]

But we really come to you today suggesting on all of these issues on Title 20 that a big picture kind of focus is what we had in mind. We'd like to have a lot more discussion with you and your staff and the people who are here making proposals on some things, I certainly want to talk to your folks on three-way lamps, candelabras but the suggestion we have for you is that we would suggest that you encourage support and invite industry to really be engaged with you on the innovation and market competitiveness that will give you more product in the marketplace and achieve what we want to achieve which is 50 percent reduction by 2018.

That leads me to a question for you though that I hope I'd like to lead with and answer here today. I know where we have to get to but where are we today with energy savings? Are we with 1/3 of what needs to be saved to get to the 50 percent mark, are we at 40 percent, are we at 20 percent? So we know what we're trying to short for and what's still out there.

And that being said, just one detail, can we sit down at a table, if there's another 10-12-15 percent to go and find another 3-4 big answer items rather than death by 1,000 cuts that's 1-2 percent.

But while we talk about taking a positive

approach to gaining industry involvement. The antithesis of that, we think, is focus on restriction to current products, actions that diminish competition and innovativeness which include costly operating design systems. We think our people know design and systems as well as anybody. The performance testing by third parties where we've already done testing that should be applicable in reporting. Reporting requirements that are duplicative. And, lastly, an over concern we think with illumine output and on nightlights, we've got a very good example of a lumen requirement that out not to be there because it's a great product. But the lumen output says that you have to put more power into the fixture, more than you need. I'd be happy to discuss that in more detail.

We anticipate that some in the room may find the points we've made to offer a different approach to what you're doing today. I think I would call it an alternative approach that is made to the CEC Draft Staff Report on Achieving Energy Savings in California Buildings that was dated July of 2011. That report on page 13 said that Title 20 is uniquely positioned to improve end use product efficiency. Furthermore, by requiring endues products to be efficient by laws, appliance standards are quickly in a most influential

way and to cause market transformation in achieving our goal.

We believe that our points are complimentary to that position. And it's critical to the success that CEC wants and needs to achieve. To be successful, industry, and that means manufacturing and all the way downstream to retailing, needs and wants to be involved. If anybody you know, we're more excited than anybody about the industry's new technologies and systems that have the potential for enhancing consumer's quality of life and the efficiencies that we all want to gain.

We have been and will continue to be your good partner. To be successful and successful at an early time will take products that consumers want and will embrace and we encourage and urge the CEC to move forward by encouraging industry to 1-remain involved as we are today, to focus on encouraging voluntary industry innovation, to encourage market competitiveness and entry in all lines of lighting products in California and reduce and eliminate actions that negatively impact improvements, competitiveness and entry.

And that's the formal part. I'll send the written part to you in copy.

MR. STRAIT: Do we also want Terry McGowan to speak?

MR. UPTON: I do want Terry to join us for another piece of this.

MR. STRAIT: Simply let me know. We'll have to unmute the line to locate that caller.

MR. UPTON: Thank you. We have the most exciting activity going on in our industry today and I'm sure many of the rooms, as well as yourselves, have been to Lightfair. The changes that are going on in the industry around light sources today is almost incomprehensible from one year to the next. And you don't wait for one year to go by, you talk about three months or six months. And I think one of the really great challenges that we have is inserting ourselves into the marketplace that diminishes the opportunity for innovativeness and saves more energy. And I look forward to exploring that with you further.

But the Director of Technology and Engineering for the American Lighting Association is Terry McGowan and Terry's out of Cleveland and with us on telephone. And he's pointed us in the right directions as I was suggesting to you earlier today. And he has some thoughts about another aspect of an equation that needs to be brought into how we save energy. So let me ask Terry McGowan to take a piece of our discussion.

MR. STRAIT: One moment, please. Terry

McGowan could you attempt to speak?

MR. MCGOWAN: Yes.

MR. STRAIT: We can hear you but let me just up the level here.

MR. MCGOWAN: Okay.

MR. STRAIT: Go ahead.

MR. MCGOWAN: Well, thank you very much. I appreciate Dick's comments and I'm very pleased to address the meeting by telephone.

What Nick was talking about was something that we have been discussing in the American Lighting Association now for at least a year and we've been watching the technology develop that would help us achieve this. It boils down to a very simple idea, that the energy that we would like to control and reduce is a function of both power or the use of electric power by the appliance, in this case the lamps and lighting system, multiplied by the time that power is used. So energy equals power times time, a very basic kind of equation. So far, especially in Title 20 we have regulated energy by regulating power. So it's as if in residential lighting we have had one arm tied behind our back. We have lacked the ability to regulate the second part of the equation, the time part which of course is normally done interdentally of regulation by means of

dimmers and switchers and so forth. There's user control involved and it's been very difficult to get our hands on that user control so that we can at least get a potential estimate of what those savings are and begin to think about how we might enhance that regulatory part of the equation. But as the technology has moved forward, we're beginning to see some ways that, for example, let's say a portable lamp with a chip inside could report back to a central part of a system somewhere in the home and begin to tell us how many kilowatt hours per year are being used by the lighting in that home. We would like to work with the California Energy Commission and their contractors in developing this idea as a full throttle approach to a reduction and better use of lighting and energy.

So our proposal is simply this. That we work together as this idea develops and as technology lets us to it, so that these products for which it makes sense, be put in the marketplace as rapidly as possible and to achieve two things. One so that we can get a better handle on how much energy we're using and two to begin to see how that energy can be regulated not only for the benefit of energy reduction but also for the benefit of the consumer who still has of course the need to use light because, of course, light is for people.

So we're saying this in a sense that we see some ideas for scoping here and for proceeding with these ideas that would have benefits not only for the industry but also for the goals of the Energy Commission.

And thank you for the opportunity to present those ideas.

MR. UPTON: Thank you, Terry.

MS. DAVID: Thank you, Terry.

MR. UPTON: How much more time do I got?

MS. DAVID: [indiscernible]

MR. UPTON: Thank you. A comment was made, and I don't know which speaker was talking about this, a lack by the consumer to embrace CFLs and we had some lousy product in the marketplace to be sure. But I would suggest to you that one of the challenges that we've had is that the consumer thought they were being focused to acquire something that they didn't want to buy or use. And that's not good marketing. And transparency and making sure that we've got everybody in the game is very, very important. Price certainly has its place and that's certainly going to add some discouraging factors in new products as well but we're seeing all kinds of product costs come down.

To say to the public that we know better than

you and that and we'll tell you how to live your life is never won by anybody and I would just urge you to work with us and find right answers so show that we're delivering to the consumer the product that they want to have and will embrace and think we're all wonderful. Thank you. And I'll be available for anybody who may have a question for us or a discussion of any kind once so ever. Thank you, ma'am.

MS. DAVID: Thank you, American Lighting Association. Next is Alex Boesenberg from NEMA.

MR. BOESENBERG: Thank you. I am Alex Boesenberg. I am the Manager of Regulatory Affairs for the National Electrical Manufacturers Association. This is my first CEC Stakeholder meeting and I'm very glad to be here.

Previously, I served NEMA's members of the lighting systems division as the Manger of Technical Programs. I was doing a lot of the standards writing and things like that, trying to—well not trying, working as creating some of the standards that we heard called for earlier in presentations regarding quality and performance. So, rest assured, we are working on that. My replacement is very good and has taken the baton and is working very hard on it.

So I want to, on behalf of NEMA and our

members, thank you Madam Commissioner and thank your staff for all of the collaboration that we have increased on and had over the last 4-5 years. We're very happy with the increase of synergy and working together to better standards which increase energy savings. We wanted to point out—I'd like to point out that lighting has long been an industry which is experiencing innovation and progress. Our products continue to innovate, often independent of regulation. Technology being what it is, it marches on.

We do have some concerns over some of the efforts, proposals raised but we'll submit that with our public comments. I won't dwell on that here today.

One of the things that we have noticed in all of the presentation, not just today but over the last several years, is that everybody has been tracking energy consumption, is that it does look like, at least to me, that the percentage of energy used by lighting is decreasing. It remains a large sector but the efforts that we have already made to-date at product efficiency seem to be having an impact. Even when based on estimates, the number of lighting points are increasing. But I won't dwell on that.

I'll sort of echo what ALA had to say. We do feel that components and large components are being run

dry and we want to encourage efforts in NEMA's system and solution. Whereby we realize what we believe is a higher potential in energy savings and what I call properly designed, installed, commissioned and maintained systems. But the challenge is significant of how do you address that at the high level. And how do actually pull that off with the consideration for complicity, ease of use and sort of accessibility for the consumers and the people who install and maintain it, life cycle being one of the challenges.

I'm going to up the ante on what the ALA called for in terms of working at the Title code level here and remind folks that if they hadn't noticed that just a few weeks ago the Department of Energy released a request for information at the, obviously, federal level which opened up the discussion on lighting systems rulemakings and how we might regulate lighting as a system at what is, arguably, the building level and the building energy usage level.

That is a challenge. How to do that right. And one of the understandings that we have with the Department is because the component regulations are already pretty tight and that we have argued that some of them are in diminishing returns, we want the opportunity to focus on the system solution which means

that we will be getting them to relax component regulation. It's not going to stay where it is. We're not asking for backsliding but that we've done what we've can so let's look at the new areas where the talent and expertise can be applied.

By the talent here, I want to talk about the talent and experience both resident in the Commission and its staff and all the stakeholders. Very knowledgeable and significant resource in experience so we would like your help in tackling this significant challenge of the system solution at the high level and besides the technical challenge itself, there is the challenge of time and resources. For all of us to be working a large number of new or renewed efforts and component levels, takes time away from the system solution and if that really is, as we feel, the opportunity for the highest return, that's where we need to focus. So we ask you for your assistance on that. And I thank you for your time today.

MS. DAVID: Thank you, Alex. And welcome to your first meeting at the California Energy Commission. I'll just take this opportunity real quickly to remind everyone that written comments for any of the topics in today's scoping workshop are due on September 30 and speaking for staff, we are always happy to meet with you

anytime. We appreciate offers of assistance. We welcome collaboration and any data that you can provide is especially welcome. Thank you.

COMMISSIONER DOUGLAS: I don't have any questions. I don't know if any of the advisors do but I appreciate everyone who has spoken on the panel. American Lighting Association and NEMA, it's really helpful to hear your comments in particular. We'll look forward to working with you as we move forward and, of course, we're very committed to working collaboratively with industry and we appreciate the leadership that you have shown. So, thank you.

MS. DAVID: Thank you, Commissioner Douglas. We'll take a five minute break and stage for the next panel.

[BREAK AT 1:52. WORKSHOP RESUMES AT 2:04]

MS. DAVID: Thank you once again, everyone. The next panel will be discussing water using products. Our first speaker will be Noah Horowitz from NRDC.

MR. HOROWITZ: Good afternoon, Commissioners, advisors and other stakeholders. My name is Noah Horowitz and I'm a Senior Scientist with the NRDC. I'm pinch-hitting for my two colleagues Ed Osam and Tracy Quinn who couldn't be here today. They're truly our experts on water and energy efficiency related to water

using products. I also want to get ahead of people with Noah's Ark jokes are welcome are discouraged at the same time but I know pinch-hitting on water, that's going to be coming. Next slide, please.

For the record, that was a veiled attempt at humor and I'll use my time more wisely. There's a whole range of products. The CEC does have the authority to regulate the water use of products and the main reason there is as we move water across the state, energy is used to pump the water up the hills at the water treatment plant, back to the waste water treatment plant and the energy to treat the effluent.

So what we're potentially suggesting here is that there's a whole range of products that some standards might exist and that it would merely be the CEC codifying them and making a few minor tweaks, in other cases taking things a step further. So the range of products are traditional toilets for the home, urinals, lavatory faucet and the aerators that go into those faucets which help govern the flow rates of the water, commercial dishwaters, water meters and sprinkler heads. Next slide, please.

There's a lot of material here. I apologize. Some of it might be tough to read but everything will be submitted to the docket. We're very confident in what

the water savings are in the proposals that follow and, in some cases; we haven't calculated the energy savings. It depends on the modeling assumptions. A few of these savings are purely related to having to move less water around and there's a certain factor and we want to make sure we're doing it right. Embedded energy and how many kilowatt hours does it take to move so many gallons of water and then we'll be able to fill in the table.

The water savings are a million gallons a day and the savings are quite significant statewide. Next slide, please.

So I'm going to go product by product. Due to AB—Assembly Bill 15 several years ago the state already passed water efficiency for both toilets and urinals. Those are due to go into full effect in roughly two years time. What we're suggesting here is that the CEC formally codify the standards as part of Title 20 so that we have a way to enforce these standards and properly enact them and then there's a couple of clean up things that would need to happen as well and that's provided in the text. But in short, we'd be going from 1.6 gallons per flush to 1.28 gallons per flush and a 50 percent reduction in the amount of water in our urinals. Next slide, please.

So plumbing fittings or the lavatory faucet.

Many people may not know this but faucets account for about 15 percent of indoor household water use. And that's more than a trillion gallons of water that are being consumer across the US and we're probably 10-15 percent of that given our population here. So the standard would go from 2.2 GPM, or gallons per minute, at a certain pressure rate down to 1.5. And this would go into effect January 1, 2014. And there's also a few types of products where scope isn't sufficiently brought and we have some language that helps close up some of those loopholes.

The very encouraging thing here is that there's no known incremental price different between a product that provides the designed flow rate to the new one. Next slide, please.

So commercial dishwashers, this is a product where we both have water savings and direct energy savings as with the proposed standard we would be using less energy to heat up the water and still deliver the same performance. Next slide, please.

So what we're proposing is that the CEC consider taking a hard look at Energy Star Version 2 and there's a whole bunch of products that are covered by Energy Star and they're expanding the scope of those products and we think all would make sense for a

standard at this level.

The next slide is just a breakdown of how many of these units are sold per year. Going forward we fully expect the water utilities and water agencies to also embrace these standards. And they'll be coming forward and we expect them to be submitting favorable comments as well.

The next table is a breakdown of what the energy and energy savings would be for these various types of products and what the proposed standard would be. Next slide.

These products have energy being used while they're in an idle mode and there's also a test method and proposed standard for those. Next slide.

This one was the most interesting to me and caught me by surprise and I want to spend a second to explain it. Most residential homes in California are hooked up to a water mater. These water meters are a great thing. They enable people to be billed directly for the amount of water they use and also send a price signal to conserve.

The downside is that these water meters aren't sufficiently sensitive so if there's an ongoing low leak rate, you're not charged for that, even though that could increase dramatically.

So we show here what the minimum test flow is for the American Water Works Association and we think that these should be tightened, these meters should be more sensitive otherwise we're not accounting for a lot of unnecessary water use. And I'll give you an example on the next page.

Some of the issues are that 20 percent of toilets have an ongoing leak where the seal isn't working or the float isn't doing its job. And about 13 percent of water use in the home is due to leaking toilets and dripping faucets. And much of this isn't accounted for in your bill because the meters aren't sensitive enough at very low amounts of water use.

So we think here we're very simply requiring a more sensitive meter and having some sort of certification that the meter can detect at those levels of water use and could provide dramatic savings to the state, both in terms of saving water and in terms of reducing people's bills and making our scarce water go a lot further.

Next up one of the biggest water uses in particular in homes is landscape irrigation, so outdoor water use. Again, the CEC has the authorization to move forward here. Rotating sprinkler heads have been looked at by some of the Southern California utilities. There

are lots of qualifying models out there. One could cut the water use but still deliver the same level of service. Cut it by about 20 percent. We don't have a firm proposal for you today but we encourage this be one of the categories to be considered. And we look forward to working with the Commission and others to develop that.

So that concludes, next slide please, so that concludes our initial comments and Ed Osam and Tracy Quinn, my esteemed colleagues would be the ones to follow up with on this. Thank you.

MS. DAVID: Thank you, Noah. Next up, Steve Schmidt.

MR. SCHMIDT: Hello. My name is Steve Schmidt. My company is High Energy Audits but I'm really here as an independent, a person of concerned with energy efficiency. I've been working on residential energy efficiency for the last 4-5 years down in Silicon Valley and have come across what I think might be the biggest energy hog in single family homes and I just want to make sure that everyone is aware of it because I haven't seen any regulations or anything that's come out about continuous hot water circulation pumps.

I apologize, this is my first time at a CEC

hearing and I didn't realize there was a ban on cartoon like clipart so I apologize in advance for the funny pictures.

Okay. So I'll talk a little bit about my background just briefly, then what are continuous hot water recirc pumps probably everyone knows but I'll go over that quickly, where are they and how many are they and some energy analysis I've done and then some options for mitigation.

So I'm a mechanical engineer but have been working in the software industry for many. I was a climate change denier. I hate to admit that but it's true, until about 2005. I became convinced after investigating it a little bit on my own that it really was a problem. So after that I got into my town's environmental committee and spearheaded our greenhouse gas inventory. I live in a purely residential town and it became very clear to us that in order to do anything to reduce our town's greenhouse gas emission that the key lever we had was residential energy and it also turned out that in our turn the average house uses 2-3 times the energy of the average California home.

Me and another committee member as volunteers starting looking into this, trying to figure out why our houses were using so much energy. Was it the size of

the house, was it the number of pools we had. We found out very quickly and from sitting in the presentations this morning I'm preaching to the choir here, but we found out very quickly it's all about plug loads.

So since then we have been focusing on how to help people understand the power used by their plug loads and to identify for them simple things that they can do, cost effective, very cheap measures that they can take to significantly reduce their power use. We focused on—the ones that we see over and over again, and the one that we see most frequently is the continuous hot water recirculation pump.

I'm also involved in an ECCBG program with a total of five different town in the area and we're helping people understand their energy use by analyzing their SmartMeter data, we're all in PG&E land so we're using SmartMeter data.

This is a continuous hot water recirculation pump. I'm sorry for the people who aren't here and are following the webcast, you can't see it but there's a recirc pump running on the podium up here. That particular one draws about 95 watts. These things are hooked up to a loop of plumbing and they're usually found right next to the water heater. There's a couple of pictures there of two we've seen in homes.

They're generally installed when the house is built and they run continuously. Many—up to about half of the ones we've encountered have timers on them but just like most of the programmable thermostats in California, they are not programmed. People have—they've gotten out of whack because the power went off or whatever and people turn them off. So they're not timed at all, they're running continuously.

We find these things in bigger houses. The way they work, I'm sorry I skipped over that, is that they just circulate the hot water through the pipes continuously. And what happens is as this hot water goes through this loop of pipe and this pipe can be a loop of about 200-300 feet long, the water that comes back on the return trip is much colder than the water that went out. So in addition to the electricity used by the recirc pump, the water heater has to work much harder. So these are in most big homes. We talked to a couple of building inspectors where I'm located and they say 90 percent of the homes built over the past 10 years have these things. They're even in a lot more middle size homes, so quite a few 2,000 square foot homes. One that we had encountered had been running continuously since 1961. That's 50 years. I took the HERS class and as part of the certification we had to go to a house in

San Jose and I was amazed to find, in kind of a smaller home, that there was a continuous recirculation pump running in that house. I must say that I'm the only graduate of that program that even noticed that they had one and the homeowner was very excited to find out that by buying a cheap little timer, you could save far more money than doing the duct ceiling or getting a new furnace or any of the other recommendations that we made to him.

In terms of the current stock, it's very hard to estimate. Based on the anecdotal information on what I've been seeing is that there's far more hot water recirculation pumps than there are pool pumps and I know the CEC has done some work on pool pumps. Using the numbers, you can see how I derived the numbers. If there's 7 million single family homes in California, the second line down there at the bottom is buildings data book information from the DOE, about 11 percent of those homes across the United States are over 3,000 square feet. About another 7 percent are between 2,500-3,3000 square feet. Also, if you just do some rough numbers I came up with 700,000 of these things installed in California. That's just a wild guess. I have yet to see any better information.

Than the energy use analysis. So—this is

about two years ago—we did detailed testing just to figure out how much energy these things used because I have searched all over the web and I think it was until—I think it was Yanda here has recently published information on multifamily homes. Until that study, I hadn't been able to find anything that talked about the natural gas impact of a hot water recirculation pump. So we actually went out and calculated it, I took some free classes from the PEC, the Pacific Energy Center, and was able to borrow some devices called HOBO loggers which can log when a device is on and log high temperature readings and we were able to come up with some rough guess of how much electricity they use. The electricity is really easy to measure and you can see there that on average it's about 650 kilowatt hours per year. Most of these, I mentioned that most of these things are in slightly bigger houses. So these people are generally in the top tiers or higher PG&E tiers so 650 kilowatt hours to them equals about $250 a year.

On the demand side, it's anywhere from 70 watts and as I said, this one up there is 95 watts but it's drawing continuously. In terms of natural gas, I'll show you some detailed number but we think that on average, it's about 200 therms per year. And again, that's another $250 per year so that's a total cost to

the homeowner of $500 a year just to have instant hot water at each of their faucets throughout the day.

Now earlier I saw a presentation that talked about game consoles and set top boxes and they showed that 2/3 of the energy used by those devices was when they were not in use. This is far worse. This is using probably 90-95 percent of the energy consumes is when you're not using hot water. It's running all the time. So it's a ridiculous amount of waste. I would use the word egregious, if I may.

If you look at the 700,000 number that I kind of came up with and you multiply it by this amount of energy use on a per unit basis, you come up with some tremendously large numbers in terms of potentially how much energy these things are using. So the numbers are 450 gigawatt hours in California plus 150 megatherms, millionthers. If you combine that you have to convert units, if you combine that into kilowatt hours, you wind up with 4,000 gigawatt hours. And I was very happy to see that this number was bigger than the number mentioned earlier for the biggest plug load which was computers and I think that was 2,500 gigawatt hours. So this is a huge amount of electricity.

MS. DAVID: Two minute warning, Steve.

MR. SCHMIDT: Pardon me? Two minutes. Okay.

So I'm just mentioning here down at the bottom is Yanda's work and this is the only data that I've seen that is only close. He'll talk about it later but I don't think he's going to talk about recirc pumps but it was fairly close with what I came up with. This is a slide from Yanda's presentation where he said in multifamily homes, the recirculation loop loss represents 34 percent of the total hot water used and the other numbers are highlighted there were fairly close with what I came up with. His 800 therms per year is bigger than mine but that makes sense because it's a multifamily housing. The way that we calculated the data was that this top draft shows when the recirculation pump is on and when it is off, over here. And then you see here, down below, the spikes indicate when the water heater came on and you can integrate across these peaks how many therms per year this would work out to. So when the recirculation pump is on you see lots of spikes, when it's turned off during the experiment, you see far fewer spikes. And that difference works out to be from 241 therms to 102 therms, quite a drop in energy use.

And this is another example, the first example was a 2,000 square foot house. The bigger the house the longer the loop of piping, the larger the waste. So in

this case, we started out with the pump being off for a week. You see how often the water heater comes on, when the pump is on for the next week, you see this water heater coming on constantly. Here's the difference of 393 therms down to 150. This next house is a 6,000 square foot house. If you look at the difference here, this is a difference of 400 therms. That's a tremendous amount of energy. And it's all based on this recirculation pump. I'm almost done, I think.

In terms of mitigation options. What we've been focusing on in our work with residential energy efficiency is the low hanging fruit, the stuff that's really easy to mitigate. So in this case, I don't know anything else at all about regulation. So I don't know how you'd regulate this for new homes. I'm not working on new homes. I'm working on existing homes. For existing homes, there's three simple things that homeowners do.

First, we tell them how much it's costing them to run that thing. Unplug. Unplug it for a week and see if you notice a difference. Homeowners don't notice any difference. First, they didn't know they had it. Second, it wasn't really doing much.

Second option is to add a cheap digital timer, a $25 timer that has a battery backup. You never have

to reset it. You can get it from Amazon or anybody else and attach it and it cuts down the energy used tremendously.

Finally, you can replace it with an on demand model. The one that I've shown up there is the chili pepper. It's less than $200 and you can install it yourself. You can have a handyman to install it. It's an on demand version that uses far less energy.

The other good news about continuous hot water recirc pumps is that they're very easy to spot. As I mentioned, we're doing analysis of home's energy use based on SmartMeter data. If you look at a home's gas energy use, you see that during the middle of the summer that they're spending more than $40 a month, dollars to donuts, they've got a hot water recirculation pump and it's very easy for a utility to spot this or anybody that does energy analysis. And you could have a program specifically targeted at these people with those three options of what they can do to cut down their energy use. That's all I have. Thanks very much.

MS. DAVID: Thank you, Steve. And speaking of PG&E, up next is Gary Fernstrom.

MR. FERNSTROM: Hello everyone. Commissioners, staff, interested parties. It's a privilege to be here again to talk about energy

efficiency opportunities because there are so many of them that can be had for so little cost. My affiliation now is more complicated than it used to be. I'm retired from PG&E; I'm a part-time employee of PG&E now. I'm also doing some work for Sempra Utilities so what I have to have to present reflects those individuals' stakeholders as part of the IOUs presentation.

Before I get into the specifics, I'd kind of like to make an observation stemming from what I've learned after having done this sort of work a longtime with a few folks. I see a number of stakeholders here today saying that regulation isn't really necessary. It limits people's freedom and flexibility of features and products. And the free market does fine but itself.

The utilities when they come to advocate for efficiency improvement aren't trying to take anything away. They're not trying to take any utility, any features. They're just trying to provide the same benefits more efficiently at lower costs to consumers and less energy use and environmental degradation for society.

The IOUs also offer incentive programs. So it's a combination of polling the market, trying to encourage for those early adopters more efficient equipment and bringing up the bottom. Trying to

discourage the very least efficient on the market. So I think that everybody is better served by a balanced approach. The IOUs certainly present a balanced approach but I see many of the speakers saying, “No, no, no. No regulation.” And I really think that we should consider the fact that both have their place and both are effective.

To give you an example, the CEC adopted a portable electric spa regulation. The energy use for spas for essentially the same volume of water and utility ranged from a 4:1 ratio. The worst spa used four times the electricity of the most efficient one. So to kind of shave a little off the bottom, it’s not a bad thing and regulation was the best way to do it. So there are some industry cases where regulation makes sense.

Okay. So to get to the meat of my presentation, I’d like to talk about commercial clothes washers. And, if I can figure out how to use this thing, we’ll do that.

MR. STRAIT: You’re in PowerPoint currently and it should operate just like a normal mouse. If you want to advance to a specific slide.

MR. FERNSTROM: That’s great. I’ve got it now. I was just scrolling the mouse the wrong

direction. Thank you. Okay. So to talk about clothes washers, commercial clothes washers. They represent a significant energy use as you can see from the slide, both in terms of direct use of electricity and water consisting of the local heating energy requirement to heat the water. The embedded energy in the water to bring it to the location and the waste water treatment and disposal.

Commercial equipment isn't as well know as residential clothes washing equipment and this proposal would essentially take a look at the idling energy use of clothes washer equipment—pardon me, dishwasher equipment, thank you Yanda, and set the maximum waster consumption limits by machine type and temperature. We think that there's a big energy saving opportunity there and would like to draw the Commission's attention to considering that.

I'm going to move relatively quickly through these things so hopefully we can get a little ahead of schedule here.

In terms of irrigation equipment, many homes and certainly a lot of homeowner's associations, multifamily dwellings, commercial real estate properties have garden areas and irrigation controls or sprinkler controllers. This is estimated to be 5 million. The

CEC looked at this a little while back and, I think in a sense, got distracted by pretty complicated opportunities to save energy that would be instruments that measure installation from the sun, instruments that measure the moisture content of the soil. There's some low hanging fruit here that would be easy to get to through potential energy regulations and that would be the standby electric use of the equipment itself. It's typically powered by a magnetic transformer that is relatively wasteful in terms of its electric energy use. And by a simple rain monitor that will not let the sprinklers come on when it's raining.

Certainly, I've seen irrigation systems running when it's raining and it's because whoever is managing the system hasn't gotten a chance to get out there and shut it off for the winter. So those two simple measures we think are worthy of consideration and would not cost much and would save water and electric energy.

I'd like to call your attention to plumbing products. According to the Department of Energy, over 60 percent of industrial motor system energy consumption involves pumping or fluid handling of various different kinds of fluid. Those fluids go through pipe. And the pumping power and energy required to move those fluids

is a function of the diameter, size, length, quality of the pipe through which it flows. Engineers, when they're designing pumping systems, use engineering specifications that tell you how much friction loss there is in the pipe or how much power and energy it's going to take to move the fluid through the pipe.

The problem is that these friction numbers-specifications are based on a mathematical formula and according to the Department of Energy are not very indicative of what the actual performance of these fittings is. The consequence is over design, the engineer has to assume the worst case, the fittings may work better. So you wind up with a pump that's bigger than you need and wasted energy.

TO give you an example of that, the CEC adopted in Title 24 Building Code for Residential Swimming Pools and one of the recommendations was to use sweep elbows instead of, as shown here, the tight 90 degree elbow and someone from the swimming pool industry pointed out that some of the type 90 degree radius elbows were better than the sweep elbows. I was astonished to learn that and, as a consequence, the regulation in the building code now specifies the geometry of the elbow in order to get good performance. So while we don't have the details we think that there's

an opportunity through better design and smaller pump sizing to save energy if better specifications were available for these types of pipe fixtures.

So that concludes my presentation on water.

MS. DAVID: Thank you, Gary. There's one more gentleman at the table next to you. The last speaker.

MR. ZHANG: My name is Yanda. I'm going to present the commercial clothes dryer topic.

MS. DAVID: Okay. The next panel. Great, thank you.

MR. FERNSTROM: So it looks like I'm up again for luminous signs.

MS. DAVID: We're going to take a short break. We're going to change moderators and make sure everyone for our next panel is here at the table.

MR. FERNSTROM: Well, you were doing just fine. You can stay.

[LAUGHTER]

MS. DAVID: We collaborate here.

[WORKSHOPS BREAKS FOR 5 MINUTES AND RESUMES AT 2:41]

MR. RIDER: All right, ladies and gentlemen. We're going to try to reconvene and get moving on the other appliances panel. We have a first speaker, who is Gary Fernstrom with PG&E and also, probably generically, representing the IOUs. So, if you could Gary, go ahead

and go into that plug in luminous signs that you were so eager to go into a moment ago.

MR. FERNSTROM: Okay. Thank you so much. Plug in luminous signs are pervasive. You see them in a lot of small stores. They're typically Open for Business signs or, my favorite, various brands of beer signs. And they come in three or four different configurations with respect to appearance, function and energy use. Some of these signs are powered or lighted by incandescent lamps, many by fluorescent lamps, some are neon or cold cathode lamps and now increasingly you see lighted in diode signs.

There's an example on the screen of what I'm talking about. The luminous efficacy of these different light sources varies with fluorescent and LED being better than incandescent for sure and often better than neon. The efficiency of the power supplies or transformers that run these signs vary as well too.

Neon transformers, magnetic transformers are notoriously inefficient, excuse me. Some neon signs have electronic transformers which are better but the very best without favoring any individual technology and get looking at performance are LED signs now because their power supplies are efficient. And the LEDs are quite efficacious as light sources. They can have an

appearance that looks exactly like their neon equivalent.

So we're advocating for better performance for these signs as the state appliance efficiency standard and as you can see from the numbers we think that a substantial amount of energy can be saved for a relatively low avoided cost. The LED signs are getting now down to the point where they're equally expensive or less expensive than their neon counterparts.

Yanda Zhang is going to talk about commercial clothes dryers for us.

MR. ZHANG: Good afternoon. My name is Yanda Zhang with Heschong Mahone Group. This proposal is regarding commercial clothes dryers. The project was sponsored (inaudible) proposals of various interesting natural gas savings.

First of all, commercial dryers just like clothes washers are widely used in multifamily buildings, in laundry mats and on premises locations such as hotels, motels, nursing homes and university dormitories.

I've listed here the many energy savings for both electricity and gas. As you can see, most of the energy will be consumer on the natural gas side since most of them are natural gas driven.

In contrast we already have a DOE standard, test standard, as a performance standard for residential clothes dryers which energy efficiency is measured by a few factors basically indicating how many pounds of clothes can be dried in each kWh energy input.

For commercial dryers we don't have any standard or test standard as well. So what we have done is collaborated with UC Davis and the mechanic engineering department and have done very extensive test studies basically trying to adapt basic DOE standards for residential dryers for commercial dryers as well as getting energy performance statistics so the study has been finished. And the study has also been communicated with all major manufacturers. So at this stage I think, can you go to the next slide, please?

So based on the data, what we're seeing is that clothes dryers, the cost while the same in a sense is that they're not correlated with their deficiency performance. But in general clothes dryers are 10-20 percent less efficient than their residential counterpart and we don't know why exactly. We think mostly because they are one, probably not regulated. Also because commercial applications, they're driven to get clothes dryer much faster so they tend to use larger burners.

With the test study results, what we propose is to adopt a test standard for commercial clothes dryers which will be consistent with existing DOE test standards for residential dryers. We think of this as very straightforward as this study already demonstrates that this test method is feasible for commercial dryers as well. And we'd also like to propose that Title 20 begin to require manufacturers to submit test data so essentially a list of requirements of manufacturers.

We'd also like to propose based on our test results, a performance standard that is reflecting the best performance, best dryers in the market and we think it's feasible because we say that residential dryers are pretty much, very similar dryers physically. You can achieve 20 percent higher performance. There's no reason that we couldn't establish a performance standard which is much lower.

In long term, we say that Title 24 should, strategically, drive commercial dryers to achieve similar performance as residential dryers that you see 10-20 percent energy reduction which is substantial.

Another two features we'd also like the Commission to consider is automatic termination control and cool downs. Those are two, in a sense special features, used at the end of the drying cycles to stop

the gas firing so that the dryers can be one, when the clothes are dried enough, the machine will stop automatically and two, if the clothes dryer to some degree instead of using gas energy, it was stopped, using the residual heat in the dryer to get the rest of the moisture out.

These are mature technologies and are implemented widely and, if not all, in the residential dryers but commercial applications as we've talked about perhaps there are manufacturer application issues but we think that they can be resolved. We think that our proposal should also include that, at least an encouragement, of using these features for commercial dryers.

So next step, in regarding this project we have all the data and test results. We have communication with manufacturers and once we sort out the rulemaking schedule, I think we're ready to discuss with manufacturers together to see what we can finalize in the proposal.

I'd also like to add, this time it's not on the agenda, but in parallel we also studied commercial convection ovens. This is a kind of cooking equipment that is widely used in restaurants.

Utilities have been running (inaudible) for

many years. We have both PG&E and Sempra running labs, testing those increments and just about a year or two years ago, DOE—not DOE, the EPA adopted a pretty much the California Efficiency Program criteria as Energy Star criteria so it's a really good history when you see California programs go into Energy Star programs.

We think that it's also matured now to take it from Energy Star program, as we did for other appliance standards, back into—not back into but into Title 20 regulations so that we can see the utility program move to the next stage. We don't have complete data so that I can include here but I would like to propose that as well. Thanks.

MR: RIDER: All right. I guess that concludes the appliances panel. So we can move onto the public comment, unless you had any questions.

MR. FERNSTROM: We have a few more topics.

MR. RIDER: Oh, well then. Back to you, Gary.

MR. FERNSTROM: I'll be quick, I promise.

MR. RIDER: I didn't realize.

MR. FERNSTROM: I wanted to talk about commercial refrigeration condensing units. These are found supporting grocery stores, small convenience stores. The issue with commercial refrigeration system and this type of package condensing unit is that the

energy efficiency performance are not very well tested or known at different load conditions that would be different circumstances of outside temperature versus the incase temperature inside.

In order to even discover what the energy efficiency opportunity is, we'd like to have better information on what this efficiency is at different load conditions. We're proposing testing and reporting of this perimeter for fixed output units as well as variable output units so we'll be able to understand how they perform at different points at their load curve.

And from that information, it will be possible to make energy efficiency improvement recommendations and to differentiate between equipment with respect to how they perform in the California climate and different climate zones. So that's the essence of the proposal for refrigeration condensing units.

Pretty much all heating and air conditioning systems have air filters. To be honest, I was surprised by this one. Of course, like everyone else, I have a furnace filter in my furnace. I didn't actually realize that their performance was specified in terms of how much resistance they present in terms of the flow of air through the heating and cooling system.

I really didn't know that there was a Title 24

requirement either. So this proposal would recommend marking on these products so consumers can tell the difference between them, when they purchase them, and purchase ones that work the best for them in consideration of the money that they're spending for them.

There's a pretty significant energy savings associated with this because as the resistance to air flow decreases, I might add, without compromising the filtration efficacy of the filter it requires less power and energy to move that air and savings are possible.

What's proposed here is adopting for California an AHRI existing testing procedure to use for customer information.

One of my favorite topics is residential swimming pools. California adopted in 2006, a regulation having to do with swimming pool pumps, swimming pool motors, replacement motors and controllers. During that time, the industry has really embraced the whole idea of swimming pool energy efficiency; I'd pretty much consider it a revolution in attitude because virtually everything you see in the industry now is focused on efficiency.

But the technology was moved beyond where the regulations were at that point that they were brought

into being. For example, California has a prescriptive requirement for pool pump mode motors that require that they be high efficiency motors, not cap start, induction start standard efficiency motors. When that regulation was put into place, the motor industry, the pump motor industry, really wanted a performance based regulation rather than a prescriptive design based regulation. But the information didn't exist at the time to determine what the standard level ought to be.

Since then, variable speed motors have come into the mix. And, I believe, the industry would be supportive and, certainly, the IOUs are supportive of working on changing the prescriptive motor regulation to a performance based regulation. And requiring the testing, reporting and listing of those products.

So even though there is a design regulation in place, motor manufacturers are not asked to report the design or any other information about their replacement motors and the whole market would be served if that information was reported and was publicly available.

The same thing with controllers. Pool pump controllers, while they are subject to some regulation, are not reported or listed either. So it's difficult to find which of these products are truly compliant with the regulations unless you do an individual comparison

between the two.

There's yet another opportunity with the swimming pool business and that is swimming pool heaters. There are about 1.5 million residential swimming pools in the state which if they were operating coincidentally, all at the same time, would draw the output of 6 500 kw power plants.

The heaters, about 60 percent of these pools, roughly 900,000 pools, have usually natural gas heaters plumbed in the plumbing system all the time. So whenever the pump is operating, whether the heater is firing or heating or not, the water is being forced through the heater.

The building regulation could require a bypass valve which we think is a good idea. However, changing the building regulation would only address the issue in new swimming pool construction. An alternative way to address the opportunity is to look at the resistance to the flow of water that these heaters present for all products and establish a regulation that would require a maximum or establish a maximum resistance to the flow of water that these heaters could impose on the pumping system. That would save substantial power and energy.

Last week I measured one of these heaters. It's probably typical. And I found that the resistance

to the flow of water under all flow conditions was 16 feet. So all the time the filtration circulation pump was pumping, all the hours in the year, it was in effect raising the water 16 feet vertically just to get it through the heater. And when the heater's not working, it doesn't seem reasonable that it should present that much resistance to the flow of water. That could be fixed by drilling a little bit bigger orifice plate in the outlet of the heat exchanger and providing a little weaker spring in the bypass regulating valve so the cost of fixing this, I believe, would be miniscule.

So we'll be proposing a regulation that would reduce the electric pumping power and energy needed associated with these heaters. And when consumers are using variable speed pumps they can turn their pumps down and take advantage of that energy savings.

As I mentioned earlier, California has already adopted a portable electric spa regulation. It's difficult, for consumers to compare the performance of spas when they go to buy them at retail because the last thing the spa dealer is probably going to talk about is how much this is going to cost you every month. The average is about $60 bucks a month, by the way, for those people who have spas.

This proposal would ask the CEC to implement a

marking requirement on not just spas but other products so that consumers would have at the point of sale more information about the comparative performance of products in order to make better educated decisions about how they want to trade off energy efficiency versus other features in terms of the price they're paying.

So there's generally an opportunity across the board for us to improve marking and consumer education so that consumers can make better choices. Thank you. That concludes my presentation.

MR. RIDER: Very good. I think that also concludes the miscellaneous or other appliances panel. So we can move onto the public comment period.

So I think we'll start with people in the room.

MR. LEAON: And, once again, if you'd like to make a public comment, if you could please fill out the blue cards which are available on the back table and bring those forward and we will call on you for public comment.

MR. RIDER: All right, well I'm going to—we've got some blue cards here so I'll call Tony Brunello —

MR. FERNSTROM: Ken, I forgot one last slide.

MR. RIDER: Okay. Well, can we pull that back

up real quick before we get into the comment period.

MR. FERNSTROM: I promise that I won't take more than two minutes.

MR. RIDER: That's all right. We're on schedule now.

MR. FERNSTROM: I hope to get us on schedule here.

MR. STRAIT: Do you know where it was in the presentation?

MR. FERNSTROM: The very last slide in the presentation.

MR. RIDER: The big warm thank you for everybody.

MR. FERNSTROM: Okay. So I had wanted to talk about power factor, EPRI is and others, are part of the PIER program as you know are looking at power factor. It would be the utilities intention to try and advocate with the CEC for a consistent policy on how power factor is treated. And as EPRI talked about the energy loss reduction opportunity associated with improving the power factor, they talked about it in terms of the circuit length. But actually the power factor losses go beyond the customer's meter into the utility's distribution system. So there is an energy saving opportunity, both on the customer and on the utility,

side of the meter. And we'd like to work with the PIER program and the consultants performing that research as well as the rulemaking portion of the CEC to bring about a consistent and productive policy for how we deal with power factor. Thank you.

COMMISSIONER DOUGLAS: All right. Thank you. We'll go on to public comment now. Tony Brunello, are you in the room? Tony, we saw him earlier today. Tony, if you'd come back we'll call you up again. Elton Sherwin.

MR. SHERWIN: I'm Elton Sherwin, I'm the author of "Addicted to Energy" and I'm on the Board of Directors for five California based companies, three of which are semiconductor companies and collectively they ship millions of chips into the consumer products that we've been talking about today – PCs, DVRs and various other ones.

I wanted to comment and say that I thought the NRDC straw man proposals all seemed reasonable. They passed the sniff test and, in particular, I think the 5 watts standby requirement is a very reasonable requirement given that many consumer products today use less than a half watt of standby so the 5 watt standby rule would be 10 times and, in some instances, 50 times much power as some off the shelf consumer products. It

is not possible for the homeowner to eliminate the standby power on DVRs. You can't put them on timers, you can't disconnect them. They have to be connected and they draw 40 watts and some of you may also have friends who have three HD TVs and two guest rooms and collectively they may have five or more of these devices installed. There's really no way to get around using them. So I think the 5 watt standby power is very reasonable.

A couple of things that weren't talked about today, that I'd like to add for your consideration, one is what may be considered automatic day-lighting and that is requiring the commercial lighting fixtures to automatically dim when there is light present.

This is a very clever regulation. Not a very particularly complex one but requires you to use a digital ballast and various controls. So when you walk around, through the State of California, one of the most striking things is looking at these great, new high efficiency T5s and T8s on bright right next to a window with the California sun streaming in. Everywhere in the state, we ought to just require that the light fixtures not do that.

I love the idea of labeling things. I think that's a marvelous idea. I think that there's some

things that are so egregiously bad that they should be banned or effectively banned. Obviously an extremely inefficient air filter for a furnace falls into the category of things that make no sense for that to be legal in the State of California. Just not at all. I mean, there are a lot of things that should be labeled but to allow someone to innocently walk into an Ace Hardware store and buy a filter that's $.05 less expensive and then use dollars more electricity, I don't get why we're compelling social need to serve by allowing that to continue.

I guess the—one last thing that I would say is and has not been discussed today is we're the internet and semiconductor capital of the world. The laws that we pass get mimicked everywhere else. Many consumer product companies who manufacturer in Asia, once we require it is so inexpensive to do, they just ship the product worldwide, relatively few instances where people have said, "Oh my goodness. California laws are so stringent. We're going to build a product for California and then we'll ship a less efficient one to Nevada and the other states."

When those more efficient products have to be designed, they're frequently designed here. The chips are designed here and if there's internet connectivity

required, that's often worked on here. So in terms of generating California jobs, I think there's been a subtheme by some of the companies that increasing efficiency hurts California jobs. My experience has been exactly the opposite.

Efficiency benefits California workers because when the world needs to be more efficient, they look to our products and our services and our teams to redesign the products and the core semiconductors. So I would just encourage the CEC to not fall victim to the thought that this might hurt California labor. I think that there's very few examples where one could point to where California increasing efficiency has hurt California jobs. I think all the evidence and recent reports show us that, not only as we've tightened efficiency does it help the whole world, it's helped the California worker. Thanks.

COMMISSIONER DOUGLAS: Thank you. Thanks for your comments. Thanks for being here. Is Gary Fernstrom? Do you have comments? Oh, you've had a number of comments. Would you like to make a public comment?

MR. FERNSTROM: I wanted to make one public comment on behalf of the IOUs and I was responding to Terry McGowan's comments on behalf of the ALA.

If I understood him right, he suggested that regulations were looking at the power of portable lighting equipment rather than the time, essentially overlooking the control opportunity for dimming or reducing the utilization in contrast to just reducing the power.

Actually, the compromise that we worked out last time was the inclusion of a CFL instead of an incandescent lamp with the product. Prior to the regulation there was no lamp included. So by including a CFL, we're just giving the consumer the opportunity to use it instead of going out and buying another lamp.

And that is an efficacy driven regulation. It has to deal with how much light you're getting for the power and energy, so the regulatory direction to limit the power or to make lamps dimmer or to create consumer dissatisfaction. It's simply has to do with providing the same or better lighting for less power and energy.

COMMISSIONER DOUGLAS: Thank you. Thank you for that comment. Bernio Rosco, California Cable and Telecommunications Association. Welcome.

MR. ROSCO: Good afternoon, Commissioners and staff. Bernio Rosco on behalf of the California Cable and Telecommunications Association. We represent the cable industry here in California.

My point is very brief. It's just the adoption of state specific technical standards for set top boxes is inconsistent with the federal standards and expressly prohibited by the communications act. It's just not a debatable issue. Not to say that it's not a worth issue. I think I want to associate my comments with the very first panel talking about the national level of activity that's going on there and the encouragement that California participate at FCC or other federal agencies to work on these issues. And that's it. Thank you.

COMMISSIONER DOUGLAS: All right. I've got two cards from Intel. I've got Henry Wong and James Cardoch. Go ahead.

MR. WONG: Hi. I just want to go ahead and point out two items. Hopefully to help clarify part of the presentation from ITI. My colleague will talk about some of the Intel items.

One is we highly recommend a holistic approach to energy efficiency and these are not just words. In particular, associated with some of the foils that we were only briefly able to review.

On the computer side, it's really at a system level. Component level assessments tend to drive incorrect behavior. As evidenced with the crying babe

diagram.

Secondly, on servers, it's not the servers as evidenced with the Department of Water Resources. It's the data center. If we optimize the data center, we improve the footprint. We optimize the server, we may not get there.

Finally, on the holistic approach is to make sure that we understand the unintended consequences. Data centers and servers, as well as computer products, are critical to the function of our society. And a lot of the activities we do, it would be a shame for you not to go ahead and get money from the ATM or make a financial transaction just because there was a rule or regulation that you have to shut down the servers every night so that you can't get access to your money. It doesn't make any sense.

The next big point was this call for engagement with the industry, as I pointed out and as available in the foil deck, is that the industry along with the end user, and that's really important, are already engaged in a lot of energy efficiency activities. We wholly recommend the Commission and its researchers to participate in those activities. A lot of those misconceptions can be resolved there, especially for some of those technical issues such as

security, reliability and some of the quotes associated with utilization are not necessarily the only item in the data center and so forth. So we have to go ahead and look at the operations of the whole to make sure that not only are we addressing the energy consumption but also the primary functions of these devices. Thank you.

COMMISSIONER DOUGLAS: Thank you, Mr. Wong. I almost feel compelled to clarify for the record that we have not, will not, do not propose to shut down ATM machines at nighttime.

[LAUGHTER]

If James Cardoch could come forward.

MR. CARDOCH: Yeah. Hi. I'm Jim Cardoch. I'm an Engineer with Intel Corporation. I've been doing it 25 years and have been working on low power technologies. I probably have around 100 plus patents in the area of low power technology development. I do work on energy regulations and I just wanted to make a couple of comments.

Again, more primarily than the ITI section, just based on some of the things that I've seen and heard today, one of the things that sometimes when we regulate we lose focus of the goal. And I see this a lot. In the computer space, we regulate energy. It's important not to miss that we're trying to do things to

lower the energy. And some of the silly things that I've seen, and I really tie this back to the Energy Star program, and I'll give examples because I don't want some of this repeated.

Back when they were doing Energy Star version 4, they wanted the hard disk drives to be spinning. So on computer systems, if you buy an Energy Star system back then, hard drives had to be spinning. Even though for the past 20 years, we had been spinning it down to save power in the system. And then when that came up again for Energy Star version 5, again they wanted the hard drive spinning. In this upcoming one, I hope that's not the case. In this case, what I would say is that if you're regulating the energy, don't tell the industry or the person doing it, how to hit that energy. Give them that freedom to do it and delight the end user, provide a good experience.

Power supply is another example. We talked about power factor correction. I think that's a very good thing. But once you regulate power factor correction and you're already telling me to hit the energy limit and then you blow it, why are you going to tell me to come back and go from a bronze power supply to a silver to platinum and I guess in some 20 years if we continue this it'll be a diamond power supply.

I have to hit a certain yearly energy limit. Why do I have to put in an exotic power supply to hit that if I can hit that in a much lower cost, better way of doing it. And so, regulation to a certain point is okay but in many cases we go too far. Because power supply is such an easy target, it's easy to come back and say, "Well, it's 89 percent efficient. Let's make it 93, 97 percent efficient." But you still have to hit those 35 kWh per year limit. So all you end up with is a lot of devices—there's a lot of PCs and devices out there today that have much lower energy footprints than Energy Star devices. They're lower cost but they don't have that exotic power supply. The goal here, again, is to lower energy. Keep your eye on that.

The other thing is that we're running into a lot of issues where people do copy the Energy Star program for these mandatory regulations. We see it in Europe, in China and Australia. It's not just a good—it's a voluntary program, Energy Star. It targets the top 25 percent performers. It's a wonderful thing, to put a sticker on it that says Best in Class. That's good. And it doesn't target the entire market. So right now, we're dealing with Europeans taking the Energy Star version 5 and saying let's make this mandatory. Well, now we have mobile workstations that

aren't described under Energy Star version 5 but as a voluntary program, it doesn't matter. But now it's a mandatory program. If they'd just adopt that, you can ship those systems into that economy anymore because they weren't described in Energy Star so there were no limits or ways of describing them. One of the things that I advise if you're looking at a mandatory requirement, it's very desirable to come back and look at Energy Star and what they did but it's a voluntary program and it's not intended for market access type of regulations.

The other thing is that I heard someone talk about MPEG 4 and as an example is one of the things that we don't want to do when we trade regulations is to stop innovation.

I thought that was a perfect example because MPEG 4 is a compression technology for video and it products beautiful video at very low data rates and allows us to transfer it around satellites and gives this wonderful digital picture. Now if we had very strict energy requirements, would MPEG 4 would have been able to ship in the market. And what I mean by this is when MPEG 4 came out, it needed a workstation class machine to be able to decode that video. Five, ten years later, I'm able to play MPEG 4 video on my

cellphone and so technology scales.

Henry showed Moore's Law, it shows how we're able to drop the power of a transistor every 18 months by half and be able to increase the number of transistors, doubling every 18 months and increasing the performance every 18 months. Technology scales.

What you don't want to do is put in a regulation that stops that innovation scaling. Sometimes I want to introduce a new feature, it's going to cost more power but if you give it more time. It's going to become more energy efficient. Thank you.

COMMISSIONER DOUGLAS: Thank you for your comments. Your comments point out the importance of us working with you and you working with us as we move forward because, you know, flexibility in terms of how you get to savings goal is almost always a very good thing. So we look forward to working closely with you as I know e have in the past. And we've appreciate your participation in the past, in past proceedings.

All right. So I've got one card left and that means either that we're done for public comment for people in the room or somebody would like to speak who hasn't filled out a card.

MR. STRAIT: There are also people online—

COMMISSIONER DOUGLAS: We'll go online

afterwards.

Is there anybody else? Okay, so I've got Charlie Stephens, Northwest Energy Efficiency Alliance.

MR. STEPHENS: Good afternoon, Madam Chair. I am the Senior Energy Codes and Standard Engineer at the Northwest Energy Efficiency Alliance. We're a nonprofit that's funded by all of the electric utilities in the Pacific Northwest.

I'm here because NEEA has, since its inception in 1997, supported efficiency codes and standards whether they be at the federal level or the state level. I personally have worked with California in the past to enact similar standards or the same standards, the very same standards, that are in Oregon and Washington as California has enacted. And we're continuing that.

We're also generating a lot of data in the field right now as we invest heavily in data research and we are engaged right now, I think, in collecting some data that you might be interested in and I would like to invite your staff to ask us for any data that they might need that they don't have and we'll see if we can get it in the course of what we're doing. Residential is now and in 2012 and commercial in 2012 and 2013. Hopefully it's timely for what you're doing. But I will join you as often as I can and assist your

efforts as we go along.

COMMISSIONER DOUGLAS: Thank you. Thanks for being here. Thanks for your good work. Let's now turn to the phone. Oh, I'm sorry. I did get one more card. Pierre Delforge.

MR. DELFORGE: I thank you for the opportunity to make some additional comments. Just want to briefly clarify a couple of points after the comments by our industry colleagues from Intel.

Firstly, the comment about looking at data centers rather than servers for efficiency, I think that's a very valid comment in terms of the opportunity that we ought to optimize on the operation of data centers however we need to make sure that about half of servers in the US are not in data centers but small server rooms and server closets. And they're often purchased and operated without a good understanding or good practices in terms of energy efficiency.

I think data center energy efficiency and hardware efficiency are complimentary and not either or and we should pursue both.

The second point is in terms of the power supplies. So the recommendation that we don't have a prescriptive requirement on power supplies and just focus on the system level. The reason why we recommend

both is because power supplies, the improvement of power supplies, is very cost effective and we think that we should be able to get power savings both from the system level and from prescriptive components when it is cost effective and relatively simple to do so.

There's a NEEA report which came out recently that found that only 1/3 of the market today used 80 plus power supplies which are basically some of the more efficient power supplies which means that 2/3 of the market or in terms of PCs or desktop PCs are still using power supplies at about 65-75 percent efficient over the life cycle of the computer which means that half of the— or a third of the power in the computer is lost, stressing the power supply before it does anything useful in the computer. Surely that's something that we should not be allowing to continue in California. Thank you.

COMMISSIONER DOUGLAS: Thank you. Let's go to the phone now.

MR. STRAIT: All right. The first person who's raised their hand to make a comment is a Francis Rubinstein. Francis, you are now unmated.

MR. RUBINSTEIN: Can you hear me now?

MR. STRAIT: Yes.

MR. RUBINSTEIN: Great! Well, thank you very

much for the opportunity to comment. I'll make this very brief. I'm Francis Rubinstein. I'm Staff Scientist at Lawrence Berkeley National Lab.

I'm just going to address my comments on the lighting section. I commend the lighting stakeholders there, from what I can hear, Randal and Michael McGaraghan and of course, Kostas, I thought you guys did a great job. I like almost all of the stuff that you're proposing here.

Clearly, there is some filling in needed of some of the gaps that with EESA and the DOE have left off, particularly in some of the specialty areas like candelabra based products and three way bulbs and so forth. Eventually the feds may preempt us but would certainly expect an energy bill in the next couple of years. So while the cats away, the mice will play. So I think you guys should keep going the direction you're going.

With regards to dimming ballast, I think that the issues related to ballast luminous efficiency and system efficiency, those are technical details which can be worked out on the fly and I don't think that we need to burden things too much.

But my main comment here, my closing comment really, is the main thing is that we need manufacturers

to provide accurate performance data on ballast factor and system input power for ballast and operating in all common lamp types. I'm afraid to say that I've lost confidence in the data that I've seen in at least some ballast manufacturer's website so I think this needs to be addressed going forward.

I very much liked Terry McGowan's concepts of essentially putting in an energy reporting chip in there a bulb, I've been arguing that for a long time with regards to dimming ballast, of course I know it'd be a great option anyways. I definitely think it'd be a fruitful thing to go at. And I'll have some more comments but I will submit them before the deadline. Thanks very much for the opportunity to address the group there.

COMMISSIONER DOUGLAS: Thank you. Next.

MR. STRAIT: All right. I do not see anyone else that has their hand up. On the other hand, there are some people who are attending the meeting solely by phone and can't click the button to do that so I'm just going to unmute the lines and see if anyone else present has a comment they'd like to make.

The phone lines are now unmated. If there's someone who desires to make a public comment specific to this workshop please speak up.

MR. EARNHARDT: This is Bob Earnhardt with (inaudible) Electronics. Can you hear me?

MR. STRAIT: Yes, we can hear you.

MR. EARNHARDT: I just wanted to make a couple of comments. I heard one comment that system luminous efficacy has no positive implications for dimming systems and I would like to comment that energy efficiency does cost money so there will always be a cost trade off, just assume that these items will have a cost impact. That's all. Thank you.

MR. STRAIT: Thank you, sir.

MR. EARNHARDT: Oh, excuse me. One more comment.

MR. STRAIT: Sure.

MR. EARNHARDT: Mr. Rubinstein was saying about measurement accuracy. I think the CEC may want to follow what's going on with the—

MR. STRAIT: One moment. Let me—

MR. EARNHARDT: They're having quite a bit of discussions now with the Department of Energy on this very topic, this very significant topic right now, and the industry is working very hard to try to develop accurate metrics for ballast efficiency.

MR. STRAIT: Thank you. I apologize for some of the noise that was on the line there.

COMMISSIONER DOUGLAS: Are there other comments? All right. I'd like to thank all of the participants of this workshop. It's been very helpful for me and I'm sure our staff as well. So we'll look forward to continuing to work on these topics and we look forward to following up in the relatively near future.

I really appreciate all of the hard work that everyone has put into preparing for this workshop and for coming to the Energy Commission or participating by phone. It's been very helpful to use. So with that, we are adjourned. Thank you.

[Meeting is adjourned at 3:32 p.m.]