BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of:	)	Docket No. 14-AAER-1
	)	
2014 Appliance Efficiency	)	
Pre-Rulemaking	)	
	)	
California Code of Regulations	)	STAFF WORKSHOP
Title 20, Sections 1601	)	
Through 1608	)	RE: 2014 Appliance Efficiency
	)	Pre-Rulemaking

Small Diameter Directional Lamp and General
Service LED Lamp Efficiency Opportunities

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

Monday, September 29, 2014
11:00 A.M.

Reported by:
Kent Odell

APPEARANCES

Present (* Via telephone and/or WebEx)

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Keith Cook, Philips Electronics
Amanda Gonzalez, Energy Solutions, on behalf of California IOU Codes and Standards Team
Suzanne Foster Porter, Ecova, on behalf of California IOU Codes and Standards Team
Noah Horowitz, Natural Resources Defense Council (NRDC)
Willem Silleris Smitt, Soraa
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Mike McGaraghan, Energy Solutions, on behalf of the IOUs
Joe Howley, GE Lighting
Randall Higa, Southern California Edison
Alex Boesenberg, National Electrical Manufacturers Association on behalf of Manufacturers of Lamps and Dimmers
*Terry McGowan, American Lighting Association

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P R O C E E D I N G S

SEPTEMBER 29, 2014 11:01 a.m.

MR. SINGH: Good morning. Welcome to the Energy Commission. My name is Harinder Singh; I'm the Project Manager for the Rulemaking and I work for the Office of Appliances and Existing Buildings.

First off, a few housekeeping items. For those of you who are not familiar with the building, the closest restrooms are located as you go outside on the left, as you go outside the double door it's on the left side. There is a snack bar, but it's closed, but we have vending machines there. It's under the white awning. Lastly, in the event of an emergency and the building is evacuated, please follow employees to the appropriate exit. We will reconvene at Roosevelt Park located diagonally across the street from this building. Please proceed calmly and quickly, again, following the employees with whom you are meeting to safely exit the building. Thank you.

The Energy Commission Staff is conducting this workshop on two topics today, 1) Small Diameter Direction Lamps, and 2) Light Emitting

1 Diode (LED Lamps).

2 I will present the Small Diameter

3 Directional Lamps presentation, part of it, while

4 Ken Rider, my colleague, will present LED Lamps.

5 If you wish to make comments, please fill

6 out the blue cards which are outside here as you

7 come in, and leave it with the staff, either

8 Tuan, Ken, or me. And stakeholder comments will

9 be limited to five minutes because of the time

10 constraints.

11 California Energy Commission, I'll talk

12 about California Energy Commission's policy,

13 State Energy Policy and Planning. The California

14 Energy Commission is the State's primary energy

15 policy and planning agency created by the

16 Legislature in 1974. It's responsibilities

17 include promoting energy efficiency and

18 considering by setting minimum Appliance and

19 Building Efficiency Standards and other cost-

20 effective measures.

21 Since 1974, the Commission and Appliance

22 and Building Efficiency Standards have saved

23 Californians more than $74 billion in reduced

24 electricity bills.

25 The Appliance Efficiency Program has a

1 statutory mandate, Warren-Alquist State Energy
2 Resources and Conservation Development Act, the
3 Public Resources Code gives the authority to the
4 Appliance Efficiency Program and the Commission
5 to adopt the minimum level of operating
6 efficiency and other cost-effective measures to
7 promote the use of energy and water efficiency
8 appliances, whose use requires a significant
9 amount of energy or water on a statewide basis.
10 Also, Assembly Bill 1109, the California
11 Lighting Efficiency and Toxics Reduction Act of
12 2007 requires the Energy Commission to adopt
13 minimum energy efficiency standards for general
14 purpose lighting. These standards, in
15 combination with the other programs and
16 activities must be structured to reduce average
17 statewide electricity energy consumption by 50
18 percent in the residential lighting by 2018 from
19 the levels of 2007. And also it requires a 25
20 percent reduction in commercial and outdoor
21 lighting by 2018.
22 Other policy drivers also identify
23 appliance efficiency as a key component in
24 reducing electric energy consumption and in IEPR
25 2013, CPUC 2011 Energy Strategy Plan. Energy

1 efficiency is also identified as a key component
2 to meet the greenhouse gas emissions goals of AB
3 32 in the California Air Resources Board's
4 Climate Change Scoping Plan.
5 So with that, you know, we started this
6 rulemaking phase which we are right now in the
7 pre-rulemaking phase, in 2012. The Commission
8 adopted OIR, Order Instituting Rulemaking, in
9 March of 2012. The Commission identified a
10 variety of appliances and potential to save
11 energy and water for appliance efficiency
12 measures.
13 So in March of 2013, an invitation to
14 participate was issued to seek the opportunity
15 from the comments and proposals from interested
16 parties to inform the Commission about the
17 product market industry characterization of the
18 appliances identified in the OIR.
19 In June of 2013, we issued an invitation
20 to submit proposals, opportunities for interested
21 parties to submit proposals for standard test
22 procedures, labeling requirements, and other
23 measures to improve the efficiency.
24 Right now in the process, in the middle
25 here, we're in workshop mode, we have issued

1 actually a staff report for the lighting on
2 September 22nd, and we are hosting a workshop
3 today, and this blue box in the middle, that is
4 where we are today.
5 The purpose of this staff work is the
6 Commission has posted the staff report on
7 September 22nd, this was a small diameter
8 directional lamps, as well as the LED Staff
9 Report. The workshop is an opportunity for the
10 stakeholders to provide comments and seek
11 clarification on the draft staff analysis and the
12 draft regulations.
13 The written comment period has begun on
14 September 22nd, and the stakeholders can submit
15 their comments by October 29th. All comments
16 that are received will be evaluated and the staff
17 will update the proposed Draft Regulations as
18 needed.
19 Again, you know how to submit the
20 comments: written comments should be submitted in
21 writing to the Docket Unit by 4:00 p.m. Pacific
22 Daylight Savings Time on October 29, 2014. The
23 Commission encourages interested parties to send
24 information up to 5 megabytes by email at
25 docket@energy.ca.gov. Please include the docket

1 number 14-AAER-1 in the subject line. And if you
2 are sending it by mail, or paper copy, or CD,
3 please mail it to the address: California Energy
4 Commission, Docket Office, Mail Stop 4, Docket
5 No. 14-AAER-1, 1516 Ninth Street, Sacramento,
6 California 95814-5512. If you have a
7 confidential data, if interested to need to
8 maintain the confidentiality of the data, or if
9 you have a confidential data you want to submit,
10 you should contact our legal counsel, Jared
11 Babula, and he's in the Chief Counsel's Office,
12 before submitting a response to the comments,
13 before submitting the data. So his address, his
14 name is Jared Babula, he's California Energy
15 Commission, Office of the Chief Counsel, 1560
16 Ninth Street, Mail Stop 14, Sacramento,
17 California 95814-5512. And his phone number is
18 (916) 519-1462. And his email address is
19 Jared.Babula@energy.ca.gov.
20 Now we move to the Small Directional
21 Diameter Lamps. So I have a brief agenda here.
22 I will be discussing scope, background, why
23 standards for Small Directional Diameter Lamps,
24 regulatory approaches, proposed requirements,
25 analysis, and next steps.

The scope of the Small Directional Diameter Lamps includes lamps that are 2.25 inches or less in diameter, which includes multifaceted reflector lamps, MR11s and MR16s, and also MRX, which is I think part of MRA lamps, and parabolic aluminized reflector lamps, PR11s and PR16s.

The scope also further includes two pin GU 5.3 base for the low voltage applications and GU 10 base and medium screw base for line voltage applications. The scope also applies to the low voltage lamps of 6, 4, 12, or 24 volts, and line voltage lamps of 120 volts or 277 volts.

Small diameter directional lamps are often used in retail, hospitality, residential, and museum applications. However, their popularity in residential applications is growing. Incandescent based small diameter directional lamps are practical and relatively inexpensive. A large majority of the small diameter directional lamps currently installed in California buildings are inefficient incandescent and halogen lamps.

LED lamps are now available in the market that are highly efficient and their efficacy,

1 quality, light output, and beam angle continues
2 to improve.
3 Lamp stock and energy consumption by the
4 small directional diameter lamps (SDDLs) are
5 continuously growing. In 2018 SDDLs are
6 estimated to consume about 1900GWh/year. LED
7 small-diameter directional lamps provide
8 comparable utility and they are highly energy
9 efficient.
10 In 2018, the proposed SDDL standards will
11 save about 1700 GWh/year if the standards are
12 adopted by the Commission. Regulations will
13 transform the market towards more cost-effective
14 and energy-efficient LED lamps. LED SDDLs are
15 cost effective and will save California consumers
16 money on their electric bills.
17 Right now, the DOE doesn't cover these
18 lamps. There are no existing DOE standards for
19 the small diameter directional lamps.
20 DOE has started conducting a rulemaking
21 on Incandescent Reflector Lamps, but MR 16s, MR
22 11s, PAR 16s, and PAR 11s are outside the scope
23 of its rulemaking. DOE has established HIR
24 performance standards for Incandescent
25 Reflector Lamps (IRLs) of diameter greater than

1 2.25 inches that use 40 watts or more.

2 Energy Star established specifications

3 for LEDs in their Version 1.4, including MRs and

4 PARs included in that version. Energy Star

5 specifications require minimum efficacy of lamps

6 to be at least 40 lumens per watt.

7 Energy Star provides a tool for PAR and

8 MR lamps to calculate minimum CBCP requirements

9 based on the replacement lamp's beam angle and

10 claim about wattage equivalency. So it's a

11 different measure to measure the efficacy of

12 those lamps.

13 Also, Seoul Electronics submitted a

14 proposal to the Energy Commission and in their

15 proposal they asked California Energy Commission

16 to harmonize with the Energy Star specifications.

17 The Energy Star program provides a framework of

18 standards and testing that California can adopt;

19 that's what they're saying in their proposal.

20 And they want the Energy Commission to harmonize

21 with the Energy Star and that would mean the

22 manufacturers would need to test only one of

23 their bulbs and therefore reduce the testing

24 costs for them.

1 Staff has also reviewed the Australian
2 Lamp Standards. The Australian Commission for
3 Lighting Standards established lighting standards
4 for low voltage MR lamps by establishing a
5 wattage cap of 37W, which became effective on
6 April 14, 2012.
7 This cap effectively banned the 50W
8 halogen lamps from being sold in the market,
9 leaving the 37W HIR lamps and LED replacements to
10 be sold in the market. So we have reviewed their
11 proposal, as well.
12 We also received proposals from IOUs and
13 Natural Resources Defense Council (NRDC).
14 Initially IOUs and NRDC proposed two-tier
15 performance standard for small diameter
16 directional lamps. IOUs' current proposal is
17 aligned with the CEC staff proposal requiring
18 small diameter directional lamps to produce at
19 least 80 lumens per watt.
20 The proposed requirements for SDDLs, the
21 scope includes the 2.25 inch diameter, or smaller
22 than 2.25 diameter lamps that operate on low
23 voltage and line voltage.
24 This slide is from the Regulator language
25 that we are proposing. The scope includes

1 halogen, halogen-infrared, and LED technologies,
2 as well as any other lighting technology that
3 falls within the definitions outlined for this
4 standard. This standard establishes minimum
5 performance levels for efficacy and lamp
6 lifetime. So this is the scope of the SDDLs.
7 We also have proposed the test
8 procedures. The first test procedure is to
9 measure the Photometric characteristics of the
10 Solid-State Lighting. And the second one is for
11 the Lumen Maintenance and the lifetime of the
12 lamp.
13 Basically the proposed requirements are
14 here on Section 1605.3 and what we are proposing
15 is, effective January 1, 2018, all small diameter
16 directional lamps must have a luminous efficacy
17 of 80 lumens per watt or greater, a power factor
18 of 0.9 or greater, and a minimum rated life of
19 25,000 hours.
20 We have evaluated that and we find that
21 the lamps are available in up to 90, 85 and, you
22 know, they are continuously making progress on
23 the efficacy side of it and the quality. So it's
24 quite feasible by 2018 to have these lamps
25 available in the market.

1 Here is one slide that we have looked at,
2 the study from Navigant, and we extrapolated the
3 sales number of the existing stock, and we find
4 that stock is going to be 16 million lamps in
5 2018, and it will grow to 18 million by 2028.
6 And it's quite a bit of growth and, because the
7 SDDLs are used, 65 percent of the usage is in the
8 commercial sector, and 35 percent of these lamps
9 are used on the residential side of it.
10 So the energy savings generated from the
11 Standard, if it's adopted, the 18 lumens per watt
12 standard, it will save around 1,600 gigawatt
13 hours a year. In 2018, the consumption is going
14 to be 1,900 gigawatt hours, so this will save
15 almost 1,600 gigawatt hours in energy savings and
16 that's a significant energy savings. And it will
17 save the consumers $223 million in the first year
18 at $.16 per kilowatt hours. And we have
19 calculated the energy savings and the dollar
20 savings up to 2028 with a discount rate of $.3
21 per year in the net present value.
22 And we conducted some cost analysis
23 looking at various lamp prices and energy
24 consumption, also the Duty Cycle, so we
25 calculated the Duty Cycle based from the Navigant

1 consultant study for the DOE, and we find the
2 commercial sector on the average uses 3,720 hours
3 a year, whereas the residential uses 840 hours a
4 year. The average operating hours we calculated
5 for the commercial and residential to be 2,712.
6 And the incremental costs of improvement for
7 these lamps, we assumed is 13.52 cents and the
8 payback period is 1-1/2 years.
9 So right now the SDDLs that are presently
10 in the buildings use $15.51 dollars a year in
11 power consumption. And if the 80 lumens per watt
12 standard is adopted, the cost is going to go down
13 to $2.86. And there will be like $12.65 savings
14 per year.
15 Next steps for the stakeholders is we
16 will consider the input from the stakeholders
17 from today's workshop and written comments, which
18 are due by October 29th.
19 Based on these comments, we will revise
20 the staff report analysis and the proposed
21 requirements, as necessary.
22 Commission staff are available to discuss
23 any questions and concerns at any time during the
24 proceeding.
25 So with that, I conclude my presentation.

1 And to submit comments and information related to
2 the rulemaking, this slide has the address,
3 again, the California Energy Commission, and make
4 sure that you put the docket number, and my
5 address and information and telephone number is
6 also available on this slide. And thank you very
7 much and I think our next presentation on the
8 agenda is from Michael Siminovitch from CLTC.
9 MR. RIDER: Michael, if you could just go
10 ahead and come up here?
11 MR. SIMINOVITCH: I want to thank the
12 Energy Commission for inviting me to speak today,
13 and I want to say I'm very supportive of the
14 Title 20 initiative here. With the added
15 comment; I'd like to see a stronger color quality
16 component tied into the efficacy requirement.
17 And I think the strong color quality component
18 added into the Title 20 proposal will support and
19 underwrite our 2016 Title 24 proposal. So I
20 think there's a potential for a much closer
21 alignment and support here with the idea that
22 Title 20 and Title 24 can potentially work
23 together.
24 So in the Draft 2016 proposal, there's a
25 strong color quality component and I think that

1 it would go a long way for the Title 20 proposal
2 to mirror that, or to support it, or to work hand
3 in hand. So while I'm supportive of the efficacy
4 side of Title 20, I'd like to see an addition
5 that would speak to the quality metrics as we've
6 seen in the voluntary specification.
7 So just a few comments to sort of add
8 into this, we've gone through this before, is
9 that our eyes have evolved under a broad
10 illuminant, this is well understood that our
11 visual system is well prepared for a broad
12 illuminant. Our light sources in our homes are
13 almost exclusively of high color, be it
14 daylighting or incandescent light sources. Most
15 of our homes have very high color quality light
16 sources.
17 If you look at the proposal for the 2016,
18 it's that we have a very high percentage of low
19 efficacy fixtures in California homes. What this
20 means is that we have a very high percentage of
21 high CRI light sources in California homes, so
22 California homeowners are very well used to very
23 high quality in their homes.
24 You've all seen the breakdown in the bar
25 graphs and important places like bedrooms, living

1 rooms, dining rooms, very high color quality
2 light courses. Californians are used to very
3 high color quality in the home.
4 I've gone out to the California Builders
5 and close to 100 percent of master bathrooms use
6 light sources of very high color quality, very
7 close to 100 CRI. So California homeowners are
8 very used to high color quality in the home.
9 I did an informal survey of portables
10 inside people's bedrooms, I'm not going to go
11 into the logistics of the study, but 90 percent
12 of homeowners have light sources in the home of
13 high color quality that are also fully dimmable,
14 and so people like to have high color quality and
15 dimmable light sources in the bedroom.
16 There's been some comments on high
17 quality lamps that they will be very expensive,
18 and it will be unaffordable to Californians, and
19 this was actually part of public testimony two
20 years ago where people stood up and said it's
21 going to be a $50.00 light source, it's going to
22 make color quality unaffordable, we cannot do
23 this. Today, we have a variety of light sources,
24 90+ CRI, dimmable, being produced here in
25 California, all less than $10.00. So this is in

1 striking contrast to unaffordable at $50.00 to
2 California, they're available today less than
3 $10.00
4 The other argument that was put forward
5 was high quality lamps are going to hurt savings.
6 Now, unfortunately this is based on what I
7 consider to be a very narrow and incomplete
8 definition of lumen matching and I think it's
9 very important to really look into what's the
10 difference here. And fundamentally, you cannot
11 use lumens alone to equate light sources of
12 different spectral content.
13 So an 80 CRI Energy Star lamp is not the
14 same as an 80 lumen incandescent. It is so
15 challenged color-wise, it's not the same. And to
16 say it's the same is not true. These are
17 designed, when you compare lumens, the spectral
18 content should be very similar. The spectral
19 content between these two light sources is so
20 different that you cannot equate the two.
21 So to make this important to California,
22 why did California care about this? If you take
23 a 60 watt incandescent and you replace it with a
24 10 watt LED, you're going to get 50 watt savings;
25 if you take a 60 watt and replace it today with a

1 California quality lamp at 12 watts, because
2 they've had to increase the amount of power to
3 get the 80 lumens using an incomplete definition,
4 you get 48 watts. So what that is, is about a
5 four percent difference in terms of the two
6 savings.
7 I've run more energy efficiency M&V
8 programs than most people, I cannot resolve a
9 four percent energy saving differential of any
10 kind of large scale deployment. So if California
11 were to go do this, you would not be able to
12 measure the difference between the two in terms
13 of statewide significance. So it's insignificant
14 in terms of the energy differential between these
15 two approaches.
16 Now ideally these should both be 10
17 watts, but because of your incomplete construct
18 on lumen matching, and because Energy Star uses a
19 very incomplete construct, we're not going to
20 change that any time soon.
21 Where are we today? This is a little bit
22 hard to read, but this is kind of a distribution
23 curve of lamp availability for A-lamps and
24 directional light sources in different CRI bins,
25 and this is just one sample, it's not a complete

1 sample, but it's just one sample that I grabbed
2 this morning and brought over.
3 Now you'll see a good population all
4 hugging the 80 CRI, and there's good reason for
5 that. There's no reason for a manufacturer in
6 the United States to produce a product more than
7 80 CRI because they're going to get killed in the
8 marketplace, okay, because Energy Star rewards 80
9 CRI. But you can see that there's a growing
10 population of lamps in the A-lamp region of 90
11 and above, and we've just recently seen a lamp
12 introduced to the California marketplace that is
13 consistently scoring at 96 CRI at less than
14 $10.00, so we're seeing a growing population.
15 Now also included in this are some of the
16 directional lamps. There's a few more
17 directional lamps because people who like art and
18 food and merchandising actually appreciate high
19 color, and they appreciate the idea they can
20 actually see the color differences in a retail
21 environment, so we see much more availability at
22 this end.
23 The last argument is that lamp
24 manufacturers can't and won't produce high
25 quality lamps.

1 So I have this informal survey, again,
2 these are five manufacturers that have I've
3 reached out to. And talking independently and
4 individually with manufacturers, all support the
5 concept of high quality lamps, high color lamps,
6 there's no manufacturer out that that says, "I
7 don't want high quality lamps." They're all
8 supportive of high color lamps.
9 All the manufacturers can make this,
10 okay, this is based on individual discuss, they
11 can all make this. They all agree that there's a
12 cost differential and right now it's in the 15
13 percent region. Some of the manufacturers have
14 told me it's decreasing and that's a very simple
15 volume kind of thing and we see that today with
16 the fact that you can buy A-lamps in California
17 for less than $10.00, and in less than two years
18 we've gone from "it's going to be $50.00, the sky
19 is falling" to now it's less than $10.00.
20 Well, one thing that I got pretty
21 universally was that there needs to be careful
22 standards to encourage and protect a quality
23 approach because, again, if a manufacturer steps
24 out in front of Energy Star, they're going to get
25 eaten in the marketplace because it's going to be

1 15 percent more expensive and their competitor is
2 going to take that marketplace. So what
3 California needs to do is invest and protect its
4 marketplace through insightful standards.
5 MR. RIDER: Thank you, Michael. On the
6 agenda, the next thing was have is the IOUs, I
7 think, David, you're up.
8 MR. THAYER: Okay, great. Thanks very
9 much. My name is Dave Thayer, I'm a Senior
10 Project Manager at PG&E and have responsibility
11 for our lighting rebate programs. I always love
12 speaking after Michael because he says what I'm
13 going to say, but in a much better way, so….
14 I think we're going to certainly touch on
15 a number of the same topics, but really I wanted
16 to take a step back and put this conversation in
17 perspective. I've had a lot of experience kind
18 of on the ground influencing the California
19 quality spec and working with manufacturers to
20 get those products into market. And I wanted to
21 kind of use that as a lens to look at the
22 discussion that we're having today around Small
23 Diameter Lamps and General Service Lamps.
24 So everyone in this room knows the
25 voluntary quality LED Lamps spec probably better

1 than I in this room since a lot of names are on
2 it that are in this room, but to a level set it's
3 kind of an Energy Star Plus model, looks at 12
4 criteria that are kind of above and beyond Energy
5 Star all around color rendering, color binning,
6 power factor, all with the intention to really
7 make sure that consumers have a better experience
8 with products when they get them in their homes
9 when they have that first experience with an LED
10 product. And one note, the first product that we
11 had in our programs was launched in November 2013
12 when there was only basically that product and a
13 few others that had been created to the spec.
14 So I'll talk a little bit about the way
15 that we implemented the spec and what we saw. In
16 2012 December when this was adopted by the CEC
17 and CPUC was supportive of IOUs helping support
18 this come into market, we had no products in the
19 marketplace. And as Michael was saying earlier,
20 we were really facing a lot of skepticism that
21 manufacturers would come to the spec and start
22 building these higher quality lamps and do that
23 in a retail environment where you have fierce
24 competition and price is certainly a significant
25 piece of that.

1 December 13, when the IOUs fully
2 transitioned to this spec, we had three products
3 in market and it was, you know, we were excited
4 to see that there was some movement in the
5 market, but over the course of the last year,
6 we've seen consistently new products moving into
7 market at a rate we did not expect.
8 So at this point in time we have 43
9 products in market that meet the CEC spec. These
10 are growing in a variety of ways, but we're
11 starting to see retailers look at this as kind of
12 the next tier to move out in their national
13 programs outside of just California. So we've
14 been I think in a really good position where
15 we've been able to work with other national
16 bodies on promoting kind of the elements and the
17 philosophy behind this spec, and we're starting
18 to see that come to fruition in advanced lamp
19 specs put out by CEE and we're getting a lot more
20 interest from IOUs nationally on how they can
21 build on what we've created here in California
22 and how they could bring it into their programs
23 nationally.
24 So to build on the products that we do
25 have in the program right now, as you can see we

1 really have the majority of these in the recessed
2 retrofit kit and BRs and some Small Diameter Rs.
3 Basically we're seeing the directional lamps move
4 a little bit faster than the omnidirectional, but
5 as you can see here we still have a pretty
6 significant gap in the MR space. And I think
7 part of that, to what Michael said, we are purely
8 a residential speck in the retail environment, so
9 really we're working with folks that are going
10 after the A-lamp and the BR replacements in a
11 residential setting where the market is less
12 developed for MR16s and it was 35 percent versus
13 65 percent used in commercial. So really, we're
14 seeing in our programs MRs adopted in our
15 commercial programs much faster. And one of the
16 things that we're seeing in our kind of core
17 distributor LED lamp program is that customers
18 are starting to ask for CEC spec products. And
19 the Distributor LED Program is pegged to Energy
20 Star as its qualification, but as we see these
21 new spec products come out into market, we're
22 actually getting requests from distributors to
23 roll the spec products into our distributor
24 program sooner, before they get Energy Star, and
25 so before that. We have kind of a grace period

1 for new products to get Energy Star due to some
2 of the testing requirements that take a little
3 bit longer.
4 So really, we're starting to see the
5 requests come from the market from folks that
6 understand what we're trying to do with the spec,
7 and how we're pushing those higher quality
8 products into the market.
9 To the other programs that I would
10 highlight is areas that we're seeing a lot of
11 interest in really pushing the kind of high CRI,
12 high efficacy lamps, are in our LEDA Program, the
13 LED Accelerator Program, where we really go after
14 customized projects for retail, restaurants,
15 museums, art galleries, commercial spaces where
16 the light quality really matters, we're really
17 trying to lead the market there and plan to in
18 2015 adopt some of the elements of the CEC spec
19 to roll into the tiers of our LEDA Program there
20 so we can start to look at kind of the quality
21 aspects of that for commercial spaces where it's
22 appropriate.
23 And then we have a number of direct
24 install programs that are interested in LED
25 technology and what to start moving in that

1 direction, and I think really the savvy ones that
2 have also heard of this spec and kind of the
3 quality aspects that we've been talking about are
4 really starting to kind of move toward just
5 finding, you know, the cheapest cost products to
6 get into a place where they can add value for the
7 customer in the quality of light that they have
8 in their spaces. So we're starting to see a lot
9 more demand actually come around the quality
10 aspects of the lights that we're promoting in the
11 commercial programs.
12 So just to wrap up, I think we're seeing
13 a lot of movement in the residential space around
14 the spec, around the replacement lamps, really
15 positive indications from manufacturers and
16 retailers that are looking to expand the breadth
17 of this higher tier lamp. But we do have a bit
18 of a gap in moving those products and pushing
19 those products to go for those high quality
20 elements in our commercial programs, and right
21 now it's a matter of not having enough
22 manufacturers with product in market that really
23 can push that CRI envelope and also those
24 manufacturers not having the scale to drive costs
25 down.

1 And finally, I think with the right
2 framework and the right regulation and incentives
3 in place, we've seen the industry move really
4 quickly and I think we're at a place where we can
5 see the lighting industry innovate at a pace that
6 they have not in the past. And I think LED is an
7 incredible opportunity to do that and I think for
8 California, pushing forward in that space is a
9 noble cause, is a great priority for us to have.
10 And I think that's it.
11 MR. COOK: Keith Cook from Philips. The
12 43 lamps that you showed, do all of those meet
13 the LED quality specification 100 percent?
14 MR. THAYER: Yeah, with the
15 clarifications that we've gotten, there are
16 certain gray areas; like our dimming requirement,
17 we don't have a metric that we can pin a number
18 to, so we have test methodology that we have
19 implemented to get those products into market.
20 MR. COOK: But what determines whether or
21 not they're on the list?
22 MR. THAYER: All the criteria that's laid
23 out in the spec and the direction that we got
24 from the CEC on implementing the spec.
25 MR. COOK: And the 43 products, what

1 percentage of the total lighting market does that
2 represent?
3 MR. THAYER: That's a good question. I
4 don't have that --
5 MR. COOK: I'm just concerned that the
6 insinuation was is there's a large move to this
7 and yet I think that the number of products may
8 not necessarily mean that the sales are there.
9 MR. THAYER: Sure. I can speak, at least
10 from the utility perspective this year we'll have
11 65 percent of our incentive dollars in our retail
12 program going to spec LEDs. We plan to increase
13 that to 75 percent next year. So I think as far
14 as the utility is concerned, our programs are
15 really on the way to shifting almost entirely to
16 focusing on this part of the market.
17 MR. COOK: And my last question is, is
18 there a website where I could find the listing of
19 these approved products?
20 MR. THAYER: There is not at this time.
21 MR. COOK: Why is that?
22 MR. THAYER: That's a great question.
23 Right now, because the IOUs are charged with
24 implementing this spec, we've developed the
25 methodology and are vetting the list internally

1 for the IOUs, but we're not to a point where we
2 can move that to a public list. It's certainly
3 in our roadmap for managing the program. I think
4 it will be a benefit for the whole industry, but
5 at this point in time we aren't to the place
6 where we can do that yet.
7 MR. COOK: Okay, thank you.
8 MR. RIDER: Thanks, David. We have a
9 couple other presentations. This is the one that
10 came up next, so I guess Amanda, are you here?
11 Or Suzanne? Whichever one of you. And again,
12 just use the arrow keys here to get through the
13 presentation on the keyboard.
14 MS. FOSTER PORTER: Thank you. It is
15 still good morning. Good morning, everyone, my
16 name is Suzanne Foster Porter, I'm with Ecova.
17 I'm here with my colleague, Amanda Gonzalez, with
18 Energy Solutions, and the two of us together will
19 be speaking on behalf of the California IOU Codes
20 and Standards Team.
21 As Harinder mentioned earlier, Harinder
22 Singh, he talked about the timeline. The IOU
23 Codes and Standards Team did submit a proposal to
24 the California Energy Commission around Small
25 Diameter Directional Lamps, and today we're going

1 to make comments on their behalf on CEC's staff
2 report and proposal.
3 The California Codes and Standards Team
4 that the IOUs make up support the 80 Lumens per
5 watt standard that the California Energy
6 Commission staff proposal put forward. And in
7 particular, we would also like to acknowledge the
8 manufacturers that have put some great products
9 out there in the marketplace that we have seen
10 through our research that we have conducted for
11 our Codes and Standards Enhancement Report
12 Proposal, and even since the production of that
13 report that we submitted to the CEC we've seen
14 gains, both in efficacy for leading lamps that
15 have come out in the last year, in addition to
16 color quality. And so we commend manufacturers
17 and it's one of the reasons why we continue to
18 support the standard that we put forward.
19 One of the reasons why we support this
20 standard is because it puts money back in the
21 pocket of consumers and businesses in California;
22 even when we consider an incremental cost of
23 $18.00 per lamp, for every lamp that would be
24 installed under this standard, we would see
25 $75.00 to more than $125.00 back in the pockets

1 of consumers and businesses, and that's for every
2 single lamp according to the analysis that we've
3 conducted. And it varies a little bit depending
4 on the residential or commercial Duty Cycle, but
5 that's something that every Californian can use
6 today with the recession that's been hitting many
7 families across the state.
8 In addition to that dollar savings in the
9 consumers' pockets, this standard will deliver
10 more than 1,500 gigawatt hours per year after
11 stock turnover, which is in a couple years based
12 on the lifetime of current products.
13 In addition, 500 megawatts of coincident
14 peak demand reduction, which is important to the
15 state, that's the equivalent of approximately the
16 demand of a small power plant and that could
17 enable us to shut down a power plant in
18 California.
19 Harinder spoke to some of the policy
20 drivers we have here in our state and the
21 California IOU Codes and Standards Team certainly
22 works to support the policies that our
23 Legislature puts forward for us. Harinder spoke
24 to the Huffman Bill which directly addresses
25 lighting, as well as AB 32 which seeks to reduce

1 carbon emissions in the state to 1990 levels by
2 2020. This Standard will support both of those
3 goals. It will also support the Zero Net Energy
4 goals that the state has by reducing residential
5 and commercial lighting loads in new commercial
6 and residential buildings. And those are targets
7 for also driving toward as well in the state.
8 We strongly support the efficacy
9 requirements and standard that the California
10 Energy Commission staff proposal put forth;
11 however, in the same vein as some of the other
12 commenters that had an opportunity to speak here
13 today, we always need to remember that people buy
14 lights to create light. People buy lamps to
15 create light, not to save energy, and they want
16 their homes to be beautiful, they want the retail
17 products that they're trying to sell to pop out
18 of that shelf or case.
19 And so, because of that, the California
20 IOUs Standard Team remains concerned that we have
21 an efficacy standard only and we would like to
22 see the CEC adopt, as well, some quality elements
23 to go along with this proposal.
24 So with that, I'm going to turn it over
25 to my colleague, Amanda Gonzalez, who will speak

1 to a couple of the elements of the proposal we'd
2 like to put forward, a 90+ CRI requirement, as
3 well as a label for consumers. Amanda.
4 MS. GONZALEZ: Thank you, Suzanne. Yes,
5 as Suzanne mentioned, we care a lot about the
6 consumer experience with these products and we
7 want to ensure that when a consumer goes to a
8 hardware store and selects a lamp off the shelf
9 that they have a favorable experience with it.
10 And we think that there are two things
11 that could be done to help address that, and one
12 of them would be to, at a minimum, require the
13 LED quality proposal to be applicable to Small
14 Diameter Directional Lamps. Of particular
15 concern to us is universal light quality and, as
16 a proxy for that, we think that a minimum
17 requirement of at least 90 CRI should be
18 applicable to the Small Diameter Directional Lamp
19 market.
20 Additionally, we have a draft concept for
21 product labeling. First of all, Diameter
22 Directional Lamps, which we think will help
23 consumers in their purchasing decisions by
24 providing information to them that will help them
25 compare across different products.

1 So I wanted to begin with an analysis
2 that our team did, which suggests that good color
3 rendering index and high efficacy are
4 simultaneously achievable. So what you're
5 looking at here is a graph of Lighting Facts Data
6 Products, so all of the products graphed here
7 represent products that achieve 90 CRI. And the
8 red products represent 90 CRI products with
9 average efficacy, and the blue products represent
10 90 CRI products with higher efficacy. And if you
11 were to discount the efficacy of these lamps
12 since they represent all LED lamps, so that they
13 would be more representative of Small Diameter
14 Directional Lamp Efficacy, so if you take about
15 20 percent reduction efficacy and you re-plot the
16 higher efficacy products trend line for that, you
17 can see that at least the trend line would
18 suggest that by 2018, maintaining 90 CRI and
19 achieving 80 lumens per watt is achievable.
20 And I'd like to say that this is just a
21 starting point for dialogue and conversation
22 around this, we want feedback from manufacturers
23 on what they think is achievable in terms of
24 pushing for higher efficacy while maintaining
25 color quality.

1 Additionally, we think that labeling is
2 really important. One of the things that I
3 wanted to highlight is that current labels seem
4 to be missing key information and many of them do
5 not support a comparison among products, so I've
6 highlighted four different products that I
7 sampled in San Francisco this weekend at two
8 different hardware stores, and going from left to
9 right you can see that, on the left-hand side,
10 there's a product that has very very minimal
11 labeling. Basically what we know about that
12 product is that it's a 50 watt product, it's low
13 voltage, and it has a narrow flood beam angle.
14 And moving toward the right, there are
15 other types of information indicators to the
16 consumer that could be helpful to them, and on
17 the far right this happens to be an LED lamp, but
18 there's information about dimming ability, lumen
19 output, lifetime hours, wattage equivalency, all
20 this information we believe will be key to
21 consumers as they want to or begin to transition
22 away from filament-based lamps to these lower
23 wattage LED products.
24 And so we've come up with a draft label
25 concept that we're looking for feedback from

1 manufacturers on, and other stakeholders in the
2 lighting world. And some of the things that we
3 think are really important include wattage
4 equivalency, light output, beam angle, voltage,
5 dim ability, color accuracy, and correlated color
6 temperature. And this is something that we think
7 should go on all labels in California for Small
8 Diameter Directional Lamps.
9 And I'd like to wrap things up, as well.
10 So in conclusion, we're really supportive of what
11 the California Energy Commission is doing. We
12 think that a high efficacy standard paired with
13 good quality measures will really put California
14 on the right path to achieving its energy
15 reduction goals, as well as maintaining a
16 positive consumer experience and supporting
17 manufacturers that are making really quality
18 products. Many of those manufacturers are in the
19 room today and I know that engineering these
20 products is not trivial, and so we commend them
21 for making quality products that make the
22 standard feasible. Thank you.
23 MR. RIDER: Thank you. I saw some
24 comments. Let me just make sure, no? Okay. All
25 right, we have some more presentations. Let me

1 see if I can find another one we haven't seen. I
2 have Noah Horowitz, NRDC, if you would?
3 MR. HOROWITZ: Good morning. I'm Noah
4 Horowitz with NRDC, the Natural Resources Defense
5 Council. I'm here today to do some high level
6 things, and then to get into some of the details
7 of both proposals here.
8 To be clear, and I'll state this upfront,
9 we're very supportive of the two proposals being
10 made by the CEC in terms of their stringency and
11 their effective dates. We also philosophically
12 agree with the LED Quality Spec as a means to
13 continue to be part of the rebate programs.
14 And my general comments are going to be
15 about we think some additional parameters are
16 needed to the CEC's proposal beyond what they've
17 done on CRI and efficacy, and I'm going to give
18 some more discussion on CRI and some of the
19 uncertainty we think is around there.
20 So why would a consumer not buy an LED?
21 We all know and are working to make them great
22 products. First and foremost is price. The
23 inefficient halogen that's out there is
24 approaching a dollar a bulb now, and that's
25 competing with an LED that might be $9.00,

1 $10.00, $20.00 a piece. So the number one reason
2 we're not going to get an LED in that socket is
3 price, and we need to be careful that our policy
4 doesn't have the opposite effect of increasing
5 the price and lowering the adoption right of
6 LEDs.
7 Other reasons people might not like them?
8 They're noisy, they hum, they buzz. There are
9 many bulbs that don't have these problems, but
10 these are the things that I do think we need to
11 address in California to make sure people
12 continue to not have these problems.
13 Some of the products don't dim very well
14 at all or, when they do dim, you get flicker and
15 it gets worse the more you dim the bulb. Also,
16 LEDs initially are very good at being a
17 directional light source. Can they give light in
18 all directions when you want them, for example,
19 in a table lamp?
20 Other reasons, and some of these are
21 legacies from CFLs, people are concerned, hey,
22 they die prematurely, I spent a lot of money for
23 this bulb, I'm not getting my money's worth.
24 Some might say, "I don't like the color," and
25 that could mean many different things to

1 different people. In the past, the bulbs might
2 not fit in the socket, that's a reason they
3 wouldn't buy it, or these things look weird.
4 Some people could just never get around the
5 spiral shape of the CFL, and some of the initial
6 LEDs look like shower heads. I think they're
7 more and more looking like the everyday light
8 bulb they think they should be having. Or the
9 thing is not bright enough.
10 I'm going to focus on the first four.
11 And in terms of CRI, there are lots of bulbs out
12 there that are in this less than 85 range, and we
13 haven't seen consumers express a dissatisfaction
14 about them. We do, however, agree with all the
15 stakeholders that we do need some minimum level
16 of CRI to make sure they have a good enough
17 experience. There's no data out there that shows
18 the consumers don't like the low 80 bulbs.
19 There are studies that say, "Hey, if I
20 give you an 80 or a 90, can you tell the
21 difference?" Many people can. Do they like the
22 90 more than 80? Typically they might. But does
23 that mean that they would not buy the 80? And
24 are they willing to pay more for the 90? And
25 that sort of tradeoff is something I think we

1 need to be very careful about.

2 So there are two ways you can bump up the

3 CRI, one is to maintain the light output, but you

4 have a penalty in power, it goes up about four

5 watts. Or you can maintain the power, but your

6 bulb gets significantly dimmer, so the real

7 implications of increasing the CRI. And again,

8 these bulbs today cost a lot more than the lower

9 CRI bulbs.

10 So we don't want to cause the price to go

11 up so much that it's going to impact people and

12 they're not going to buy the LED at all, so we

13 have to find that right sweet spot and it looks

14 like the CEC proposal has done that.

15 Here are two bulbs data from this

16 September. The top is the Cree Bulb, this is the

17 one that was kind of the game changing bulb that

18 looks like a regular light bulb, and it came in

19 at a $10.00 price point. This uses 9.5 watts and

20 gives out the same amount of light as the old 60

21 watt incandescent.

22 The version of that that gets to the

23 higher CRI uses four more watts, and it's about a

24 $5.00 price increase without rebates. GE, they

25 have an 11 watt bulb, they chose a different

1 route to go, they kept the power constant, but
2 the bulb is considerably dimmer and it's twice
3 the cost, these are prices today in September.
4 And here are two examples of the bulbs.
5 Again, notice they're both using the same amount
6 of power, the one on the left is only 570 lumens
7 compared to 800.
8 These are the two versions of the Cree
9 bulb, it's not shown here, but there's a 40
10 percent different in their power use. Cree on
11 their website, they call their high CRI product
12 Tru White. And you could click on the link there
13 to get there.
14 But basically the question on the RQ: Is
15 there such a thing as good CRI and poor CRI
16 light? And bottom line, they say light bulb with
17 a CRI of 80 is an excellent general use light
18 bulb for the home. Isn't CRI 80 good enough?
19 For general illumination it's fine, but there's
20 certain applications where a higher CRI light
21 might be preferred. We agree with all of this,
22 we think whatever policy we need, we need to
23 preserve the ability for high CRI bulbs to be
24 sold. We don't want to set the efficacy so high
25 that that eliminates the CRI 90 bulbs from being

1 sold for those people that are willing to pay
2 more and/or there are some parts in the home
3 where it might make sense to have the very high
4 CRI. And we think the proposal that the CEC has
5 enables both of those to occur.
6 So if you were to take four watts per
7 bulb on average and multiply by the number of
8 bulbs that are there, this does add up. These
9 are ballpark numbers, you could quibble with
10 them, but order of magnitude we're looking at an
11 impact of 720 megawatts if half the state's bulbs
12 went to LEDs and had a bump up to the higher CRI.
13 So our recommendations for consideration
14 in today's workshop and ongoing conversations, we
15 think the CEC is right in setting requirements
16 for LEDs, not only efficacy, but other
17 requirements. We think something needs to be in
18 the CEC proposal that's not currently there,
19 premature failure, is it testing 1,000 or 3,000
20 hours, or some combination with lumen
21 maintenance? The current spec is not addressed,
22 noise or hum. And if you go to the websites of
23 Amazon.com, Home Depot, Philips, GE, what are
24 people complaining about? The one thing that is
25 consistently there is something about noise or

1 hum.

2 Energy Star has something in there we

3 think that's a great starting point. Similarly,

4 we think something needs to be done in flicker,

5 and you have something in there, and we think

6 that should be expanded; not only does the bulb

7 flicker when it's dim, but what about in the 100

8 percent light output position?

9 We agree completely with some of the

10 other speakers, we need to make sure that people

11 aren't being misled and we need some equivalency

12 claim requirements. You shouldn't be able to

13 claim that a bulb is as bright as the old 60 watt

14 bulb if it only gives off 570 Lumens. We, too,

15 agree that there should be some minimum CRI

16 requirement. We don't have all the answers, but

17 we think there's a scarcity of information today

18 to justify going all the way to 90.

19 As we said earlier, we want to make sure

20 the CRI 90 bulbs are allowed to continue to be

21 able to be sold and we have to thread the needle

22 with the efficacy on that.

23 Also, the CEC spec doesn't have anything

24 on R9, which is the part of the color spectrum

25 that deals with making sure the products under

1 the bulbs look sufficiently red in a true red
2 color, so we would encourage them to add an R9
3 requirement, and if the bulb is dimmable, we
4 should have some basic dimming requirements and
5 that's currently in there, we think you have a
6 good first step, you need some tightening on the
7 language in terms of which dimmer do you test
8 with.
9 So the thing I want to point out here is,
10 if we don't do this right, Title 20 could
11 actually increase the State annual energy us used
12 by these lighting products, not reduce it, and
13 that's because of the concern of cost. So let's
14 really understand the tradeoff between CRI and
15 cost and how high or low we should go.
16 Lastly, there's a requirement that when a
17 bulb is being tested, not only do you need to
18 meet the average CRI, but between R1 and R8, all
19 of the scores must be 75. It would be good to
20 understand this: are the bulbs that are meeting
21 these various points either at a CRI of 82 or 84,
22 can those products also hit 75 across the board,
23 or is this an unintended way of making sure all
24 the bulbs need to be a very very high CRI? Thank
25 you.

1 MR. RIDER: Okay, I think I have one more
2 presentation here and that is from Soraa. Why
3 don't you go ahead and go through the whole thing
4 since you only have one slide on the other
5 subject? Thank you.
6 MR. SILLERIS SMITT: My name is Willem
7 Silleris Smitt. I represent Soraa. We are an
8 LED lamp manufacturer from Fremont, California.
9 I would like to thank you for the opportunity to
10 provide comments here.
11 And I commend the staff for their
12 excellent report. I want to cover quickly Small
13 Directional Lamps and LED Lamps in general. It
14 was mentioned in the staff report that the
15 average efficacy of LED Small Diameter
16 Directional Lamps comes in around 80 today. I
17 looked up products in *Lighting Facts* last week,
18 this is a histogram showing their distribution by
19 color 82-84 CRI, 85-89 CRI, 95-99 CRI, and what
20 you can see here is that there's a pretty big gap
21 between the quoted 80 Lumen efficacy of, in this
22 case, MR 16 lamps, which are the Small
23 Directional Lamps, in fact, they come in around
24 roughly 61 lumen per watt average. When you look
25 at the products that are north of 90 CRI, they

1 come in at 44 lumen per watt average. And I only
2 looked at products that were listed in 2013 or
3 2014, 3,250 Calvin or below, 80+ CRI. And also
4 looked at *CALiPER Report 22* from DOE that was
5 published in July, you will come to similar
6 averages. In fact, three percent of the products
7 of 80 CRI were above the 80 lumen per watts
8 today. If we extrapolate those numbers that we
9 have today with a 10 percent annual improvement,
10 we can expect that 80 to 85 CRI products, MR 16
11 LEDs will come in roughly average around 78 to 80
12 lumen per watt, and for 90+ CRI products, we can
13 expect 58 lumen per watt.
14 Based on this data, we believe that the
15 minimum 80 lumen per watt requirement for small
16 directional lamps will put substantial harm on
17 90+ CRI lamps in this category and it will
18 basically mean that 90 or 95 CRI LED MR 16s will
19 be taken off the market.
20 The overall product offering in LED MR
21 16s will skew towards lower CRI, higher CCT
22 because if there's just one lumen per watt
23 requirement, that allows manufacturers to make
24 lower cost products.
25 Probably unnecessary to say, but if

there's a skew in the market towards low CRI and high CCT, it will have a negative impact on acceptance of energy efficiency lighting and especially in this case for MR 16 and GU10 products.

Our proposal is to include CRI in the requirement and make an adjustment, and we think the overall LED proposals for LED lamps provide an excellent format because they include both LED And CRI in a single formula. We recommend to take into consideration that small directional lamps inherently have lower efficacy than larger omnidirectional LED lamps. There's lower optical efficiency because the light has to be directed, there's lower driver efficiency because the space to incorporate a driver is very small, and the tradeoffs that you have to make as a manufacturer result to fit in that small form factor leading to slightly smaller efficiencies in the driver.

And there's a slight reduction in overall efficiency because of the small size of these lamps, they run at higher temperature because of less cooling. We've proposed a standard that can look, for example, like this for small directional lamps, three times the CRI plus the

1 efficiency has to be greater than 340 and a
2 minimum efficacy of 55 lumen per watt. We
3 believe that there will be substantial amount of
4 products in the 90, not only 90, but also 95 CRI,
5 including very high R9 that can meet this
6 requirement by 2018.
7 On the LED lamps, in general, we have one
8 comment and it was mentioned earlier this
9 morning, we can recommend to include R9. It
10 depends a little bit what a good R9 is for a
11 minimum. If the minimum gravitates towards 84
12 CRI, and R9, a minimum of 25 could be important.
13 We believe that R9 also -- there's two reasons
14 for including this, probably the main reason is
15 that, as mentioned earlier, R9 is a very
16 important measure for rendering skin tones and
17 for giving an overall impression of warmth to
18 light. For consumers it's very important to
19 compare R9 products to understand what the warmth
20 will be of the product once it is installed in
21 our homes. Thank you.
22 MR. RIDER: All right, thank you. I
23 think that is all the presentations that I have.
24 So I think we can go to the general comment.
25 What time do we have? It's noon and on the

1 agenda -- okay, so we've got time, we're on
2 schedule it looks like.
3 So what I will do is I think we'll take
4 comments in the room first. For folks on the
5 phone, if you could go ahead and raise your
6 hands, and after we get the folks in the room,
7 I'll go ahead and unmute you so you can make your
8 comment. You can also, if you're on the phone or
9 you're on the WebEx, you can write a comment down
10 if you don't want to speak and then I'll read
11 that into the record.
12 Also, if you want to speak, if you could
13 -- Tuan, if you wouldn't mind maybe moving to the
14 center back there -- and if you could fill out a
15 blue card it helps the transcript and it helps us
16 keep this all pretty orderly. And then once
17 you've gone ahead and done that, go ahead and
18 approach the mic and line up. So anyone who
19 wants to make a comment, just flag down Tuan and
20 he'll give you a blue card. Nobody? Okay, Tuan,
21 do you have a couple cards? I'll go ahead and
22 call them up. So I have David Chen from Jade
23 Sky.
24 MR. CHEN: Hi, thank you everyone for the
25 opportunity to provide my comments today. My

1 name is David Chen, I am the CEO and Cofounder of
2 Jade Sky Technologies. We are a company that
3 makes driver ICs and our excellence in focus has
4 been on dimming which includes both compatibility
5 in full zero to 100 percent range.
6 So my comments today are in regard to the
7 draft staff report, and particularly we have some
8 concern in terms of how lamps are marked. So
9 oftentimes we see on packages the word
10 "dimmable," and we definitely appreciate the
11 efforts to have that stated, however, according
12 to the text on page 69, there is a reference to
13 saying that a product that is marked as dimmable
14 shall pass a flicker test as described in Section
15 1604(K)(6), using a standard phase-cut dimmer. A
16 standard phase-cut dimmer is also referenced if
17 it cannot pass the flicker test.
18 So the main issue for me is that one
19 dimmer as a representation is clearly not enough.
20 In the landscape, there are a tremendous number
21 of phase-cut dimmers, and so speaking on behalf
22 of the user experience, so I definitely
23 appreciate what folks have been saying in terms
24 of user experience being incredibly important.
25 By "user experience," I simply mean my mom, you

1 know, my mom is going to go buy a light bulb to
2 replace something working at home, and she's
3 going to see it marked "dimmable" on the box, but
4 what does that really mean? Is she really going
5 to go to the website and look at compatibility
6 charts? Is she really going to go figure out
7 what dimmer she has at home? It's impossible.
8 It's not labeled on the front whether it's from
9 Lutron, Leviton, you have to take off the
10 faceplate, unwire it, it's just not going to
11 happen.
12 So my basic point here is that we need to
13 put in some standards that say it has to meet
14 testing beyond just one dimmer. I mean, at least
15 it has to be a set of dimmers and these dimmers
16 need to include digital type dimmers, those are
17 increasingly popular on the market, it has to
18 include dimmers that have occupancy controls, at
19 least a representative sample of what we can get
20 in the hardware stores. So, again, I feel that
21 if user experience like dimming experience isn't
22 improved, we will repeat the failure of CFL for
23 adoption because users just won't like it, even
24 if we have something cost-effective, even if we
25 have something that is great in energy

1 efficiency, if my mom doesn't like it she's not
2 going to buy it. And only when we improve this
3 user experience as it comes from dimming will we
4 see mass adoption, which is really the goal for
5 everybody in this room. Thank you.
6 MR. RIDER: Thanks, David. And written
7 comment I think would be really useful if you
8 could expand, you know, what you think would be a
9 reasonable set of test dimmers or --
10 MR. CHEN: Yeah, we're happy to provide
11 that. We did provide a written comment that has
12 been docketed, that I believe is referenced on
13 your website, but we're happy, happy, happy, to
14 provide much more information in terms of our
15 experience. In fact, I even brought a demo here
16 today later for those who are interested to show
17 some of these very issues, seeing is really
18 believing. And finally, I'd like to say the
19 technology exists today, it already exists, it's
20 not magic, we can achieve incandescent-like
21 dimming and still simultaneously preserve
22 reliability and efficiency.
23 MR. RIDER: Thank you.
24 MR. CHEN: Thank you.
25 MR. RIDER: I have a card from Mark Lien

1 from Osram Sylvania -- Lien, sorry. My bad.
2 MR. LIEN: It's okay. Thanks, Ken. I've
3 agreed with most of what I've heard here today.
4 It's hard for anybody to disagree with what was
5 said about quality. I think what the problem is,
6 is that we've made an assumption that CRI is a
7 quality metric. And in the lighting industry,
8 it's generally accepted that CRI is flawed, and
9 especially flawed when it comes to LED lamps. So
10 I brought a couple of articles and I won't
11 trouble you with the whole of the articles, but
12 one is from the Leucos Lighting Journal, and it
13 was released in June. Now, all of these are
14 fairly new documents, but they're taking a pretty
15 strong stand against CRI as a measurement of
16 quality for lighting.
17 So this one comes from Kevin Hauser at
18 Penn State University, and in part it says:
19 "Adoption of CRI would be a mistake. If CRI
20 becomes a legal standard, lamp manufacturers will
21 be obligated to engineer light source specter
22 using CRI as one of the optimization criteria.
23 This would only make good sense if CRI adequately
24 characterized the visual experience of color
25 rendition; unfortunately, it does not." And that

1 correlates with what Noah said about no studies
2 showing that 90 CRI looked more acceptable to
3 someone than 80 when it came to lamps.
4 He says: "Further entrenching a 40-year-
5 old system with known problems would impede
6 innovation of LED light sources." It would
7 impede the process.
8 From the Department of Energy, we have a
9 guideline, an LED measurement series, on color
10 rending index, and they say: "A long term
11 research and development process is underway to
12 develop a revised color quality metric that would
13 be applicable to all white light sources. In the
14 meantime, CRI can be considered as one data point
15 in evaluating white LED products and systems. It
16 should not be used to make product selections in
17 the absence of in-person and onsite evaluations."
18 And lastly, we have from the Illuminating
19 Engineering Society a white paper released in
20 July and they say: "It is the position of the
21 Illuminating Engineering Society that CRI
22 requirements should not be a metric used in
23 energy regulations to characterize color
24 attributes for solid state lighting until there
25 is an industry consensus on the issue." So they

1 are working right now on a document, they have a
2 task force in place to come up with a better
3 measurement. There are currently 21 different
4 groups globally that are working on a new metric
5 to replace CRI, so it is acknowledged by the
6 industry to be very flawed, for LEDs especially.
7 Of those 21, this metric team is going to come
8 down with suggestions for what we could embrace.
9 They're expecting within a month to have a draft
10 document, but they have an approved document by
11 the first or second quarter of next year. So
12 timing is very important here. If California was
13 to promote and embrace a metric that, for a
14 quality measurement that has been discredited by
15 the lighting industry, then I think that could
16 slow adoption of a more accurate metric,
17 particularly when we're looking at projections of
18 Tier 2 in 2018 and carrying into 2020.
19 The 80 CRI standard that's already in
20 place by Energy Star is a minimum, so embracing
21 that, that's already done as a minimum. There's
22 no evidence that consumers prefer 90 over 80
23 because it is a flawed metric, and I think that
24 promoting for California the stricter version of
25 a discredited metric could reflect poorly on the

1 California Energy Commission, it certainly could
2 harm the lighting industry and consumers.
3 MR. RIDER: Thank you. I don't have any
4 other blue cards. Was there anyone else in the
5 room that would like to comment?
6 MR. PAPAMICHAEL: My name is Kosta
7 Papamichael and I'm a Professor at U.C. Davis,
8 and I'd like to respond to Mark's comments. The
9 color rendering index was never meant to be a
10 metric of people's happiness or acceptance or
11 pleasure from color, it's a color fidelity metric
12 that tells you how a particular light source will
13 match the color of different objects and the
14 illumination from the light, or from incandescent
15 lighting. So that's all of what it says. And
16 Kevin Hauser is one scientist of many, one cuckoo
17 bird doesn't make sense. I personally think that
18 it's not that he's wrong, he's wrong for trying
19 to use a metric that is meant for differentiation
20 of colors and perception of differences in colors
21 to address people's happiness. CRI was never
22 meant to do that. And the CRI for what it was
23 meant to be, it's a pretty good metric. It has
24 limitations, especially at the lower values, and
25 most of the work that is happening is to change

1 the computation to increase the accuracy. It
2 will still be a CRI. The IES white paper was not
3 really a white paper, it was a position statement
4 that came out of the Board of Directors. We have
5 been looking at it, we have responded to them,
6 and we are asking, explaining how ridiculous that
7 position statement is without any technical
8 documentation. So that's what I would like to
9 put in there.
10 MR. SIMINOVITCH: Actually, the color
11 committees are responding --
12 MR. RIDER: Michael, if you could
13 approach the podium?
14 MR. SIMINOVITCH: Members of the IES
15 Color Committee are responding specifically to
16 the Board. The Board action was not done by
17 suggestion or by input from the Color Committees,
18 and the Color Committees are now responding
19 saying this is probably not the position that the
20 Board ought to be taking without scientific
21 evidence. And so I think it's very important
22 that CRI with a high R9 is one of many metrics
23 that could be used to look at light sources.
24 MR. RIDER: And that's in response to the
25 quote from IES? Is that --

1 MR. SIMINOVITCH: Yes. And so that's
2 being looked at now, that a lot of this did not
3 come from the Color Committees, and actually
4 members of the Color Committees are now
5 responding to this saying, "Why weren't the Color
6 Committees involved with this?"
7 MR. LIEN: So, Michael, you and I have had
8 conversations on this before and I've actually
9 agreed with you in the past that it's all we had
10 with CRI, so we had to go forward with it. The
11 IES did not say that there was scientific
12 evidence, what they in fact said in the quote
13 that I read was it is the position of the IES
14 that CRI requirements should not be a metric used
15 in energy regulations to characterize color
16 attributes for solid state lighting until there
17 is an industry consensus on the issue. And that's
18 the group that they formed to come up with a
19 metric that we can use for quality -- and Kosta,
20 not happiness, I didn't hear happiness mentioned
21 at all. I ran the educational center for Hubble
22 and for Cooper and I taught on CRI and I agree
23 with everything you said about what it is, but
24 what we have is a lot of industry professionals
25 saying that I was presenting with Mark Ray two

1 weeks ago in DC, and he's of the same accord
2 here, it's such a flawed metric for solid state
3 lighting that to proceed with it with California
4 really sends a message because people really look
5 at California for Energy Codes and Standards, and
6 it sends a message that California is embracing
7 it, and it's a discredited metric.
8 MR. RIDER: I just want to keep the back
9 and forth to a minimum, specifically to the mic.
10 I've got a few things here online that I'm going
11 to read out loud and then I'll go back to folks
12 in the room.
13 I've got Jim Gaines here from Philips
14 wrote: "DOE has shown radically faster adoption
15 of SSL," which is Solid State Lighting, "…than
16 CFL. There is simply no comparison between the
17 two adoption rates. Why does California, in
18 light of the high adoption rate, persist in
19 thinking that they need to put in strict CRI
20 standards based on old arguments that the CFL
21 story will repeat itself. Does anyone think that
22 this adoption will suddenly reverse itself? We
23 believe that CRI 90 has its place, but is not
24 reasonable as a minimum acceptable requirement in
25 State Codes."

1 Also, from Aaron Feit from Feit Electric,
2 "Currently there are no Small Diameter Reflector
3 R14, R16, PAR16s, at 80 lumens per watt.
4 Changing this spec to 80 lumens per watt will
5 reduce the amount of LEDs sold and increase the
6 energy used. Alternate lamps that will be used
7 are higher wattage, incandescent A15 or other
8 incandescent or halogen lamps. There is no CFL
9 replacements for these two lamps as far as MR16
10 lamps. Less than a handful of lamps meet 80
11 lumens per watt." And Jon McHugh wanted to chime
12 in on the IES, so I'm going to unmute him.
13 MR. MCHUGH: Good afternoon. Can you
14 hear me?
15 MR. RIDER: Yeah.
16 MR. MCHUGH: Yeah, I'm a member of the
17 Illuminating Engineering Society of North America
18 and I was kind of shocked by this statement that
19 was made and, you know, if you look at their
20 statement this is what was written in this public
21 statement. It recognized that CRI has
22 shortcomings that limited the ability to fully
23 represent how humans perceive color and that
24 there is a color metric task force which is
25 looking at improving the metric. And as a

1 result, for Energy Standards, the IES doesn't
2 want the CRI requirements to be used in Energy
3 Regulations for Solid State Lighting. Well, you
4 know, this argument is exactly the argument that
5 could be used for illuminants, something that
6 people feel in fact you have a better grip on,
7 but how many times have any of these IES members
8 been at a meeting that's saying, well, you know,
9 illuminants is imperfect, it's not really that
10 great of a metric of necessarily illumination for
11 a space, but yet nonetheless if you look in the
12 IES Handbook, what are we using? We're using
13 illumination. What are we using in the various
14 RPs that also form the basis of the California
15 Energy Efficiency Standards? We use
16 illumination. It's an imperfect metric. Should
17 it be equivalent to your illuminants? Should it
18 be some other kind of metric? You know, this
19 kind of discussion has been going on forever.
20 Now, related to LEDs, yes, there have
21 been people working on alternate metrics and, you
22 know, as an example, there was a paper written by
23 Yoshio Ono of NIST and Wendy Davis where they go
24 through the benefits of CQS versus CRI, and most
25 of the discussion is around color mixing LEDs.

1 And if you go to the end of that paper which, by
2 the way, I sent my comments to the IES, I have
3 not received, even though I'm a member, have not
4 received a response yet. But if you actually
5 look through this paper, what you find is that
6 when they look at the comparisons between CRI and
7 CQS, phosphor type LED products, the CQS and CRI
8 are within two points of each other. So, you
9 know, all of this discussion about how imperfect
10 CRI is, is something that is related to color
11 mixing LEDs, which are a tiny fraction of the LED
12 market. And I would be interested in Mr. Lien,
13 if he had a comment in response to that. Thank
14 you.
15 MR. RIDER: Thanks, Jon. Okay, so back
16 to folks in the room. Does anyone in the room
17 care to comment? Go ahead, Noah.
18 MR. HOROWITZ: Noah Horowitz with NRDC.
19 This discussion I find very interesting. I think
20 there's broad consensus CRI isn't a perfect
21 metric, but it is what we have today and I think
22 most people in the room would agree, you don't
23 want to have products that are CRI 40 or 50,
24 regardless of how flawed it is.
25 So we need to set, in my opinion, some

1 floor. Is it 80, 82, 84, 86? More information
2 will inform that. Combined with an R9, I think
3 we're doing a pretty good job.
4 Otherwise, I think the CEC has two
5 choices, they do nothing on color because of this
6 dueling Standards conversation which I think
7 would be a disservice, and then we're allowing
8 the really bad products, the really really lowest
9 CRI despite it's potential flaws as a test
10 method, do nothing in color. Or, should the CEC
11 wait one, three, five years for these Standards
12 bodies to reach consensus, and there will
13 probably be multiple Standards, I don't think
14 that's the right thing either.
15 So it's my opinion you move forward with
16 what you have and let's just figure out what the
17 right level is that's sufficient to remove those
18 really poor performing products and encourage the
19 others to move forward.
20 MR. RIDER: Thank you, Noah. And I would
21 just like to remind everybody that there's no
22 proposal to require 90 CRI in the staff report,
23 and I don't think on the STDLs there's any
24 requirement for CRI, although there's certainly
25 the IOUs suggested that and other folk are

1 suggesting that there should be. But just
2 reminding what's in the proposal.
3 MS. GONZALEZ: Hi. This is Amada
4 Gonzalez with Energy Solutions on behalf of the
5 California IOUs. I just wanted to respond to
6 Aaron Feit's comment on the phone. We do
7 recognize that there are not many products that
8 currently meet 80 lumens per watt, in fact, the
9 average lumen per watt efficacy of STDL Lighting
10 Facts products is about 60 lumens per watt, but
11 all of our analyses suggest that 80 lumens per
12 watt at higher CRI and lumen output and beam
13 angle is achievable by 2018. So that's a
14 forecast. Thanks.
15 MR. RIDER: Okay, thank you. Anybody
16 else in the room? Go ahead and approach the
17 podium. Please remember to state your name and
18 affiliation.
19 MR. MCGARAGHAN: Hi. Mike McGaraghan
20 here speaking on behalf of the California IOUs.
21 Thanks for having us here today. I think we will
22 have additional comments in the afternoon after
23 we go through the LED quality portion. But since
24 we have started some of that discussion here, I
25 wanted to chime in on a few things.

1 First of all, just out of the gates you
2 mentioned that the staff proposal does not have a
3 90 CRI requirement in it. The IOU proposal does,
4 and the proposal that was submitted in July of
5 2013, had a proposed requirement of 90 CRI across
6 the board and that is still our recommendation to
7 the Commission.
8 There have been some comments about the
9 accuracy, the validity of that metric, and I just
10 wanted to reiterate that the metric does improve
11 as it gets stronger, so the way it works is it
12 averages eight sample colors and to achieve a
13 score of 90, it's extremely difficult for any one
14 of those colors to perform at a very low level.
15 So the lower you get, if you go to 80, or down to
16 70, or down to 60 it becomes easier and easier to
17 game the metric. So I think that also speaks in
18 support of the Commission's proposal to require a
19 minimum of 75 for every sample between R1 and R8.
20 We definitely encourage that approach.
21 The other thing I wanted to address
22 briefly was a comment made via chat by Jim Gaines
23 and mentioning that LED adoption is outpacing CFL
24 adoption, or I forget exactly how he phrased it,
25 LED adoption, improvement to adoption rates.

1 I think that's a really interesting comment and
2 I'd like to kind of dive in with him on which
3 numbers he's looking at and how that came about,
4 but CFL adoption once upon a time was looking
5 very promising, it was skyrocketing in the mid-
6 2000's. It went from about zero percent to about
7 25 percent very quickly and it was a great time
8 for the energy efficiency industry, for the
9 lighting industry, everybody was very excited
10 about that. And then it plateaued. So I don't
11 think what we're seeing with LEDs is
12 substantially different. We've seen huge
13 increases in LED sales over the last year to two
14 years, that's for sure. But what we're talking
15 about is going from a quarter percent up to a
16 percent, or a percent up to two percent, and so
17 those look like huge jumps in LED adoption rates,
18 but they're not dramatically different than what
19 we saw with CFLs initially when CFL prices came
20 below $10.00. So that's really what we're
21 talking about here, we're not talking about the
22 initial sales for those early adopters and those
23 adoption rates, we're talking about down the line
24 when we really get prices down below eight, six,
25 five, four dollars, what happens then? Can we

1 convert the rest of the sockets, not just the
2 first 10, 20, 30 percent of them? And as I
3 mentioned, we'll have more comments this
4 afternoon.
5 MR. RIDER: I have a comment here --
6 thank you -- I've got a comment here on the chat.
7 It's not addressed to you, I'm just going to read
8 it: "Anecdotally, one hears complaints from
9 consumers about LED color," oh this is from Jim
10 Dakin, "…do we really understand the concerns?
11 Some of this could be purchasing the wrong color
12 temperature, some of this could be the absence of
13 familiar incandescent warm dimming." So I guess
14 the point there is that there are several ways
15 you could be unsatisfied with the color of the
16 lamp. Anybody else in the room? I'll take you
17 first, Joe, and then Mazi after.
18 MR. COOK: Keith Cook from Philips. Just
19 responding to Mike's comment, I actually have the
20 chart that Jim Gaines was referring to, and it
21 was presented before, I believe. And what it
22 shows is that years after market introduction,
23 the CFLs after six years on the market had only
24 reached a penetration of less than one-tenth of
25 a percent. LEDs, on the other hand, after six

1 years have already achieved over four percent
2 according to DOE data. So that's the huge
3 difference from --
4 MR. RIDER: You said that's a graph that
5 you've already seen?
6 MR. COOK: Excuse me?
7 MR. RIDER: I can pull up the graph just
8 so that everyone can follow along. It's in which
9 presentation?
10 MR. COOK: This is one that we presented
11 last time.
12 MR. RIDER: Oh, okay, never mind then. I
13 don't have it here, then. Thanks. Sorry. I
14 just wanted to share that graph. Mazi? Thanks,
15 Keith.
16 MR. SHIRAKH: Mazi Shirakh, CEC staff. I
17 was going to build on Mike McGaraghan's comments
18 on CRI. I know he mentioned that their proposal
19 is a CRI that's based on the eight color palette
20 that each one of them has to meet 75 percent or
21 better. And my question is, if we meet that
22 requirement along with R9 50, is there any
23 evidence that that metric, that CRI with R9 a
24 metric are meeting those requirement are flawed
25 in rendering the true colors?

1 MR. RIDER: I think anything less than
2 100 is technically supposed to be flawed
3 somewhat, but --
4 MR. SHIRAKH: Yeah, but is it, I mean, of
5 all the various ways of determining what the good
6 color rendering is, is there any other metric
7 that's superior than having those requirements
8 along with --
9 MR. RIDER: I think Michael is itching to
10 answer that question, so I'll let him.
11 MR. SIMINOVITCH: I mean, both IES and
12 CIE are actually working on exactly what you just
13 said. And the original construct was one through
14 eight. We added in nine and the CIE is now
15 looking at really broadening the palette samples.
16 Before they used to do these things physically,
17 so the idea is you would look at these color
18 samples and you'd make comparisons. So it was a
19 very laborious, long process. But now with
20 computation techniques, you can take spectra and
21 you can take digital information, and you can
22 very quickly look at an infinite number of color
23 samples.
24 Now the question is, is one of expense,
25 convenience, etc., but if you use CRI and you use

1 R9, a good value for R9, it's a probability
2 function. If you get 90+ CRI with a good R9,
3 it's almost impossible to have a challenged light
4 source. And everyone in the industry agrees with
5 it, every single person in the Color Committee
6 today agrees with that, okay? Everyone.
7 Now, the issue is that, well, where do
8 you cut this off? Do you cut it off at R10?
9 R15? R20? R100? And so one of the leads in the
10 CIE Committee is advocating for a very large
11 number of color samples because you can do it
12 computationally, and that's starting to gather
13 more favor.
14 Now the IES and the CIE are working
15 collegially on this. Now, the existing or the
16 future standard, is it going to be CRI? It's
17 going to be some type of CRI construct. It's
18 going to expand. It's not like this is a flawed
19 construct, what it is is an incomplete construct.
20 So you start with what you've got, and R8
21 everybody knew was not full. R9? Pretty good.
22 R10? R20? R100? Better and better. So if you
23 look forward 20 years from now you will find CRI
24 right in the middle of this, but it will just be
25 fuller, it will be fuller and more complete.

1 MR. SHIRAKH: So we could wait 20 years,
2 but I think we don't have 20 years, and I'm
3 talking about right now, I guess. Winston
4 Churchill said Democracy is the worst form of
5 Government except for another form of Government.
6 I mean, we have what we have and we have two
7 rulemakings going, Title 20 and Title 24, and
8 we've got to base this on something. Is there
9 anything better? It sounds like there's not.
10 MR. SIMINOVITCH: Right now, you've got a
11 beginnings of a foundation. So our suggestion
12 and the case team's suggestion was you start with
13 CRI plus R-R9 as the beginning, okay, with the
14 idea that in the future it will move forward. It
15 is impossible with CRI and R-R9 to have a
16 challenged light source.
17 MR. SHIRAKH: That's the answer I was
18 looking for. Thank you.
19 MR. SIMINOVITCH: That's the question you
20 need. And, in fact, all the Color Committee
21 folks will tell you this from the scientific
22 side, will tell you that you're not going to go
23 wrong there. And so the naysayer side of this
24 are, 1) the folks that are selling 80 CRI from
25 Energy Star are trying to protect that industry,

1 okay? So you're hearing sort of inaccurate
2 information from that side. So the idea is you
3 start with what you've got, but allow it to grow
4 because, they're absolutely right, it's
5 incomplete, but it could be added to
6 incrementally as we go through.
7 MR. RIDER: Joe, sorry, I accidentally
8 called Keith you earlier, but now really this
9 time, Joe.
10 MR. HOWLEY: Okay. Thanks, Ken. Three
11 comments. I guess I have to say one thing about
12 color and then two unrelated color comments. On
13 the color side, we're all arguing that you have
14 to have a certain level to get good color, but
15 what we found is that actually isn't true, we
16 have some light sources that are in the high 70's
17 that people believe, if they look at them,
18 provide a better color appearance than products
19 over 90. And so there's a lot of things you can
20 do within the, let's say, over 80 space to create
21 good color quality. All it does is when you move
22 this higher is remove the flexibility for
23 manufacturers to create a variety of different
24 pads for good color.
25 I agree that when you're down in the 40's

1 and 50's, as somebody mentioned that's pretty bad
2 color, but when you're up at this higher range,
3 there's different ways manufacturers could
4 approach that to provide different color
5 appearances. CRI is not perfect, which is why
6 you can get very good color lamps that are even
7 in the high 70's, that people view are better
8 than lamps over 90. That's all mentioned with
9 the CRI.
10 With regard to the other two comments,
11 one of them is addressing a labeling proposal.
12 State labeling proposals are very problematic for
13 national manufacturers of products. We cannot
14 control distribution, therefore we need one label
15 that we put on all products sold throughout the
16 country. We can't have state-by-state labels.
17 We can't control distribution to that level.
18 I would suggest if somebody wants the DOE
19 lighting facts label modified in some way that
20 they work with DOE to propose changes or
21 additions to that label so that we could have one
22 federal label. But a state label that is
23 different than a federal label, especially if
24 they directly conflict, so you can't meet both at
25 the same time, would be very problematic from a

1 national manufacturer's standpoint.
2 And then the last comment, when I'm
3 reading the report I notice that it mentioned
4 several backward compatibility issues when
5 dealing with MR 16 lamps and it was brought up
6 already about dimming systems, there are many
7 many different types of dimming systems out there
8 today, many different circuits. EPA looked at
9 this for A line products a year or so ago and
10 found there was really no way to address backward
11 compatibility issues. All you can do is address
12 forward compatibility issues. So it would make
13 some sense perhaps with the Title 24 Standard,
14 when we're talking about basically forcing
15 everyone to an MR 16 type of product, because you
16 could get a dimmer that works well with MR 16s,
17 you could make sure that system works. But you
18 are introducing lots and lots of problems onto
19 the market if you try to do this in a backward
20 compatibility way.
21 In looking at the Standard, many of these
22 older systems need halogen products to work, but
23 the question I have is what halogen products
24 would be left with the proposed standard, if
25 somebody simply could not get an LED system to

1 work, how are they supposed to get halogen
2 products? I don't think that has been addressed
3 in the proposal and I think more discussion has
4 to occur in that area. Thank you.
5 MR. RIDER: Harinder, did you want to
6 address that? Or should we go to the next
7 person?
8 MR. SINGH: No, I think go to the next
9 person.
10 MR. RIDER: Go ahead, Keith.
11 MR. COOK: Keith Cook with Philips. I
12 think that all of this discussion on CRI is
13 interesting, but I think we're missing the point.
14 I think unfortunately that going forward
15 California may end up harming themselves more
16 than helping themselves. And simply the fact
17 that they're going to be carving out unique
18 products to their market, and although California
19 is a very large market, it's like 12 percent, I
20 think, of the total U.S. market, even if I say
21 it's 20 percent, if I have finite resources,
22 which I do, I'm going to design a new product;
23 I'm going to design for the 80 percent market,
24 period. And then when I have time available,
25 I'll come back and pick up that 20 percent. But

1 what's going to happen going forward is
2 California is always going to be lagging the rest
3 of the country as far as new product introduction
4 is concerned if it has to meet these new
5 requirements. And what are you getting for that?
6 I mean, to me the 80 has already proven itself as
7 being a very good number. Energy Star has
8 adopted it, Philips went through and developed
9 and won the L prize, that was at 94 CRI, an
10 outstanding product. We came back with a product
11 that was almost identical to it that was 80+ CRI,
12 and never had a single one returned for a color
13 quality problem, not one. So what are you
14 getting for this 90 CRI over an 80 product?
15 Slower market adoption because it's more
16 expensive? Less efficacious? I just question
17 it.
18 MR. RIDER: Thanks. Amanda?
19 MS. GONZALEZ: Yes, this is Amanda
20 Gonzalez with California IOUs. I want to address
21 Joe's comment on backward compatibility. I think
22 you stated that backward compatibility was
23 impossible and that we should be focused on
24 forward compatibility, and I completely disagree.
25 We've been speaking with both lamp manufacturers,

1 as well as manufacturers of chips and drivers,
2 and they are aggressively working on chip, driver
3 and lamp design that can work in a plug-and-play
4 scenario for the replacement retrofit market.
5 And I don't think anyone has proven yet that a
6 plug-and-play replacement lamp scenario is
7 impossible.
8 MR. SINGH: I'd like to respond to Joe's
9 commentary to the halogen lamp. I know the LED
10 lamps are comparable to it, they have the angle
11 as well as the efficacy and, you know, all the
12 attributes. So why somebody would want to have a
13 halogen lamp when high efficacy lamps are
14 available? So it's just something that we --
15 MR. RIDER: Well, I forgot what your cost
16 -- how much is the savings on that?
17 MR. SINGH: Yeah, it saves -- it drops
18 the energy consumption from $15.00 to $2.80, so
19 it's a 70 or 80 percent energy savings. Why
20 would somebody would go and spend money on
21 something and then put a lamp in there that will
22 consume more energy and also cost them more in
23 terms of energy consumption?
24 MR. RIDER: Go ahead.
25 MR. HOWLEY: So there are so many old

1 systems out there, and EPA discovered this when
2 they were trying to come up with a single system
3 for dimmability looking at A line LED lamps and
4 dimmability on existing dimmers, they found that
5 it was impossible to design a product that met
6 and worked on all these dimming systems properly.
7 And I notice in your proposal, you said, well,
8 consumers can keep buying different products
9 until they get one that works right, but these
10 are very expensive LEDs, and I don't think
11 anybody in this room would think it would be
12 reasonable for a consumer to purchase an LED
13 product over and over again from different
14 manufacturers, hoping vainly to try to find one,
15 just one that might work on their system, like
16 dim properly might work properly. That is a very
17 unreasonable expectation for people out there
18 with existing halogen systems.
19 The other thing in terms of
20 compatibility, right now they're suggesting, or
21 DOE's Caliper Report suggests about 10 percent of
22 the people have tried and are using MR16 LED
23 lamps, so they do work in applications, but they
24 certainly aren't working well in all
25 applications, otherwise there would be higher

1 penetration plus they cost a lot more, which is a
2 major issue right now.
3 And then finally, from a light
4 distribution standpoint, the Caliper Report said
5 that, of the MR16 lamps available today, none of
6 those products produced the same lumen output and
7 the same center beam candlepower of a 50 watt
8 halogen MR16. And although they claimed to
9 replace the 50 watt halogen MR16s, most of them
10 had lumen output and center beam candlepower that
11 was lower than a 35 watt halogen MR16 lamp. And
12 so it still has a ways to go, and certainly I
13 think going to ADLPW is wishful thinking, but
14 we're certainly not ready there today. Today we
15 don't even have an MR16 that meets a 50 watt
16 MR16. They're working on it, they're improving
17 it, but it is going to take a while to improve
18 this and going to 80 lumens per watt is just too
19 fast, too far. Thank you.
20 MR. SINGH: Amanda, do you want to
21 respond?
22 MS. GONZALEZ: This is Amanda Gonzalez
23 with the California IOUs. We conducted some
24 testing with the CLTC over the summer on LED MR
25 replacement lamps for Small Diameter Directional

1 Lamps, and we found that some of the lamps were
2 able to meet 50 watt equivalency in terms of
3 center beam candlepower and beam angle using the
4 Energy Star tool. So we have shown that in
5 today's times we are meeting 50 watt equivalency.
6 And I'd like to remind stakeholders in the room
7 that we're proposing a Standard to be effective
8 in 2018 which is over three and a half years out.
9 MR. HOROWITZ: This is Noah again from
10 NRDC. I want to respond to Joe's last point that
11 you can't find today MR16s that are as bright as
12 the old 50 watt bulbs. That might be true today,
13 but again, as Amanda just pointed out, we're
14 looking at the standard in 2018. If we were
15 having this discussion a couple years ago, LEDs
16 aren't going to be able to replace the regular
17 everyday light bulbs, they can't give off more
18 than 800 lumens. Now we have the 75 watt
19 replacement at around 1,150 lumens. The 1,500+
20 lumen A-lamp is already there. Why is this
21 happening? LEDs by themselves are becoming more
22 efficient, there's a strong trajectory towards
23 increased efficiency, and we're going to blow out
24 of the water the 80 lumen per watt number many
25 years from now. I agree, 80 LPW might be

1 challenging for the high CRI lamps, and I think
2 we should explore further the proposal we heard
3 from the representative from Soraa if there's a
4 way to still get past today's halogen and HIRs
5 into LEDs in all flavors. Is the number 80 LPW
6 or 70? We can have some discussion on that, but
7 I disagree fully that we're not going to have a
8 full palette of LEDs at all the various light
9 points. Thank you.
10 MR. SINGH: Randall.
11 MR. HIGA: Hi, Randall Higa, Southern
12 California Edison. I want to speak more from my
13 former job and that was when I was specifying
14 lighting for a mechanical electrical plumbing
15 engineering firm. And you know, this goes back
16 35 years and even before that when I worked in a
17 camera store, I sold things like slide projector
18 lamps, so going back even more than 35 years.
19 But once I started getting involved with lighting
20 specification and saw the MR16s for the first
21 time, I said, hey, these are very similar
22 technology from the projector lamps that I used
23 to sell back even before that. And the customers
24 we had that wanted the MR16 lamps, wanted a
25 certain type of light, certain quality, beam

1 angle, you name it, but more importantly it was
2 the light quality, and that product from my
3 perspective as a lighting designer remains sort
4 of in that niche product category for display
5 lighting, accent lighting, not so much for
6 general lighting that you may see more so in,
7 say, residential applications, which personally
8 speaking may not be the most appropriate use of
9 it, but the fact is that's what it's used for
10 today.
11 But the lamp, that product category, I
12 believe is still important for that initial
13 application of good quality display lighting,
14 accent lighting where colors are important, etc.
15 etc. And because there is no, say, fluorescent
16 incumbent technology, we're jumping from mostly
17 halogen to LED here. So I think the expectation
18 is going to be much higher for the Small Diameter
19 Directional Lamp than, say, an A-Lamp where there
20 was that expectation of higher quality.
21 So with that in mind, I would tend to
22 support a very high quality minimum standard,
23 what everybody is talking about in terms of CRI
24 90, R9, but also would not want to have an
25 efficacy level that would exclude even beyond 90.

1 So I want to make sure from a Lighting Specifier
2 standpoint that we still allow, or have some way
3 to allow for, say, 94, 95 CRI SDDL products in
4 the marketplace. Thank you.
5 MR. RIDER: Thank you. We've got a
6 comment written here. I'm going to read it out
7 loud. It's from Richard Greenberg and these are
8 his words: "I just want to mention that the CRI
9 issue is different from SDDLs than for other
10 lamps because of the high proportion of
11 installations used for display and car sensitive
12 illumination such as for artwork and colorful
13 products. There would be a 20 percent decrease
14 in CRI from the 100 percent of users where 100
15 percent of users are accustomed to. That is one
16 reason to favor high 90+ CRI for SDDLs.
17 MR. SILLERIS SMITT: This is Willem
18 Silleris Smitt from Soraa. The Caliper Report
19 from DOE mentioned lumen equivalence of MR16s, so
20 it was a little bit confusing. And it's true
21 that 50 watt halogens easily go up to 800 lumens.
22 You can also find a 50 watt halogen of 500 lumen.
23 When you look at those 800 lumen, 50 watt
24 halogens, especially when you go the narrow beam
25 angles like 10 degrees, you will find that 40

1 percent of the lumens can be outside the beam
2 into a zone that is called "spill light" where
3 it's 10 percent, its less intensity at angles of
4 spill light is less than 10 percent of the center
5 intensity. So when I remind myself of the
6 meeting we had here last year, invitation to
7 participate, there was a big discussion about
8 field lumens, beam lumens, etc. I think that was
9 the backdrop of that discussion, lumen is
10 confusing, and when we talk about directional
11 lamps, that's why DOE created an excellent center
12 beam candlepower tool. We recommend that that
13 center beam candlepower is used when we talk
14 about equivalence, not the lumen output of a
15 directional lamp.
16 Also, we think that lumen and lumen port
17 is a reasonable proxy for describing efficacy of
18 directional lamps because if you go down to
19 center beam candlepower, it gets very confusing
20 because the center beam candlepower of the lamp
21 is only meaningful to talk about in the context
22 of its beam angle. So in summary, lumen is not a
23 good metric for equivalence, for directional
24 lamps. Lumen port can be a reasonable metric for
25 efficiency.

1 MR. SINGH: Thank you. Anymore comments?
2 Yes, please.
3 MR. CHEN: Hi, this is David Chen from
4 Jade Sky Technologies again. I just wanted to
5 make a comment in regard to backward and forward
6 compatibility. So I want to clarify that
7 backward compatibility today exists, it is
8 possible with technology, and it can be done at
9 the same cost point. So I take issue with
10 thoughts that we may give up on this. The fact
11 is that my company has already demonstrated time
12 and time again after testing with over 100
13 different types of dimmers a technology that
14 enables full compatibility with all dimmers.
15 That's a big statement.
16 I understand for MR16 it is more
17 challenging because the lower power levels, the
18 smaller size, all of that is completely true. So
19 if we're limiting the comment to MR16, or Small
20 Diameter Lamps, then yes, there are still more
21 challenges before us, but we're working on that
22 as well and we're making very very good progress.
23 So my only point is that let's not give
24 up on it in this room and beyond this room, I
25 think the technology as it comes from incredible

1 innovation in this very spot in Northern
2 California is quite incredible, so let's not
3 assume just because we haven't seen it before
4 that it doesn't exist. And forward and backward
5 compatibility are incredibly incredibly important
6 to user adoption because at the end of the day we
7 don't want to just buy a replacement lamp that we
8 could just put back in, right, as I said, my mom
9 just wants a replacement lamp that works with any
10 dimmer in any wall, and she's not going to go rip
11 it all out just to make it work, right? And the
12 fact is, because the technology actually exists,
13 it isn't a pipedream. We can do this already.
14 And this is why I carry around demonstrations, we
15 have innovations that basically mimic an
16 incandescent light bulb, so anything where an
17 incandescent light bulb can work on a dimmer, we
18 can do it despite constant current LED
19 requirements. It seems amazing, but I just want
20 to make sure people understand this technology
21 exists. Thanks.
22 MR. SINGH: Thank you. Two more comments
23 and then we need to wrap it up. Yes, Kosta.
24 MR. PAPAMICHAEL: This is Kosta
25 Papamichael again from U.C. Davis. I want to

1 respond to the 70 CRIs that was acceptable, etc.,
2 and again make sure that we all understand that
3 there is really a difference in measuring the
4 color fidelity of a light source from the color
5 preference of people. I can argue that I can
6 have a terrible CRI that makes the red meat look
7 good, and I can sell rotten meat for beautiful
8 meat. In that case, I consider that deception.
9 So here the effort that we are focusing on is not
10 to get the preferences of people on how red they
11 would like to see their meat or their clothes,
12 but on how accurate the colors that we look at
13 the food and the clothes compared to the way that
14 they would look outside or under an incandescent
15 bulb because of continuous spectrum. So let's
16 give the color rendering the fidelity level, the
17 level of accuracy. And the truth is that if we
18 compare any lamp with 100 CRI or 95 with 80 or
19 85, every single one of us will see the
20 difference in the color of the same object, so
21 that's what the color rendering is, it's
22 fidelity, not preferences. Thank you.
23 MR. SINGH: Suzanne.
24 MS. FOSTER PORTER: Suzanne Foster
25 Porter, Ecova, here on behalf of the California

1 IOUs Statewide Codes and Standards Team. I'd
2 like to respond to the comment regarding the
3 label proposal that we put forward today to help
4 consumers better understand Small Diameter
5 Directional Lamp characteristics.
6 The California Energy Commission has on
7 two occasions prior to this proposal created a
8 label for products that were not regulated
9 anywhere else in the U.S., or anywhere else in
10 the world, to help inform what the efficiency
11 level of that product was. The first was for
12 external power supplies and, as part of that,
13 they harmonized with the international community
14 to create a label that indicated the efficiency
15 level with a Roman numeral symbol, it's now used
16 internationally around the world to indicate the
17 efficiency level of an external power supply.
18 And California was successful in being a leader
19 to champion that label. It's now known very
20 widely in the community of the industry for power
21 supplies and widely used as a nomenclature for
22 how we talk about efficiency of power supplies.
23 The second label that the CEC produced
24 was for battery chargers and that also is found on
25 products; both of these labels are compliance

1 labels which is different from what we're
2 proposing today, which is a consumer label.
3 However, there is sufficient precedent that the
4 California Energy Commission has created labels in
5 the past and they've been effective for compliance
6 purposes, and we feel like for this product it's
7 an opportunity to build on that precedent and
8 ensure that consumers of California have
9 information they need, and possibly lead the way
10 for what could be possible in other jurisdictions,
11 both federally and internationally. Thank you.
12 MR. RIDER: Yeah, I'd just like to add on
13 top of that that we also have a history of taking
14 whatever we've adopted as a label in California
15 and advocating it to be a national labeling
16 standard, so that way we do have consistency.
17 And I also related to the manufacturer comment,
18 we do work to try to get any label -- most of the
19 labels we get here to be federal, and our
20 comments have been consistent in supporting one
21 cohesive national labeling program.
22 So I think that comment about red meat
23 kind of got me hungry. It's 1:00 here and so
24 we've got scheduled a break for lunch so we can
25 get some food.

1 And I just want to reiterate, everyone is
2 going to have a chance to submit written
3 comments, so this discussion is far from over and
4 we'll have another opportunity for discussion
5 after my presentation on the other half of this
6 staff report.
7 So get something to eat and we'll see you
8 back here in about an hour.
9 (Break at 1:12 p.m.)
10 (Reconvene at 2:15 p.m.)
11 MR. RIDER: All right, folks, it's around
12 2:0, so if you would go ahead and take a seat and
13 we'll get back to the show.
14 So Jade Sky was nice enough to bring a
15 demonstration and so I thought maybe before we
16 all got too much back into the nitty gritty of
17 the regulations that maybe we would let them go
18 ahead and run through their demo. So please go
19 ahead.
20 MR. CHEN: Thanks everybody for the
21 opportunity to show you a demo. I think a
22 picture is worth a thousand words and a live demo
23 is worth a thousand pictures, so I figure I'd
24 show what some of the main concerns are that we
25 have and that the end users have.

1 So what I'll show is a combination of
2 operation from existing dimmable LED light bulbs
3 they can buy in the marketplace, these are all
4 purchased within the last few months. They
5 represent all of the major brands, I'm not going
6 to pick on any of them, in particular, but what I
7 want to highlight is that on the boxes they're
8 very clearly marked as dimmable, there's really
9 no mistake in it, they are all advertised such.
10 So all the bulbs that I'm showing here are all
11 advertised as dimmable and thus the concern about
12 how things are labeled is relevant.
13 And what I show here in this box is six
14 different phase-cut dimmers. These are very very
15 common, most of them are from Lutron which is the
16 predominant dimmer manufacturer here in the U.S.,
17 and I have a couple from Levitan, and one from
18 Cooper. It does demonstrate a whole range. As I
19 said, we test with 100 different types of
20 dimmers, obviously I can't bring 100 dimmers with
21 me, but these are some of the toughest ones and
22 some of the most common ones, including digital
23 type dimmers with controlled fade-out, fade-on,
24 the one on the end is an occupancy sensor dimmer,
25 as well, that has a detection for vacancy and

1 will shut off as a result. So what you'll see is
2 I will take these products that are out, you
3 know, that are being sold in the marketplace now,
4 and show you a variety of issues that go beyond
5 just AC flicker, ripple, it's very very bad. So
6 with that, I'll start.
7 So what I'll show you is problems located
8 at the dimmest end, right, so this is a very
9 common rotary dimmer style and you can see that
10 with a lot of the rotary dimmers when you go to a
11 very deep dimming level, it starts to flicker. I
12 think this is quite generally known and folks cut
13 off often times at the low end of the range,
14 maybe they don't go down to 20 percent or 10
15 percent because they don't want to see this sort
16 of bad behavior as it goes down to the deep
17 levels.
18 A second type of problem is what I'll
19 show her with this PAR 38 and this to me is
20 extremely annoying, it's not even that obvious
21 until you point it at a light screen, or it's
22 illuminating something while you're trying to
23 read. So what I'm showing is this, right in the
24 middle of the dimming range, so if I go higher to
25 the max using the Lutron Maestro Dimmer, you can

1 see it's more stable; if I go all the way to the
2 bottom, you can see a more dramatic effect. But
3 what you can see here by the level indicator,
4 although you can't quite make it out, is that
5 it's at a minimum brightness range, and this is
6 also a very very common problem. What's worse
7 than this, if you can believe it or not, is I
8 will now turn it off, it will fade to off, and if
9 I turn this bulb around, oh my God, it's still
10 on! This is impossible to turn off. This is an
11 instant return to the hardware store because,
12 remember, these dimmers are wired into people's
13 walls. So the only way you turn this off is to
14 unscrew the light bulb. That's completely
15 unacceptable. And this is the sort of thing
16 that's very hard to catch in legislation, in
17 testing, because nobody defines this precisely.
18 But for me, I would just be happy to see
19 something with a digital style dimmer, you really
20 have to be able to turn off and on and show basic
21 operation beyond even just flicker spec. This is
22 clearly a dead end for user experience.
23 So the final one I'll show has to do with
24 the fact that people say, well, okay, it's only
25 at the low end of dimming that you ever see these

1 flicker problems and such, well, that's not
2 entirely true either. So here what I'm showing
3 is that with a occupancy sensor dimmer, you can
4 get another completely different effect which is
5 really better described as strobing. This is
6 very very common, again, most of the bulbs out
7 there have some sort of bad behavior like this
8 where it outright just flashes. So probably this
9 sort of dimmer does end up on the compatibility
10 list, somewhere it says, "Okay, do not work with
11 this kind of dimmer." But again, I think
12 practically speaking it's really difficult to
13 expect end users to go look on those charts and
14 know what they have and be able to see this
15 before they buy it. So in most cases they buy
16 this, again, it's an instant return to the store.
17 So this costs manufacturers a lot of
18 money. It's not just about the end user
19 experience, but we have many many customers that
20 choose to adopt the Jade Sky driver because
21 they're getting burned by so many returns. As I
22 said, these are instant returns so there's an
23 added cost beyond just to build materials for
24 which we are already competitive, and so there's
25 really no reason why this sort of technology

1 can't be adopted.

2 So now that I've shown the bad, I do want

3 to take a moment, about a minute, just to show

4 the good. Again, this is the Lutron Maestro

5 Dimmer and so you can see this is our light

6 showing the technology that makes it possible

7 and, again, I'm going to dim down through the

8 whole range and I will step down slowly, slowly,

9 going through the mid-range, and I could get it

10 down to very dim levels, right, this is a digital

11 dimmer, it goes down through all of the steps,

12 and then what I'll do is turn it off and show you

13 that indeed it does turn off, so you can watch

14 the nice even fade to off, indeed it stays off as

15 it should. This is what every user expects at

16 the end of the day and it is very much possible.

17 Finally, I want to show that it is also

18 possible in MR 16s, the Small Diameter lights --

19 oh, I should not point this at you, that would be

20 a really bad idea, so I'll point away. So again,

21 thanks to Soraa for giving us the lamp heads for

22 these three lamps we're showing here. What we

23 did is we just added our driver to drive their

24 lamp heads, and what you can see is that not only

25 will it work with all of these, I'm not going to

1 go through all six, but trust me that it does
2 work with all of them, but what I wanted to
3 highlight in addition is that I can dim smoothly
4 down to what they call very deep dimming levels,
5 in fact, let's turn it around, can all of you
6 guys see that, that it's still on? Okay. Off.
7 It should come back on to the dim level that it
8 was on before. Again, this is stuff that we all
9 take for granted as users of light, that when
10 it's on the diming level that you last set it
11 for, it should come back into that light level
12 without having to turn it all the way up and then
13 slide it back down.
14 Then finally, one other thing, so the
15 last thing I want to show is that people say,
16 okay, you have three of these all sitting on the
17 same track; what happens, oh my God, if you
18 remove one of them, or two of them? Will it
19 behave the same way? Is this even possible?
20 Okay, check this out. Exactly the same dimming
21 profiles, smooth 100 to zero percent. It can
22 also on a single bulb go down to deep dimming
23 levels, no flicker, nothing. All right, so all
24 of this is possible, right? So to be fair, what
25 I will say is this is for convenience on a line

1 voltage track, which I believe from one of the
2 slides I saw was only 20 percent of the market
3 here in California, but nonetheless it was
4 easiest for us to hack together quickly.
5 We are also working on the low voltage
6 version of this, so for 12 volts, 24 volts, AcDc
7 where we have MLV transformers, ELV transformers
8 in our lab, so what we feel we can do, or have
9 already done with line voltage, PAR and A-Lamps
10 in terms of universal dimming compatibility, we
11 feel we can make really good progress on using
12 the same sort of technology to apply to the lower
13 voltage lighting systems, as well. So that's
14 essentially it. I appreciate the opportunity to
15 speak and we're happy to follow-up with anybody
16 who has questions at the end of this session.
17 MR. RIDER: Thank you. Thank you very
18 much for the demonstration. And now we'll move
19 on to the presentation now.
20 Welcome back everyone from lunch. We're
21 now in the second half of today's meeting, which
22 is on LED Lamps. So my name is Ken Rider, I was
23 in charge of writing this part of the staff
24 report and I'm the lead on this, so if you need
25 to contact me, here's my email and phone number.

1 So what do I mean by LED Lamps? I mean,
2 that's a pretty broad term. So I'm specifically
3 talking about here are lamps that produce white
4 light and lamps that produce white light along
5 the black-body curve and the standardized color
6 correlated temperatures. And I'm talking about
7 lamps with certain base types, so medium screw
8 base, intermediate screw base, candelabra, GU-24,
9 and also some of the can retrofit kits. And I
10 put pictures here on the bottom so you can get an
11 idea. This one in the lower left is an A-Lamp
12 replacement, a medium screw base, this is a
13 candelabra, this is an medium screw base, and I
14 think this is one of those can retrofit kits.
15 There are over 600 million of these
16 sockets in the State of California in existing
17 buildings. The current stock and future
18 projection of lamps in these sockets are a
19 mixture of several technologies, so while this
20 regulation applies to the LED segment, there are
21 other competing technologies in these sockets
22 today, CFLs, halogens, incandescent, and right
23 now LED and halogens are particularly taking over
24 the A-Lamp market, and you can see that in things
25 such as NEMA's market share projections and

1 quarterly reports. You can see that those two
2 technologies are really taking over.
3 However, the trend towards Halogen,
4 particularly, is expected to come to an end in
5 2018 because of existing General Service Lamp
6 Standards in the State of California that would
7 require 45 lumens per watt starting in that year.
8 And current halogen technology lamps, I'm not
9 aware of any halogen that can meet those
10 efficacies. And that standard is based on EISA
11 and the backstop and early implementation of that
12 backstop.
13 So I went through kind of a complex
14 modeling exercise here combining all the facts
15 that I could find from DOE and from the IOUs and
16 from NEMA and everywhere I could find some
17 information, and then came up with an estimate of
18 what the market would look like with various
19 standards in play. You can see here the blue,
20 the incandescent is the classic incandescent lamp
21 is going out, but it never quite goes all the way
22 out because of some EISA exemptions for things
23 like three-way lamps.
24 Here is where EISA pushed traditional
25 incandescent towards halogen incandescent, and

1 you've seen that right now in the market and even
2 the NEMA projections show very high spikes in
3 halogen market share and A-Lamps. You also see a
4 market uptake of LEDs, which is what's happening
5 here, and CFLs have kind of been flat for years
6 and some say that a lot of initial LED sales are
7 eating at the CFL market, I'm not sure how much
8 that's going to be true in the future. And then
9 here in 2018 you see a sharp drop off of halogen,
10 that's modeling that 2018 45 lumen per watt
11 standard that I was mentioning.
12 Lots of people think, and this is
13 information from the U.S. DOE, lots of people
14 think that LED lamps are going to take over the
15 market. And the DOE suggests in this report that
16 in decorative lamps and GSLs, they are going to
17 take the whole market by 2030. Other markets
18 aren't exactly at the 100 percent, these are down
19 lights, so you can see that doesn't quite reach
20 the same height and incandescent reflectors hold
21 on the market space, particularly in residential
22 down lights, but you still see a very large
23 percentage of market shares being projected for
24 LED Lamps. So if DOE's predictions are correct,
25 they are the lamp of 2030.

1 I attempted to model what that meant for
2 energy consumption in the state, and so back here
3 in 2010, this is just a model for medium screw
4 base, this doesn't include decorative and
5 reflector lamps, but the A-Lamp basically was
6 consuming about 15,000 gigawatt hours back here
7 in 2010, and then these standards for improving
8 incandescent lights is bringing down the energy
9 consumption. And then this move in transition to
10 LEDs really brings it down. And you can see this
11 is quite a bit different; in 2010, you had 15,000
12 gigawatts, and then over here in 2029, we're just
13 above 5,000, so going from 15,000 to a little bit
14 above 5,000, and then this little blue line here
15 is the incremental efficiency expected out of the
16 LED standards that are proposed. So this blue
17 line here, this dark solid blue line, is just the
18 market transformation to LED. And then this
19 dotted blue line is the additional incremental of
20 getting a little bit more efficient with LEDs.
21 Now, while this seems really small in the
22 scheme of things, a couple thousand gigawatt
23 hours is quite a bit of energy to be saved, it's
24 about on the order of 1-2 percent of the total
25 residential electricity consumption. So I don't

1 want to make it look too small, but it is small
2 compared to the whole market transformation.
3 Now, if we get good LED market
4 transformation, and this is assuming I think
5 about 50 percent of the A-Lamp market goes
6 through LEDs, but you get a lot of the halogens,
7 people running through EISA exempt lamps. You
8 almost completely nullify the energy savings from
9 getting the LED lamps on the market if they don't
10 work right and people run to the EISA exempt. I
11 don't think this is a very likely scenario, but
12 it's a possibility, particularly if LEDs didn't
13 work well at all.
14 In the grand scheme of things, this is
15 information taken from the 2009 RASS, Residential
16 Appliance Saturation Survey, and it shows the
17 breakdown of electricity in the average or
18 typical California home back in 2009. And this
19 whole section here, so lighting is a big deal in
20 the residential electricity market, it's about 22
21 percent back then. And this market
22 transformation to LED is going to make a big
23 difference in electricity consumption in homes.
24 And this white wedge is an estimate of how much
25 is going to be - how much this last graph means

1 in terms of the pie of residential energy
2 consumption, it's huge. And it's consistent with
3 what AB 1109 expects from us, which Harinder ran
4 by earlier, it expects us to reduce residential
5 electricity consumption by 50 percent by 2020.
6 So this is in line with what is already actually
7 expected of us, but it's basically all going to
8 come from this LED transformation.
9 So Energy Commission staff proposed a
10 standard that includes metrics for both CRI and
11 efficiency and combines them into a single
12 equation. And the equations here on the screen,
13 it's three times the CRI plus efficiency, and
14 that's, how you calculate this compliance score.
15 And in Tier 1, that score has got to be 335 or
16 higher, and in Tier 2, it has to be 350 or
17 higher. And Tier 1 would be proposed to become
18 effective on January 1, 2017, and Tier 2 on
19 January 1, 2019.
20 This standard allows -- I'll get to a
21 graph of it later, actually maybe I'll just keep
22 it to that graph -- the proposal also has
23 absolute minimum, so you cannot have a
24 performance worse than a certain level 2, so the
25 manufacturers' tradeoff between efficacy and

1 color rendering index, it does have hard
2 minimums, and those also get a little more
3 stringent between Tier 1 and Tier 2. The Tier 1
4 requirement would have a hard minimum of 82 CRI,
5 and 55 lumens per watt, and again that would come
6 into effect on January 1, 2017. And the Tier 2
7 would have a hard stop at 84 CRI and 65 lumens
8 per watt, and again that would become effective
9 in 2019.
10 In addition to CRI, staff is proposing an
11 absolute minimum rendering index for each
12 specific color, I think someone earlier mentioned
13 that there are eight colors. Well, CRI, the
14 overall CRI metric is an average of the scores of
15 all eight of those different individual color
16 tests. And I think a lot of reasons people
17 assume that customers will be unsatisfied with
18 low CRI lamps is because you get a particularly
19 low specific color, and so the 75 minimum is
20 meant to ensure that there's no single color that
21 has a very very bad score. And it's kind of
22 along the same lines of what people were asking
23 for earlier in terms of an R9, it's just not
24 specific to red, it's across all the colors that
25 are tested.

1 Also, staff is proposing to have the
2 color correlated temperature within four steps of
3 the black-body curve, that is to ensure that the
4 light is fairly white and it's consistent between
5 one lamp and another lamp, and so you don't get a
6 lot of variation in color temperature when you
7 buy two lamps and put them in the same fixture.
8 Staff is also proposing that
9 omnidirectional lamps meet the Energy Star Light
10 Distribution Requirements. Many LEDs on the
11 market, and particularly earlier in the market,
12 had this snow cone shape where not a lot of light
13 was going -- I don't know how to explain it, but
14 if this was the lamp facing down, not a lot of
15 the lamp would go upwards, and so with the
16 classic incandescent lamp the light does in, you
17 know, a sphere around the whole bulb, and it
18 doesn't require exactly that same distribution,
19 but it does set a minimum amount of light that
20 goes in all directions, so that way people who
21 are expecting that omnidirectionality will get
22 that omnidirectionality.
23 So earlier I was mentioning that the
24 standard has hardstops and tradeoffs, so you can
25 see here visually what that looks like. Efficacy

1 is along the X axis here and CRI is along the Y
2 axis. Tier 1 is the green color and Tier 2 is
3 the blue color. These spots where the line is
4 vertical or horizontal are graphical
5 representations of the hard stop. And then you
6 can see if you have a really high CRI, you can
7 have a much lower lumens per watt than if you had
8 a very low CRI. And it allows manufacturers to
9 target to different levels if they so choose.
10 One of the problems with mandating just a
11 hard minimum would be to favor one end versus the
12 other. This proposal instead kind of tries to
13 move the whole market forward, whether you try to
14 make a high CRI lamp with the lower efficacy, or
15 whichever you want to target you can figure out
16 what CRI level you want to design to and you just
17 have to meet the appropriate efficacy at that
18 point.
19 So there's also, many of you are probably
20 aware of the California Quality LED
21 Specification, and so I just wanted to take a
22 moment to compare what mandatory standard, like
23 the one that the staff is proposing, is compared
24 to the LED specification. So the staff proposed
25 regulation would set a baseline or the floor of

1 all products that would be available on the
2 California market for LEDs, whereas the
3 California Quality LED specification encourages
4 the higher end of the market and tries through
5 incentives and prestige encourage the real high
6 end of the market.
7 The staff proposal would be mandatory,
8 manufacturers would need to comply with it in
9 order to be sold. The quality spec is voluntary,
10 it's not a barrier to market entry. The staff
11 proposed regulation focuses on efficacy or
12 efficiency in energy savings, and has very
13 minimal amounts of quality in it, whereas the LED
14 quality, the California Quality LED Specification
15 almost exclusively focuses on quality and has
16 very little, if any, meaningful efficiency in the
17 spec. Again, the regulation is necessary for
18 sales and the LED specification is tied to
19 rebates, so there's a lot of advantages to doing
20 it, but it's not necessary to sell on the market
21 in California.
22 Also in the staff proposal, the staff
23 proposed mandatory regulations support the
24 California Quality LED Specification, supports it
25 by setting higher efficacy standards, first of

1 all, which means that those quality LEDs will
2 save more energy, but it also supports it by
3 requiring certification and verification of the
4 claims of meeting the quality LED specification,
5 and I'll get into that in one minute.
6 One thing that the staff proposal doesn't
7 include is any kind of requirements on LED
8 durability. We received proposals to include
9 minimum performance standards for a number of
10 different durability metrics, including premature
11 failure rate, elevated temperature performance,
12 lumen maintenance and rapid cycling, and in
13 addition we received proposals to require minimum
14 warranty.
15 Staff is interested in hearing more and
16 getting more information about what the best
17 metric would be for lamp durability, and when I
18 say "best," I mean what is going to have the
19 biggest impact on consumer acceptance of LEDs,
20 which is really the goal for a minimum standard,
21 and what's going to have the least test burden,
22 and what are the incremental costs and relative
23 savings to making a minimum standard for any one
24 of these individual metrics, or a combination of
25 them.

1 Staff is proposing several labeling and
2 claim regulations, the first is dimmable and this
3 has already come up a few times today. To claim
4 dimmable, an LED has to be dimmable down to 10
5 percent of its full light output, so it's not all
6 the way down to five percent, which maybe that
7 demo had, but it has to be able to go fairly low.
8 It must past a flicker test and currently the
9 staff hasn't -- we haven't proposed a flicker
10 test because there's an existing flicker test in
11 Energy Star, but there's also another flicker
12 test under development, and so we at this time
13 aren't proposing one over the other, and are
14 looking for feedback and written comment about
15 which one we should adopt.
16 Now, if you meet these things,
17 particularly with an old phase-cut dimmer, then
18 you can claim dimmable, and that's it, the box
19 can say "dimmable." If you can dim and meet
20 these two requirements, you don't flicker and you
21 can go down to 10 percent, but you have to use a
22 specific kind of dimmer, then that information
23 has to be included along with the claim and also
24 instructions have to be included that tell the
25 consumer what the product is compatible with in

1 terms of dimmers.

2 Also, staff proposes some regulation

3 around incandescent comparisons on packaging and

4 marketing claims. To compare an LED with an

5 incandescent lamp, that LED has to have a color

6 correlated temperature of 3,000 K or less, which

7 is warm color, which is similar to the color of

8 an incandescent lamp, it must be dimmable, and in

9 the same sense as what I just discussed is

10 dimmable. It has to have a minimum lumen output

11 of 450 lumens, and that's for general service and

12 GU24s and kind of the reflector market, but for

13 intermediate and candelabra bases, it has to have

14 a minimum lumen of 200. And that's to avoid

15 lamps that are just really dim and claiming to be

16 something that they're not, they're just not a

17 replacement for an incandescent bulb because

18 incandescents in those sockets don't -- they

19 produce more light.

20 Also, claims of incandescent wattage

21 equivalencies must match the lumen outputs

22 contained in the current General Service

23 Incandescent Lamp Regulations. Basically in the

24 Regulations that exist for incandescent lamps,

25 100 watt lamp, a 75 watt lamp, a 60 watt lamp,

1 and a 40 watt lamp already have defined minimum
2 lumens and that's to sell as an incandescent, so
3 the proposal transfers those lumen minimums over
4 to the LED market, as well, and makes certain
5 that comparisons are indeed a comparable number
6 of lumens.
7 There's a few other labeling and claim
8 requirements. In order to claim that a lamp
9 meets the California Quality LED Specification,
10 it must certify to the Energy Commission that it
11 does so. And that gives the specification some
12 validation and it also creates a public list,
13 which was mentioned earlier, and a place for
14 people to find all the models of products that
15 would comply.
16 Also, a lamp that is certified with the
17 light output of less than 150 lumens for
18 candelabra bases, or less than 200 lumens for
19 other bases, must be marked as for decorative
20 purposes only. This is actually the only
21 labeling that would be mandatory if a
22 manufacturer were to produce a lamp that was very
23 dim, a "for decorative purposes only" label would
24 mandatorily need to appear on packaging and
25 labeling. And that's a pretty dim lamp. We have

1 a similar limit for the portable luminaire
2 standards. We have a regulation for LEDs that go
3 into table and floor lamps. We set a 200 lumen
4 minimum for that, so this number is consistent
5 with that one.
6 And so I thought I would bring a couple
7 demonstrations of what's on packaging and what
8 claims are being made today. You can see
9 dimmable is pretty common, so if these two lamps,
10 and this one, too, actually, all three of these
11 at the top claim to be dimmable. Now, in order
12 to keep that on the box just like that, you would
13 have to demonstrate that the lamp doesn't flicker
14 and can go down 10 percent on a standard phase-
15 cut dimmer. If it works with other dimmers, some
16 additional amount of information would need to
17 appear along with a claim of dimmability. You
18 can see, here is a comparison to an incandescent,
19 this would be subject to the lumen bin standard,
20 the 60 watt claim here and the 60 watt claim
21 here. So you can see it's pretty standard, the
22 claim and 40 watt replacement here, so it's
23 pretty common things to claim and to make sure
24 that, you know, the market isn't getting undercut
25 with really dim lamps and lamps that don't work

1 on dimmers, the staff is proposing these claim in
2 labeling requirements.
3 And it's really important, I just want to
4 emphasize why it's really important for lamps to
5 work with older dimmers, and it's because the
6 vast majority of California's building stock is
7 pretty '70s and the lighting controls in them are
8 probably almost as old as they are, and so I
9 think the majority of the market and the majority
10 of the dimmers out there are going to be old
11 ones, and so it's really important to make sure
12 that backwards compatibility is more important in
13 the next few years than forward compatibility
14 because I just showed a huge transformation in
15 the lighting market and DOE is predicting this
16 move to almost 100 percent LEDs and moving to
17 like 50 percent from one or two percent today.
18 And so that means all these lamps are going to go
19 into a bunch of really old dimmers, and so it's
20 very important to deal with it and important to
21 deal with it today and not tomorrow.
22 So are these proposed standards
23 technically feasible? Yes, they are. There are
24 lamps today on the market that can meet the
25 levels that I've described. A lot of the

1 improvements to LED efficiency come by improving
2 the LED package and the driver sometimes, I think
3 it's Philips and some other manufacturers
4 actually put the phosphors on the outside of this
5 picture here, so improving the phosphors there
6 would be important, then, too.
7 Eighty-four CRI lamps, which is the
8 mandatory minimum for color rendering index are
9 very common and widely available in the market
10 today. And so are 90 CRI lamps which are being
11 rebated right now, and we had a presentation
12 earlier about how many of those are.
13 This is a chart of Lighting Facts and
14 Energy Star Data. This is, again, medium screw
15 base only, and I'm focusing on medium screw base
16 because, I mentioned earlier, there were 600
17 million sockets, about two-thirds of those are
18 medium screw base lamps, and so these are medium
19 screw base. I think they're also omni-
20 directional. I think these are just A-Lamps.
21 And I put these lines conveniently for you to see
22 kind of this is where the 40 watt lamp is, the
23 second line is where the 60 watt lamp would be
24 equivalence, 75 and 100. On the Y axis is watts,
25 on the X axis is lumens, and these colored lines

1 are representing different various levels of
2 lumens per watt. And this red line here is about
3 the efficacy of a standard traditional
4 incandescent lamp. The second line is the 45
5 lumen per watt level which is comparable to the
6 EISA backstop. The purple line is 65 lumens per
7 watt, and the green line is 80 lumens per watt.
8 So you can see, you know, a lot of things meet 65
9 and a good amount meet better than 80 lumens per
10 watt. So there are a lot of efficient lamps on
11 the market today and, further, they're expected
12 to become much more efficient.
13 So this is, I think, real data as well as
14 some projection -- or, actually, this is all just
15 real data, but you can see over time, now the
16 real important one to look at here is the yellow
17 line, which is the efficacy. And this is
18 basically Caliper data starting from 2009 and
19 running up to Q3 of 2013. So you can see back in
20 2009, the data they had, LEDs were sitting around
21 40 lumens per watt, but it's on a pretty solid
22 upwards trend and over here in the third quarter
23 2013 it's heading towards 70. So it's not quite
24 there yet, you know, it's something like 65
25 lumens per watt, and this is the average. So as

1 you can see in the last graph, a lot of things
2 are 65 lumens per watt; not only are they there,
3 but they're on quite a nice upward trend on
4 efficacy. That is expected to continue, which
5 makes this all very feasible because the
6 technology just continues to improve and 80
7 lumens per watt, 65 lumens per watt, it's all
8 technically feasible.
9 But what about cost, right? So here is
10 also old data and projections at the same time of
11 where cost is, was, and where it's going to go,
12 and the projections show that cost is going down,
13 not only has it already come down quite a lot, I
14 think the 2011-2013 figures here are based on
15 real numbers, but it's expected to come down
16 quite a bit more in the future. So costs are
17 going down, and you would expect incremental
18 costs for improved efficiency and improved CRI to
19 also go down as these other costs go down. And
20 this information comes from manufacturers
21 themselves, this is from the Caliper and DOE
22 meeting with manufacturers and coming up with
23 what costs a lot for you to make -- why are LEDs
24 so expensive, what are you doing about it, and
25 they created a research and development roadmap,

1 and this is what they came up with which shows a
2 lot of reduced costs.
3 Staff and I think the IOUs, as well,
4 looked at trends in the marketplace: are people
5 paying a lot right now for additional lumens per
6 watt? Are they paying a lot for CRI? There's
7 not really a strong trend in the market between
8 efficacy and cost. There's also a lot of benefit
9 and tradeoffs from improving efficacy of an LED
10 light. When you use more efficient LED package,
11 you can use smaller, less expensive, less
12 powerful drivers, and you can also reduce the
13 cost of your thermal dissipation. So even when
14 LED packages increase cost, some of that is
15 recovered from other areas in cost in the lamp.
16 So in the end, staff compared the
17 incremental costs from the IOU Case Report, which
18 was basically the incremental costs of going from
19 standard CRI lamps to 90 CRI lamps, which was the
20 big improvement in their proposal, and it's also
21 a pathway to compliance in the staff's proposal.
22 If you had a 65 lumen per watt lamp with low CRI
23 and you up the CRI, that formula would give you
24 credit for that, and it is a pathway to
25 compliance.

1 Using the incremental costs from the IOU
2 Case Report, and they were different for each
3 type of lamp, you can see -- and these are LED to
4 LED savings, these aren't LED to Incandescent, or
5 CFL to LED, or any of these things, this is LED
6 to LED -- that the cost to benefit ratio is
7 pretty good, the lowest is 4.6. And even in a
8 residential setting, I assumed a use of 2.5 hours
9 per day here, and a lifetime of 25,000 hours, you
10 get payback in less than five years in the worst
11 case. And I think in this case it was less than
12 3, and in this case it was less than 4. So it's
13 pretty cost-effective, very cost-effective, to
14 comply with this standard.
15 The statewide savings are pretty large,
16 2,194 gigawatt hours per year are estimated to
17 come from these proposed regulations and, again,
18 that's only taking credit for LED to LED, and not
19 taking any credit for the market transformation
20 from CFL and Incandescent. That 2,194 gigawatt
21 hours per year translates to about $351 million
22 per year, and that's using a rate of $.16 per
23 kilowatt hour. And that electricity would also
24 reduce greenhouse gas emissions by the State of
25 California by .678 million metric tons per year,

1 which it seems small with that decimal point, but
2 that's a pretty big amount -- a million metric
3 tons is a big unit, so it's quite a bit of
4 greenhouse gas savings.
5 So we've got this proposal, it's
6 important to remember, you know, this is a pre-
7 rulemaking process, this is an opportunity to
8 take our ideas and our analysis and present it to
9 the stakeholders and we really -- the value of
10 this process is getting feedback from you guys,
11 so the next step is to hear from you now, today,
12 and also get comments in writing by October 29th.
13 We'll take those comments to heart and we'll look
14 at them and if there are really good points made,
15 we'll alter our analysis and we'll revise our
16 staff report.
17 And I want to emphasize, Harinder and I
18 are both available to discuss any questions you
19 have about the proposals or concerns at any time,
20 I mean, our phone numbers are on this
21 presentation, our emails, don't be shy about
22 reaching out because we want to hear from you.
23 Again, you can -- I forgot to change the
24 name here -- you can submit your information by
25 mail to the Dockets Office earlier in that

1 presentation was the email to dockets, as well,
2 and here is my contact again if you, well, at
3 least my email, to reach me. My correct
4 information, I believe, is in the first slide, so
5 maybe I'll end with where I started. So you can
6 reach me at any time at this number, not any
7 time, during work hours, during office hours, and
8 I don't think we have any presentations,
9 so I think I'm going to go ahead to comments in
10 the room. Tuan, would you be kind enough to pass
11 out some cards? And again, we're going to take
12 comments in the room first and then I'll take
13 comments online. Tuan, did you get some of
14 those? Do you have some? No? Okay, well, I
15 have one, so Alex, if you wouldn't mind
16 approaching the podium?
17 MR. BOESENBERG: I'm Alex Boesenberg, I'm
18 the Manager of Regulatory Affairs for the
19 National Electrical Manufacturers Association.
20 I'm here speaking on behalf of Manufacturers of
21 Lamps and Dimmers.
22 First of all, thank you for the
23 opportunity to speak and holding the workshop
24 today. I will specifically speak to flicker and
25 then also to backwards compatibility.

1 I won't repeat a lot of what I already
2 said about flicker at the last Title 24 workshop,
3 but our position remains the same, there is no
4 industry accepted well-tested standard for
5 testing flicker, whether it's a standard or just
6 an accepted test procedure is not what I'm
7 arguing, just that without a well-tested, well-
8 vetted, understood, and bought into test
9 procedure, it is premature of the Commission to
10 establish that as a requirement. I do not mean
11 to imply that NEMA or its members don't want
12 there to be a good way to test for and verify the
13 absence of flicker, or that the levels are
14 acceptable.
15 Today the process most manufacturers use
16 is employing a person or persons with what I've
17 referred to as a "golden eye," they can see the
18 flicker and they decide on behalf of their
19 company what an acceptable level is.
20 Everyone would like to see a verifiable
21 subjective test -- or, sorry, objective test --
22 right, objective, it is subjective today, I'll
23 get this right, bear with me. As we noted at the
24 last workshop that discussed flicker, the Energy
25 Star flicker test is a guess and the purpose of

1 putting in the standard is to gather data on it,
2 which stakeholders will analyze once there is
3 enough of it, there isn't enough today, and
4 decide if we're on the right track. To suggest
5 it as a draft mandatory requirement is distinctly
6 not what was intended by that. I acknowledge
7 there are other people working on it at the IOUs,
8 and we appreciate having been made aware of it,
9 and I think some of my members have asked
10 questions periodically, we're not being left out,
11 but here we are inside of the 45-day language
12 window, 15-day language coming up soon enough,
13 it's too late to have a test procedure for
14 flicker if on the day of adoption we don't have a
15 way to verify acceptability.
16 We think we're making strides and Energy
17 Star is working on it, we need to let the
18 scientific process sort itself out. But speaking
19 of test procedures and standards, I hope I can
20 briefly speak to backwards compatibility without
21 starting a fight, as a standards development
22 organization person, when I first came to NEMA I
23 did write standards for lighting with my members,
24 and I was the facilitator for our comments to the
25 Energy Star Program regarding dimming

1 compatibility, and we fully understand, respect,
2 and sympathize with the desire for backwards
3 compatibility and I recognize that many engineers
4 at lots of different companies are trying with
5 varying degrees of success to have backwards
6 compatibility in their products, either dimmer to
7 lamps or lamps to dimmers, it's usually lamps to
8 old dimmers. The challenge is not unlike
9 flicker, writing a repeatable test procedure or a
10 standard that says if you meet this under test
11 conditions you can reasonably expect to be
12 compatible. And the biggest challenge is there
13 are dozens, if not hundreds, of old dimmer
14 designs out there and finding one or even a dozen
15 to represent it was extremely difficult, not the
16 least difficulty which is you can't go buy one.
17 We're talking about stuff that is installed 10 or
18 20 years ago involved with -- we have no idea how
19 many are out there. NEMA didn't survey those
20 products back then, we really don't know how many
21 dimmers are out there. So the challenge of
22 writing a standard to that is very difficult.
23 And the resources devoted to writing standards
24 for obsolete products, our resource is not
25 employed in innovating the future, and that is

1 why we chose a forward looking stance. The IEC
2 has done the same thing -- forward looking.
3 Over in IEC, the way it was described to
4 me is they just decided that if people are going
5 to have to buy new technology lamps, then by God,
6 they should buy dimmers too. I don't advocate
7 the Government making that decision for American
8 consumers, but if people have that choice, then
9 they can do that.
10 If you can't have a good way to quantify
11 an objective test, it's left to individual
12 designs, and that is the capitalist market, and
13 NEMA supports competition among our members and
14 with all industry. Somebody might come with that
15 better mousetrap at a good cost point. And
16 that's what the market does. I don't always
17 experience satisfaction with everything I buy,
18 and that is what the market is in some ways
19 about.
20 So I would caution the Commission against
21 setting requirements which are difficult to
22 quantify or at this time are not quantified.
23 Thank you.
24 MR. RIDER: Thanks, Alex. And I just
25 want to be clear with you that we're not in the

1 45-day comment period, we're in a much earlier
2 part of the process, so we still probably have
3 quite a lot of, I don't know, I don't want to say
4 how long, I don't want to be held accountable for
5 how long, but it's much more than 45 days,
6 guaranteed. So I just want to make sure
7 everyone's -- okay, more than 45, you can hold me
8 to that.
9 And also, I just wanted to say that the
10 stuff on dimming, the proposal recognizes that --
11 I didn't propose a test procedure, I put a
12 placeholder because I think I agree with what you
13 were saying about test procedures, so that's
14 recognized in the current proposal and thank you
15 very much for your comment. We actually have
16 some cards, so if you could just hold on a
17 second. Noah, if you would -- I've got Mike and
18 Willem.
19 MR. CHEN: I really do appreciate the
20 comments on how to define flicker, it is very
21 very challenging, I deal with that every day.
22 What I'm asking for is not that, per se, maybe
23 eventually we'll get there, I'm asking for
24 something very very simple. When a light is
25 supposed to be off, there should be no light.

1 Can we put something like that in the spec?
2 MR. RIDER: You can recommend it.
3 MR. CHEN: Yeah, so that's what I'm
4 recommending, guys, I'm not trying here to get
5 through the nuance of what frequency, what
6 percentage amplitude, I'm just saying I just
7 showed you a case, this was a product on the
8 market I just bought last month, it's advertised
9 as dimmable, or advertising as working, let's
10 just say that, and there's just no way to screen
11 it out with the current rules. And all I'm
12 asking, even if I just leave today with one
13 thought to you guys, to say a product that should
14 be off should not have light shining; I would be
15 very very happy. So I'm not trying to get to
16 like some impossible place. So that's the first
17 thing.
18 My last comment is regarding backward
19 versus forward compatibility, if you think really
20 hard about this, because I've talked to a lot of
21 customers and a lot of folks who are interested
22 in this, it really is the same thing. Okay? The
23 reason I say that is we have a technology that
24 basically mimics incandescents, and back when
25 there were incandescents, nobody talked about

1 compatibility charts because it simply worked.
2 So if there is a technology that can mimic
3 exactly how incandescents used to work, then we
4 would be remiss not to adopt it because it really
5 is that simple, especially if it's cost-
6 effective, which it can be. All right? And the
7 reason I refer to future compatibility as still
8 being related is because, just because an end
9 consumers goes, they have a dimmer that works
10 well with their current LED bulb, that's
11 fantastic, it works right now, but unless you
12 have a technology that inherently ensures
13 compatibility, when that same user goes back and
14 buys two years from now an LED bulb that claims
15 to be dimmable, there's no guarantee that that
16 new light bulb will work with what was an old
17 dimmer, and that's all in the future. So the
18 technology is directly relevant and I'm asking
19 the Commission to keep that in mind. The
20 compatibility is compatibility, future, backward,
21 forward, it's the same, and we do have a
22 solution. Thank you.
23 MR. RIDER: Thank you. Yeah, Michael, I
24 guess you wanted to address the same?
25 MR. SIMINOVITCH: I just wanted to

1 follow-up on that last point because I think this
2 points to a much broader underlying issue here,
3 is that we really ought to be looking at the
4 incumbent technology and what are we trying to do
5 here, what are we trying to replace? We should
6 have something that matches the performance of an
7 incandescent, or exceeds, to turn on and off, it
8 should dim, it should have the same kind of color
9 experiences that we've all grown to love. And so
10 I think that you really point to we ought to have
11 a performance technology neutral specification
12 here that says this is a light source, reduces
13 color, dims, lasts a certain period of time, has
14 a certain efficacy. When we build Refrigerator
15 Standards, we don't keep less eggs, or we don't
16 keep less beer, or the temperature of the
17 refrigerator is any lower, okay? It just uses
18 less power. So same thing with our light
19 sources. Our light sources should match what we
20 have now or exceed and use less power.
21 So we ought to develop a performance
22 specification here and be very neutral about it.
23 Thank you.
24 MR. RIDER: Thank you. Willem.
25 MR. SILLERIS SMITT: Thank you. Willem

1 Silleris Smitt from Soraa. First of all, I want
2 to make a big compliment on the compliance
3 numbers that you propose. I think you have
4 succeeded in grabbing the CRI and efficiency
5 requirement into a single formula. We have made
6 on other occasions a case that there should be a
7 place for high CRI, and I call it mediocre CRI
8 products, and I think this formula has in it to
9 make it really happen. We haven't had time to
10 look in detail what the implications are, but I
11 think the overall thought behind that formula,
12 we're very excited about it.
13 Similar to Michael, you mentioned
14 technology neutral, when we fast forward to 2018-
15 2019, when I look at the market forecast for
16 wirelessly controllable lamps, I think some of
17 those dimming issues that we talked about today
18 will have a completely different perspective in
19 2019, and in our comments we will provide some
20 thoughts on how to incorporate future ways of
21 controlling lights and make sure that it's part
22 of the standard, as well.
23 MR. RIDER: Thank you. Noah.
24 MR. HOROWITZ: This is Noah with NRDC. I
25 made some of these comments. Overall I'm going

1 to limit them right now to just those that
2 addressed the General Service Lamp Proposal with
3 the LED performance. Many of these are more
4 questions that I'm hoping the CEC can answer
5 during the proceeding, you don't have to answer
6 them now.
7 I'll start with, again, I want to
8 reiterate NRDC's support for the proposed
9 tradeoff scheme and the levels shown seem to meet
10 the sweet spot of encouraging higher CRI without
11 requiring the highest, although there's
12 definitely a path if those want very high CRI,
13 the efficacy gets drawn down and I think
14 everybody can get what they need there.
15 Now, in terms of the specific points, we
16 noticed there was some discussion and interest on
17 R9 earlier as a way of addressing the red that
18 isn't covered and stays CRI 8 color panels -- is
19 that the NSA?
20 MR. RIDER: It's Jon McHugh. I got him,
21 or did I? Got it.
22 MR. HOROWITZ: We're wondering why there
23 isn't an R9 requirement and is there an openness
24 to consider adding that.
25 MR. RIDER: Yeah, so the 75 minimum for

1 each R1 through R8 was meant to address that
2 concern. R8 in particular has a lot of the
3 components of R9, although it's red and it's also
4 deep violet, so I guess you could do really
5 really well in violent and have maybe an R9
6 that's lower than 50, but it's going to guarantee
7 a certain amount of R9. I wanted to have that
8 minimum for this workshop, but I haven't finished
9 getting that calculation, but the idea is it
10 covers the same concern and there certainly is an
11 openness to discuss an R9. It would be kind of
12 an alternative to the 75 all around CRI approach.
13 MR. HOROWITZ: Okay, so it seems like
14 there's some openness to R9 and maybe other
15 stakeholders can weigh in, does the R8 satisfy
16 the R9 need, or is something else needed. In
17 terms of all the individual scores R1 to R8 all
18 needing to meet 75, we want to be careful that
19 that doesn't have some unintended consequences,
20 in particular, if a bulb is scoring CRI 82 or 84,
21 can you meet 82 or 84 today and still meet all
22 the R1 and R8s at 75, or should it be R1 to R8
23 should be 71 or something. I want to make sure
24 that 82 and 84 CRI bulbs could qualify that have
25 a decent distribution.

1 The next one is an observation and a
2 suggestion. We noted that you have a 25,000 hour
3 minimum rated lifetime for the Small Diameter
4 Lamps, but there's nothing on lifetime or
5 durability. And I guess the first question, and
6 this is more from Harinder's part, how would the
7 25,000 hours be implemented? Is that a lumen
8 maintenance at 3,000 hours and you project what
9 25,000 hours would be? Or is one expected to
10 test all the way to 25,000 hours? How would that
11 work?
12 MR. RIDER: So it's the LM 80, I remember
13 the LM 80 test method, but I'm not super familiar
14 with that, so does anyone in this room maybe know
15 how the LM 80 test --
16 MR. HOROWITZ: Yeah, so one test to a
17 certain point, 3,000 hours, and then you project
18 from there. We're not opposed to that solution,
19 but that wasn't in your proposal and we'd like to
20 see additional clarification on that.
21 MR. RIDER: So you mean you would like to
22 see the 25,000 -- just to make sure I follow --
23 the 25,000 hour proposal with the LM 80, but also
24 in the General Service Lamp, like the second
25 part, these lamps that we're talking about here.

1 You would like to see that extended beyond just
2 MRs and also into the rest of the LEDs.
3 MR. HOROWITZ: I'll break these into bite
4 size. I do think, and I applaud the Commission
5 for having a lifetime durability in the SSDL
6 spec, I think more specificity is needed on how
7 you get to that level and measure it, so writing
8 the proposed regulatory language. Is 25,000 the
9 right number, or 20, I don't know what the answer
10 is, how low is high enough, because that is
11 particularly challenging to get that lifetime and
12 heat management in that small space.
13 Next, separately there is nothing in the
14 LED Lamp proposal that addresses durability or
15 life, and I appreciate your openness to having
16 something there. We think something should be
17 there, and whether it's at 3,000 hours, do a
18 certain number of the lamps need to be surviving
19 and/or something on lumen maintenance that
20 projects to lifetime. I don't know what the
21 answer is, but I'm hoping other stakeholders
22 could weigh in on that.
23 Next in terms of equivalencies, we agree
24 if you're going to make a claim that 60 watts
25 equal 11 watts, there should be a certain minimum

1 amount of lumens tied to that 60 watt claim, and
2 it seems like the way things are structured, if
3 you use the word "incandescent" in there and meet
4 some of the other things, then your claim is
5 bound by that table. What if someone simply says
6 60 watt equal 11 watts, and it's only giving off
7 400 lumens, but never used the word
8 "incandescent?" That's a potential loophole, so
9 if you could tighten that language, that would be
10 very much appreciated.
11 And in terms of this dimmer conversation,
12 I'm a little disappointed as two years ago this
13 conversation started at Energy Star and industry
14 is saying there isn't a test method, we need to
15 develop one, and until you develop one you can't
16 do anything about it. And I'm hoping this
17 process can fast track that where the CEC can
18 come up with something building off the great
19 comment we heard earlier, and maybe you could
20 facilitate a group in the next 90 days. We're
21 going to do something with or without you,
22 preferably with you, and we can move this discuss
23 further along. And to the extent there are
24 technologies that, if you take a bulb and it will
25 dim with most but not all dimmers, I think that's

1 a huge step forward. Nothing we do is going to
2 result in the bulb being compatible with 100
3 percent of all dimmers, but if we could pick a
4 handful of representative dimmers that 80 percent
5 or so of the time, the person is going to have a
6 good experience and not return the bulb or feel
7 compelled to rip out of the dimmer, I think
8 that's what we should be doing. If we're silent
9 on dimming as some might be suggesting, then
10 we're going to have the 20/80 rule instead of
11 80/20, meaning only 20 percent of the time are
12 you going to be happy. So I think there is a way
13 to move this discussion forward without trying to
14 say this bulb must be dimmable across the board.
15 And in terms of the future proofing, the
16 term we've been hearing, the proposal I think you
17 have there is you must be compatible with an LED
18 dimmer, and then you go look at the list. As the
19 earlier speaker pointed out, nobody knows what
20 dimmer they have, very few people are going to
21 take the dimmer out of the wall and look at the
22 back and then go to the computer and see, "Is
23 this a good list? And when you're at the store,
24 you don't even have that ability in most cases.
25 So there is SSL7A which is meant to be forward

1 looking. Could we instead tie compliance with
2 SSL7A for a forward looking process, that might
3 be one way to handle half of this discussion.
4 MR. RIDER: Makes sense. Good
5 suggestions. Thank you very much, Noah.
6 MR. HOROWITZ: Thank you. I've got Mike
7 McGaraghan.
8 MR. MCGARAGHAN: Hi there, Mike
9 McGaraghan from Energy Solutions on behalf of the
10 California IOUs. Thank you to the Commission for
11 hosting today's workshop and for pushing forward
12 on this proposal to improve the performance of
13 LED lamps. We think this is an extremely
14 important endeavor and we are looking forward to
15 supporting you throughout the process. I think I
16 will probably end up echoing many of Noah's
17 comments, but I will proceed anyways and try to
18 be quick, and we'll follow it with more comments
19 in our written comments.
20 Our general reaction is that we like that
21 the Commission is pushing forward on this topic,
22 but feel there are a number of opportunities that
23 we really could strengthen this proposal. And
24 right now, as you mentioned, it's really
25 barebones looking at the minimum performance that

1 should be expected of a lamp. And I think the
2 point that I've heard thrown around is we don't
3 need the best lamp in every socket, we don't need
4 the highest performing lamp in a closet, or in a
5 garage. Our take on that is that if a consumer
6 wants a lamp that doesn't dim, if they want a
7 really low cost lamp, if they want a lamp that
8 distorts color, the CFL is right there on the
9 shelf. The CFL is great for many applications,
10 it's saved a ton of energy in the state and the
11 country, and we're not touching that. What we're
12 doing here is working on LED Lamps and trying to
13 make them something different something better.
14 If we don't come out of this making LEDs
15 significantly better than CFLs are, what's the
16 point? We've already tried once with CFLs to see
17 what they would do and the market stalled.
18 So that's really where we're coming from
19 and what our proposal is about, the proposal that
20 was submitted in 2013 was trying to make sure
21 LEDs do something better and something more. And
22 of course you get into the details of exactly
23 what should be done and that's why we have these
24 meetings and there are a lot of these items to go
25 through.

1 So first and foremost, we think color is
2 important, we would support 90 CRI across the
3 board. People have mentioned that there aren't
4 studies proving that consumers need higher CRI,
5 we would argue the opposite, there aren't studies
6 showing that 80 CRI is good enough. The one time
7 we tried that, that market stalled.
8 People have argued that there's the
9 wattage penalty to go to higher CRI, that penalty
10 is shrinking very quickly as efficacy increases,
11 what is a 3 watt penalty today is 2 watts in a
12 couple years, and 1 watt a year after that. And
13 when we're talking about replacing a 43 watt
14 halogen, as Michael mentioned this morning, 1
15 watt doesn't even register.
16 The price penalty people mentioned, too,
17 and actually, Ken, I do have one slide, one slide
18 that I would like to pull up. We've been
19 collecting price information from online
20 retailers for the last year or so and have found
21 some very interesting results.
22 MR. RIDER: This is it.
23 MR. MCGARAGHAN: Yeah, actually go to the
24 next slide, yeah. So that's just about ten
25 months of data, about nine online retailers that

1 we started once a week and then we moved every
2 two weeks starting in December 2013. And that
3 shows average A-Lamp prices at 90 CRI and up, the
4 green line, and average A-Lamp prices for 80-85
5 CRI on a per kilo lumen basis. And we found
6 online prices are generally a lot higher than in-
7 store prices, so these could all be discounted if
8 we were to go brick and mortar, but this is the
9 online averages. And what was a 25 percent
10 incremental cost last November is now looking
11 like a five percent incremental cost. So the
12 projections are looking good for this. The cost
13 differential is already shrinking. It's really
14 encouraging. And the rebate programs that David
15 Thayer talked about earlier today are seeing
16 great numbers in California with the high CRI
17 products.
18 We kind of talked a lot about CRI this
19 morning, so I'll leave it at that.
20 I think the other things I do want to
21 mention are other elements of the proposal. We
22 definitely support the R1 through R8 minimum 75,
23 we like your focus on incandescent equivalencies,
24 I think that's a great way to improve product
25 performance and make sure that consumers are

1 satisfied with the products. So specifically
2 limiting color temperatures to 3000 and less, and
3 a couple of other things that you had
4 incorporated into incandescent equivalencies.
5 Dimming, we support mandatory dimming.
6 Again, we don't need LED lamps to be non-
7 dimmable, they don't serve anybody. Eighty
8 percent of them are already marking themselves as
9 dimmable and do not have a price increment.
10 Another proposal that we wanted to
11 suggest, if the Commission didn't go to all
12 dimmable lamps would be to consider requiring a
13 lamp to be labeled non-dimmable if it didn't meet
14 a particular test procedure.
15 And on the dimming test procedure, we are
16 in full agreement with Noah that we think that's
17 a priority to fast track. Energy Star is a great
18 start and if there are tweaks that need to be
19 made to it, let's make them.
20 Incandescent equivalency lumen outputs we
21 also think are important to include in there, we
22 noticed that you included what looks like just a
23 table for A-Lamps. We think you probably want
24 another table for directional lamps of different
25 diameters, as well. And lifetime and durability,

1 we agree as well, very important issue. The CLTC
2 is doing a batch of life testing right now in
3 conjunction with PG&E, and we will be working on
4 getting the results of that testing out to the
5 Commission as soon as we can, but preliminarily
6 we can say that not all lamps are thriving for as
7 long as they claim. And just at a personal
8 level, I filled up my house with LEDs a couple
9 years ago and already now I have started to see
10 certain lamps start to flicker and strobe on and
11 off. I think I'm up to four products installed
12 in the last two years in my house that are
13 already, if I were a consumer I'd be done with
14 LEDs.
15 And a few other things we believe should
16 be added, not just as a part of the dimming spec
17 or as part of the incandescent equivalency, but
18 as mandatory requirements, start time, noise
19 requirements, flicker requirements, power factor,
20 color consistency, all of these things are things
21 that can be done, the majority of the products
22 out there are doing them, but they're not all.
23 And they should all be providing this minimum
24 level of performance. And that concludes the
25 comments that I wanted to start with today.

1 Thank you very much.

2 MR. RIDER: Thank you, Mike. I've got a

3 written comment here online from Jim Gaines

4 saying, "Requiring all eight Rs," and I think

5 he's referring to the Rs tested on CRI are 1

6 through 8, those are the eight colors again,

7 "Requiring all eight Rs to meet 75 is essentially

8 the same as requiring a CRI of 90. One cannot

9 meet that requirement without having an overall

10 CRI close to 90. Arguing that CRI is allowed to

11 be as low as 82 or 84 is not correct,

12 practically."

13 And just to let you know, this has come

14 up I think already a few times. The CLTC did a

15 pretty major project a while ago to measure the

16 CRI of a bunch of different LED lamps on the

17 market today and that data includes, and it's

18 published on their website, the individual color

19 characteristics R1 through R8. And you know, I

20 did a preliminary run through that to kind of see

21 what this would look like for CRI and I believe I

22 found some products that were under 90, but I

23 don't have what the lowest one was, but just

24 because this has come up a few times, I think

25 that will be definitely something that I'll be

1 looking into after this meeting, is what would
2 the minimum truly be practical with something
3 that's out in the market, not a theoretical
4 number. The theoretical minimum was 75.
5 We have a comment on the phone, Terry
6 McGowan. I'm going to go ahead and unmute you,
7 Terry.
8 MR. MCGOWAN: Am I coming through?
9 MR. RIDER: Yeah, I can hear you.
10 MR. MCGOWAN: Okay, yeah, this is Terry
11 McGowan, I'm with the American Lighting
12 Association, Director of Engineering. On that
13 same point with respect to CRI and the Tier
14 proposals, it is part of the CRI standard that
15 was done back in the 1960's, as I recall, that to
16 be significant to the eye, you have to have a
17 differential --
18 MR. RIDER: Hey, Terry, can you keep your
19 mic close to your face, I just lost what you were
20 saying. Can you go ahead and repeat that?
21 MR. MCGOWAN: If you go back to the Tier
22 1 and Tier 2 proposal --
23 MR. RIDER: Can you somehow get --
24 MR. MCGOWAN: -- according to the CIE of
25 three to five points on the CRI measurement in

order for it to be significant to the eye. And so the 82 and 84 are not significant, it would have no visual difference as far as the eye is concerned, and that reflects back to the Standard, as I said. So I don't believe those two numbers are appropriate, especially if you compare them to a fairly substantial different lumen per watt.

MR. RIDER: Okay. Thanks, Terry. Is there anyone else in the room that would like to -- Noah, go ahead.

MR. HOROWITZ: Noah Horowitz, NRDC, I'd like to go back to Jim Gaines from Philips who made the comment that if all points between R1 and R8 need to hit 75, it's more like a CRI of 90. So I'm curious, Jim, if you have any data, if one were to try to meet 82 or 84, what would be the minimum acceptable R1 to R8 that almost passes? Is that 74? Is that 50? I don't think it's 50, but do you have any further data on that or be able to submit that to the docket to help inform this?

MR. COOK: Yeah, we're working on that now.

MR. RIDER: All right, Jim. We got an

1 answer from Keith in the room, so you don't need
2 to worry about responding. And he affirmed that
3 they will work on that. Mike, go ahead.
4 MR. MCGARAGHAN: Mike McGaraghan again.
5 I just wanted to add that we've poked around at a
6 few of these products and have identified that
7 it's possible to be below 90 and have a CRI above
8 -- I'm sorry, an R8 above 75. I think it was an
9 85 CRI product that I most recently saw.
10 MR. RIDER: Okay; yes. I definitely
11 confirm that it's below 90. I haven't figured
12 out the exact minimum yet, so thank you for that.
13 Jon McHugh wants to speak on the phone. I'm
14 going to go ahead and unmute you, Jon. Jon, go
15 ahead.
16 MR. MCHUGH: Can you hear me?
17 MR. RIDER: Yes, I can.
18 MR. MCHUGH: Oh, great. I thought I'd
19 bring this back to a couple things that are going
20 on in parallel, and I think we've probably heard
21 from a number of people today that, you know, the
22 market looks for certainty and we don't want to
23 necessarily be chasing, you know, a multiplicity
24 of different criteria. And I've been thinking
25 that some of the things you have in here about

1 the incandescent equivalent lamp is something
2 that probably is pretty appropriate for three
3 different metrics that California is looking at.
4 So one is the incandescent equivalent lamp, one
5 is the voluntary specification used by the
6 utility programs, and the other one is the
7 proposed JA Appendix for Title 24. All of these
8 three are trying to develop a specification for
9 LEDs that are essentially equivalent to
10 incandescents, but have longer life and higher
11 efficacy. And to the extent that these three
12 proposals could be merged into one specification
13 for manufacturers, I think that's desirable.
14 Because what is it really saying? You know, if
15 someone is claiming that their lamp is equivalent
16 to a 60 watt incandescent, it's really implying
17 that, well, my color temperature is not at 5,000
18 Calvin because my 60 watt incandescent, you know,
19 technically cannot operate at that light output
20 or at that color temperature. And if I've got an
21 incandescent, yes, it is dimmable, yes, it is
22 very close to the black body, so it has a very
23 high CRI. So many of these things, I think,
24 could collapse together to essentially a single
25 specification. Oh, and by the way, you know, in

1 terms of flicker, there's a recent article out in
2 the IEEE Journal that indicates that, you know,
3 flicker for incandescents are around 8 percent
4 amplitude modulation. So we're looking at
5 something like 20 percent for the California
6 standard. So all of these things point towards
7 something that is roughly equivalent to an
8 incandescent. And why that is important for the
9 state is that 2018 is going to be on us fairly
10 quickly, and we're concerned that all the energy
11 savings that's associated with the 45 lumens per
12 watt might have this huge backlash associated
13 with consumers being unable to find a high
14 quality, low cost lamp that is truly equivalent
15 to an incandescent, or equivalent and potentially
16 better in a lot of ways, you know, lasts longer
17 and of course costs them a lot less money over
18 the long term.
19 And then getting back to Mr. Boesenberg's
20 comments, you know, unfortunate I had forgotten
21 about the set of round robin tests that we
22 conducted because he had mentioned the flicker
23 test he had found was not repeatable, and my
24 understanding is he hasn't submitted any
25 information to the docket, I haven't seen any

1 information so far. But what's currently
2 published for the residential lighting case study
3 for Title 24 is a description of the round robin
4 testing done between the California Lighting
5 Technology Center and the Pacific Northwest Labs,
6 where they looked at four lamps with different
7 levels of flicker, and we looked at ones from
8 very low flicker to very high flicker, and what
9 we found was that the largest mentioned
10 difference between labs was 2 percent, which kind
11 of implies that, yeah, maybe this test is
12 actually pretty repeatable. And so I would like
13 to encourage Mr. Boesenberg to communicate with
14 the IOU Case Team and with the Energy Commission
15 and see if we can do a round robin using the test
16 method that's listed, and see if indeed his
17 comments about repeatability actually hold true
18 with the improved test method and with his
19 members. Thank you very much.
20 MR. RIDER: Thanks, Jon. And I would
21 just like to repeat a sense of urgency that I
22 tried to convey in my presentation, which is
23 there really isn't a lot of time for another
24 process to fit in here. We're in this regulatory
25 process, late 2014 going into 2015, this big

1 surge of LEDs and market transformation is coming
2 down the pike at 2018, there's not a lot of gap
3 between now and then, especially not in the
4 regulatory and standards setting. You know, not
5 only do you have to set the spec, but you also
6 have to give manufacturers time to make product
7 that meets the specifications. So, I mean, the
8 timeline is pretty tight whether it's us or
9 someone else, I just want to remind folks that
10 there's not a whole lot of time between now and
11 that huge surge in LEDs in the market, which we
12 hope is very successful.
13 Any other comments in the room? Mike.
14 MR. MCGARAGHAN: Mike McGaraghan. One
15 thing I forgot to mention is, it came up this
16 morning, but I wanted to reiterate it in this
17 section of the presentation, too, was the scope
18 and you excluded bases GU5.3 and GU10, and the
19 California IOUs supported applying the quality
20 elements of this proposal to those base types, as
21 well. The timing would have to be sorted out
22 because of the timing of the SDDL proposal is
23 2018 and the timing of this proposal is 2017, but
24 we would support moving all these requirements to
25 cover those base types. Thanks.

MR. RIDER: Thank you. Any other comments? Questions? All right, well, I would like to thank everyone again for coming today and taking the time to discuss this proposal with us. We look forward to seeing detailed written comments to follow. Again, those are due on October 29th. The easiest way is through email, all that information is available in these slides. These slides, at least the Energy Commission, for sure, slides will be made available online for folks to review later. The transcript from this meeting will be made available before the end of the comment period. So you can keep your eyes peeled for that, and again, thank you everyone for your time and your participation, and we look forward to hearing from you in the future.

(Whereupon, at 3:40 p.m., the workshop was adjourned.)

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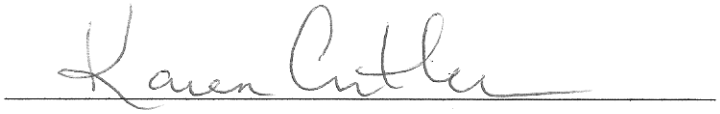

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