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COMMITTEE HEARING

BEFORE THE

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT

COMMISSION OF THE STATE OF CALIFORNIA

In the matter of,)
) Docket No. 15-BSTD-01
) 15-CALG-01
 Lead Commissioner Hearing for)
 45-Day Language)
 2016 Building Energy Efficiency)
 Standards Revisions for)
 Residential and Nonresidential)
Buildings)

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

MONDAY, MARCH 2, 2015

9:00 A.M.

Reported By:

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Peter Strait

Mark Alatorre

Bruce Wilcox

Danny Tam

Dee Ann Ross

Payam Bozorgchami

Simon Lee

Bill Pennington

Ron Yasney

Farakh Nasim

Public Present

Bob Raymer, CBIA

Alex Bosenberg, NEMA

Mike Hodgson, ConSol

Gary Klein, Gary Klein and Associates

Meg Waltner, NRDC

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1

P R O C E E D I N G S

1
2 MARCH 2, 2015

9:00 A.M.

3 MR. SHIRAKH: I think we're going to get
4 started. We have a full agenda today. Today and tomorrow
5 we'll be presenting the 45-day language for the 2016
6 Building Energy Efficiency Standards.

7 And this is the beginning of our formal
8 rulemaking phase of the standards.

9 Just a couple of housekeeping items. Please,
10 when you come in there's a sign-up sheet, either leave a
11 business card, and staple it, or just write in your
12 contact information.

13 Today's and tomorrow's hearings are going to be
14 transcribed, recorded by the court reporter here. So,
15 every time you want to make a comment, please come up to
16 the podium and introduce yourself and your affiliation.
17 And it would be helpful if you handed your business card
18 to the court reporter so he can have the correct
19 spelling of your name.

20 There's many items on the agenda today. Today's
21 is mostly about residential topics and tomorrow is
22 mostly nonresidential. And we're also going to be
23 presenting material that are in the reference
24 appendices, the ACM manuals and some of the other
25 related documents.

1 So with that, I'm going to turn it over to
2 Commissioners McAllister and Weisenmiller for some
3 opening remarks, and then we'll continue from there.

4 COMMISSIONER MC ALLISTER: All right, thank you,
5 Mazi. Thank you all for coming. Many familiar faces in
6 the crowd here.

7 And we have two very important days ahead of us.
8 My name is Andrew McAllister. I'm the Lead Commissioner
9 on Energy Efficiency, which includes the Building
10 Efficiency Standards.

11 And it's been quite a lot of effort to get to
12 the point where we are today and I want to thank staff,
13 Mazi and Erlyne, and the other staff working on the
14 2016 standards package.

15 I'm really looking forward to hearing what you
16 all have to say about it. You know, as all of you I'm
17 sure are aware, this is one important step in our
18 progression to really get to the goals that we have in
19 the State, and our built environment is fundamental to
20 getting to our long-term carbon goals. Really, these
21 days our organizing principle is largely carbon.

22 Energy efficiency is a key role, is a key
23 component of reaching those goals. And our Building
24 Efficiency Standards are a key component of that.

25 And then, sort of overlaying that on the

1 efficiency side is that in the residential, which we'll
2 be talking about today, we obviously have goals to get
3 to zero net energy.

4 This is the penultimate cycle before the 2019
5 cycle, which is when we need to get the proper
6 definition incorporated in the code for zero net energy.
7 So, this is an important step towards that end and we
8 have one more cycle.

9 So, I sort of anticipate that while energy
10 efficiency is the order of the day now, in the next
11 cycle we all should sort of keep in mind that we're
12 going to have to work through some of the issues on the
13 self-generation side in the 2019 cycle.

14 So, we really want to focus on getting as much
15 energy efficiency done this cycle, as we can, to really
16 lay that good, proper foundation for getting to where we
17 need to go for the 2019 cycle, which will come into
18 effect January 1st, 2020.

19 So, this is just backing up a little bit and
20 taking a big-picture look at what we're doing here
21 today. This is important.

22 So, I want to really encourage us to think both
23 in the near term, pragmatically, what's doable in the
24 near term, how we can shape code to be usable and
25 effective, but also keep that long term in mind.

1 So, I'm accompanied here by Chair Weisenmiller.
2 I really thank him for taking the time to be with us
3 today, to help us kick off. And I'll pass the microphone
4 to him for comments.

5 CHAIR WEISENMILLER: Thanks, Commissioner
6 McAllister, appreciate your leadership in this area.

7 As you indicated, obviously, it's very important
8 for the State to deal with climate issues. A key part of
9 our program to deal with climate issues is energy
10 efficiency, and building buildings right from the start
11 is a really important part of that. It's much easier to
12 do it right from the start as opposed to go back and try
13 to retrofit it, which we'll certainly talk about more in
14 this upcoming month.

15 But with that, again, I'm happy to be here to
16 help kick things off. Actually, the schedule will be
17 pulling me in and out. Although, Mac will be here when
18 I'm not, will actually be here all the time. So, thanks
19 again.

20 MR. SHIRAKH: Thank you, Mr. Chairman,
21 Commissioner McAllister.

22 A couple of other notes. The commenting, written
23 comments for this, we expect them by March 17th. So,
24 please make sure you give us your comments on any of the
25 topics today and tomorrow by March 17, so we'll have

1 enough time to incorporate that into the 15-day
2 language.

3 In case there's an emergency today, we're going
4 to basically exit the main door and go follow the
5 leader, and gather in the park across the street. I
6 don't expect that to happen.

7 Restrooms are in that corner and we do have a
8 snack bar upstairs. So, you know, they have coffee and
9 sandwiches, and so forth, so help yourselves.

10 So with that, I'm going to have a very brief
11 introduction. So, again, I'm Mazi Shirakh. I'm the
12 Project Manager for the 2016 Standards. And in this
13 presentation where I'm going to briefly be talking about
14 the authority for the standards and what drives us to do
15 this every three or four years.

16 I'll be presenting the 2016 Standards update
17 schedule. The process for updating the standards, some
18 of the more important or more significant topics for
19 both residential and nonresidential measures that we're
20 considering for this round, and the vision.

21 And I'll be talking, briefly, about the
22 California Advanced Home Program, CAP, these are
23 incentive and outreach programs that are administered by
24 the utilities in the State.

25 The original authorization for the Commission to

1 adopt and update the standards was granted in the
2 Warren-Alquist Act that was signed by then Governor
3 Reagan, in 1974.

4 Other policy drivers for the building standards
5 include the Governor's Clean Energy Action Plan and the
6 zero net energy goal for residential by 2020, and by
7 2030 for nonresidential, the Air Resources Board Climate
8 Change Scoping Plan, and California Long-Term Energy
9 Efficiency Strategic Plan.

10 This graph is an interesting one because that
11 basically describes where we've been in the past in
12 relation to energy use intensity in the homes, and where
13 we are today and where we're headed, where we think we
14 should be in order to meet the zero net energy goals.

15 So, these are not actual data, these are
16 simulated data. Basically, we took our compliance
17 software and we programmed it with various features of
18 the building that existed at the time. And then as the
19 time went on, you know, the standards changes, we
20 changed the features.

21 So, back in the '70s, before the standards, you
22 know, we had very high energy use per square foot in the
23 homes. And, you know, most of you recall back then, we
24 had homes that had probably R-11 or R-19 in the attic,
25 probably R-11 or R-9 in the walls. You had single pane

1 aluminum windows, probably air conditioning, if you're
2 lucky you had SEER 6 or 7. And ducts that were largely
3 made of -- put together with duct tape. And we all know
4 how that went.

5 So, it's no surprise that, you know, you were
6 getting energy use intensities at above 100 kBtus per
7 square foot.

8 And then as the standards got better and more
9 stringent, this index went down. And today we are at
10 this level which is, I'm sorry, here, which is about 22.
11 So, we've gone from about 115 down to 22. Huge progress.
12 And we're talking about here only regulated loads, which
13 is heating, cooling and water heating. This does not
14 include the nonregulated load, which is the plug loads
15 and appliances.

16 So, what this indicates is that we've done a
17 great job of actually reducing the regulated loads in
18 the house over the past three decades or so.

19 So, with the 2016 Standards, you know, we're
20 going to end up some place in this region, in about the
21 15, 16 kBtus per square foot. And so, we think that's
22 the level where we can say, okay, the envelope is
23 efficient enough that, you know, we can start thinking
24 about adding some renewables, mainly solar, and then
25 move towards the ZNE. So, our ultimate goal here is

1 about 10 by the year 2020.

2 The 2016 Standards update schedule. The process
3 got started back in April of 2014 with a joint CBIA/CEC
4 forum that was held in SMUD. That was a meeting where,
5 basically, we invited the industry, both the builders
6 and the equipment manufacturers, the utilities, and many
7 other stakeholders to basically join us. You know, we
8 shared our goals and vision with them and we asked the
9 builders and the manufacturers to basically come up,
10 help us with coming up with new procedures, products and
11 devices to help us meet the zero net energy.

12 And I'll talk about some of those measures a
13 little bit later on.

14 And then, in May of 2014, we started what we
15 called the IOUs, these are the utilities' CASE holder
16 meetings throughout the State, where the IOUs presented
17 these topics to the stakeholders, which later on became
18 the basis for the staff workshops, which we presented
19 them in June through August of last year, in various
20 public workshops here, in this room.

21 In November of last year we presented the draft
22 standards, which became the basis for the 45-day
23 language that's going to be presented today.

24 In April, we'll probably -- if all goes well,
25 we're going to be releasing the 15-day language. And

1 adoption is set for in a business meeting in May 2015.
2 And the effective date of the standards will be January
3 1, 2017.

4 This was the schedule for the CASE meetings, the
5 stakeholder meetings throughout the State and all the
6 different topics that were presented at those meetings
7 by the IOUs.

8 The standard update includes two phases, the
9 pre-rulemaking and the rulemaking phase. The pre-
10 rulemaking, as I just described, you know, included the
11 stakeholder meetings and the staff workshops that were
12 held last spring and summer here.

13 And today is actually the first, the beginning
14 of the formal rulemaking process for the release of the
15 presentation of the 45-day language.

16 And many of you were involved in these CASE
17 holder meetings. I'm not going to go through it. I just
18 want to acknowledge all of the efforts by our IOUs. Our
19 partners included PG&E, and Southern California Edison,
20 Southern California -- San Diego Gas & Electric,
21 Southern California Gas. And we also received assistance
22 from SMUD and LADWP.

23 And between all these utilities, I think we
24 covered about 98 percent of the ratepayers in the State.

25 So, we talked about rulemaking and pre-

1 rulemaking. So, I'm going to skip to this slide. So, we
2 started in earnest, in 2013, to move towards ZNE. And,
3 you know, some of the measures that are actually
4 proposed for adoption in 2016 were included as part of
5 2013 package, but some of them were dropped.

6 So, we reintroduced those packages, those
7 measures, which included high-performance attics and
8 walls, but with some additional changes.

9 So, rather than focusing on specific measures
10 with these 2016 standards, we decided we should instead
11 focus on the performance levels for walls and attics,
12 and let the builders and the industry decide what is the
13 best way of getting there. You know, there's many ways
14 of skinning the cat and doing high-performance attics
15 and walls is the same.

16 Why is it important to have high-performance
17 attics? If you think about how we build homes in
18 California, we put our ducts that contain 48 degrees,
19 relatively cold supply air, in the hottest part of the
20 house, which could be as high as 130, 140 degree
21 Fahrenheit in summertime. And the ducts leak and there
22 is conduction, there's all sorts of things going on. So,
23 there's a huge efficiency penalty for putting the ducts
24 in that hot environment.

25 So, there's different ways we can deal with

1 that. One would be to reduce the temperature in the
2 attic, of course. And again, there's different
3 strategies. You can put insulation at the roof deck
4 above it. You can have insulation below roof deck. You
5 can have high-reflectant tiles. Or, you can basically
6 move the entire duct system out of the attic.

7 And all of them have pluses and minuses, but
8 they all can actually achieve the same goal. So, again,
9 rather than us telling the industry which one to do, we
10 said this is the level of performance that you'd like
11 you to meet and, you know, help us how to do that. And
12 this is exactly what happened since April of 2014.

13 So, providing the builders with a range of
14 options to meet the ZNE goals, and the builders and the
15 manufacturers can come up with additional solutions,
16 which they have. You know, we've worked with both
17 builders and different manufacturers who have been
18 coming to us over the past few months with new ideas.
19 And some of them, you know, will be used to meet the ZNE
20 goals.

21 And different builders, based on their
22 preferences, they can choose different options. You
23 know, builders have different philosophies, risk
24 tolerances. You know, they may want to try one
25 technology versus the other. As long as the result is

1 the same, we don't care. Free market will turn in the
2 most promising solutions.

3 And we're also going to be providing, as part of
4 our prescriptive package, builder prescriptive packages
5 that the builders can readily use, rather than going to
6 the performance pack.

7 And so, talking about high-performance attics,
8 again. You know, briefly, you can use -- our baseline
9 for high-performance that we use, for both prescriptive
10 and performance, is R-13 below-deck insulation, with
11 tiles on the roof. And R-8 on the ducts, and five
12 percent duct leakage. So, that's basically the baseline.

13 But you can also meet that same criteria with
14 using R-6 continuous insulation above roof deck. And you
15 can combine insulation at the roof with highly
16 reflective materials or use hybrid tile materials. And,
17 you know, some of these solutions have already been
18 proposed to us, or come up with other strategies.

19 The other options would be moving the ducts into
20 the conditioned space. You know, going to the sealed or
21 unvented attic strategies. And many builders are already
22 experimenting with that strategy. Ductless systems, such
23 as mini-splits, or other solutions.

24 For the walls, the basis for our performance
25 level is R-19. Cavity insulation in a two-by-six wall,

1 at the 16-inch on center. This is not advanced framing,
2 but it is two-by-six, and with the R-5 continuous
3 insulation.

4 Other ways of meeting the same criteria or even
5 extending it would be going to two-by-four, at 16, with
6 R-8 continuous insulation, two-by-six, at 16-inch, with
7 R-5 CI, two-by-six, with 24-inch on center, with an R-4
8 CI. Staggered studs, six, and there's other solutions
9 out there that can all meet the same performance
10 requirements.

11 Now, if a builder, for some reason, doesn't want
12 to take advantage of the high-performance attic or walls
13 at this moment, we're also providing a photovoltaic
14 solar tradeoff. And I'll be talking about this tradeoff
15 in more detail this afternoon.

16 But the idea is to provide a compliance credit
17 for photovoltaics that's just enough to trade away both
18 high-performance attics and walls in each climate zone
19 where these measures are required. And this would be,
20 actually, a flexible credit. The builder can use it, not
21 for high-performance attics or walls, but if they want
22 to put in more west-facing glass, for instance, or
23 exceed the 20 percent limit, they can do that by using
24 the PV credit. But this is a net sum game, so if they
25 use their credit for more glazing, then that means that

1 would not be available for high-performance attics or
2 walls.

3 So, this is a way of ensuring the integrity of
4 the building envelope. Because, you know, we want to
5 make sure that the building envelope stays efficient
6 throughout the life of the building, and then having
7 some reasonable amount of PVs up there.

8 There are other compliance options also
9 available. Like, you know, super high-performance
10 windows, or more advanced whole house fans. You know, we
11 can talk about those a little bit later.

12 Other measures we're contemplating towards the
13 zero net energy goal are tankless water heaters, also
14 called instantaneous water heaters, with an energy
15 factor of .82.

16 Another big change this time around is the high-
17 efficiency lighting throughout the home. This is a
18 recognition of the huge advancement in the LED
19 technology over the past few years, enhanced
20 performance, better color, more variety of products, and
21 the price going down. And I'm sure many of you, like me,
22 go to Home Depot, and Lowe's, and Costco, and you see
23 the raise in the high quality LED lights at very
24 attractive prices.

25 So, we're going to be taking advantage of that

1 and greatly simplifying our residential lighting
2 standards, and providing some really high-quality
3 alternatives to the builders and the homeowners.

4 So, three goals, one is high-efficacy lighting
5 in the kitchens throughout the house. Also, all recessed
6 lightings would be high-efficacy. So, this will actually
7 simplify our kitchen lighting requirements because over
8 the past several cycles, you know, we allowed a mix of
9 low- and high-efficacy lighting in the kitchens, which
10 required some calculations on the worksheet to maintain
11 that 50/50 balance between high-efficacy and low-
12 efficacy.

13 So, we're doing away with that, getting rid of
14 all the forms and the worksheets, and basically saying,
15 you know, LEDs are good, it's going to work so make it
16 all high-efficacy. And I think the builders are okay
17 with this measure.

18 Another big change this time around is
19 historically, in the standards, we did not allow any
20 screw-based, Edison-based light sources as high-efficacy
21 in the standards.

22 But now we think, with the advent of high-
23 quality LED lighting it's time to change that, because
24 we think these lights are so good, you know, if it's
25 handled correctly and, you know, we provide the right

1 product there's no reason for folks to go back and
2 unscrew these sources and put a low-efficacy source in
3 there. So, that also goes to greatly simplify the
4 standards.

5 On the nonres side, our goal this time was
6 mostly just to stay in line with ASHRAE. The main focus
7 of 2016 standards were the residential measures, not
8 nonres. Simply because the 2020 res goal is more
9 imminent than the nonres, which is 2030. But we still
10 have to keep up with ASHRAE and, you know, we'll take
11 advantage of any opportunity to save energy in nonres,
12 as well.

13 So, equipment efficiencies were updated. We
14 updated some of our envelope view factors. Indoor
15 lighting, LPDs in a few areas were improved, the same
16 with outdoor lighting.

17 New energy efficiency measures for elevators and
18 escalators. And we also are considering windows and
19 doors, the HVAC lock-out sensors, which we'll be
20 presenting later. And we also provided the light-off
21 clarifications.

22 On the res side, this is the estimated cost for
23 the four main packages. For the walls -- and these are
24 the numbers that the staff and the CASE teams, they came
25 up with, and then we worked closely with CBIA and their

1 representative's counsel. And I think our numbers are
2 fairly close, give or take a couple hundred.

3 For high-performance attics, our estimated cost
4 is about \$1,200. For high-performance walls, about \$500.
5 Tankless water heater, about \$600. And the high-efficacy
6 lighting about \$365. With a total package cost of about
7 \$2,700.

8 We've also worked very closely with the CBIA and
9 the utilities to come up with a package of utility
10 incentives, which includes financial incentives to help
11 builders between now and the effective date of the
12 standards, to help basically promote or incentivize some
13 of the measures that I described, the high-performance
14 attics, walls, lighting and water heating. And, you
15 know, I think they're also including a few other
16 measures, like a QII, quality insulation installation.

17 So, those incentives are actually in place right
18 now and builders are taking advantage of them.

19 And CAHP also includes training programs,
20 education and outreach for builders and trades folks.
21 So, this is a great program and I urge builders and
22 trades people to really take advantage of this.

23 And just a note on cost effectiveness. Those of
24 you who have been involved with the standards know that
25 we're required to make sure that measures we adopt into

1 the standards must be cost effective. So, we use a
2 lifecycle costing which is a net present value
3 evaluation that includes the life of the measure, a
4 discount rate, the energy savings over the life of the
5 measure, and all the maintenance costs or benefits.

6 And for the unit of energy or the value of
7 energy we use the time dependent valuation, TDV, which
8 is a metric that differentiates between the cost of each
9 measure over the course of every hour of the year.

10 So, the unit of energy that is produced and
11 consumed off peak, in winter, is valued a lot lower
12 than a unit of energy that's generated and consumed,
13 say, in July, in a heat storm. To TDV captures that
14 variation.

15 So with that, if you have any questions or
16 comments on the standards, I'll be happy to take a few
17 questions. Bob, did you want to make a comment?

18 MR. RAYMER: Thank you, Mazi, and Mr. Chairman
19 and Commissioner. I'm Bob Raymer, Senior Engineer with
20 the Building Industry Association.

21 CBI, for those of you that aren't familiar,
22 we're a statewide trade association with over 3,000
23 member companies. Each year we produce about 90 percent
24 of the new homes in California.

25 I'd like to start off by saying the California

1 Building Industry Association supports the adoption of
2 the CEC's 45-day language for Part 1 and Part 6.

3 And for those of you who have been involved in
4 these proceedings for many years, I see a lot of
5 familiar faces, in the 34 years I've been doing this,
6 CBI has never started off a proceeding, a formal 45-day
7 language proceeding with support.

8 So, just as this is a historically large
9 increase in energy efficiency, it's also a historic
10 change for the way we've approached policy here.

11 Now, we realize formal adoption process is just
12 beginning. We understand there's going to be significant
13 fine tuning that will result from the comments the CEC
14 will be receiving over the next two days, and especially
15 over the next two weeks in writing, but we also
16 recognize the extraordinary amount of time that
17 Commissioner McAllister, the Energy Commission staff and
18 interested parties have already devoted to this package
19 over the last 12 months. A lot of work has been going
20 on.

21 Of particular note were the two all-day energy
22 forums that Mazi just made reference to. CBI co-hosted,
23 with the CEC, at SMUD's headquarters. Over 100
24 interested parties attended each one of these
25 gatherings, including industry, building officials, CEC

1 staff, manufacturers from all over the country. And this
2 provided a very productive setting where the
3 stakeholders could sort of think out loud, and they did,
4 and interact with CEC staff regarding their concerns and
5 potential solutions.

6 CBI, and our consultant, also worked extensively
7 with CEC staff in the development of the cost of
8 compliance data for each of the four main proposals in
9 the residential package.

10 We completed this cooperative effort in late
11 January, with the CEC estimating an average increased
12 cost of \$2,500 per home, which is very close to CBI's
13 estimate of \$2,700 per home. And while this is a
14 significant amount, there's no question that the CEC
15 staff has made every effort to keep overall costs in
16 mind, while working hard to moving the State forward to
17 its goal of being zero net energy by 2020 for new
18 dwellings.

19 And the staff has pointed out in the public
20 notice and the initial statement of reasons that the
21 proposed standards are cost-effective to consumers, and
22 that the energy bill savings over the life of the
23 building will be much greater than the increased
24 construction costs that will be resulting from the
25 standards.

1 At this point, CBI would like to recognize the
2 efforts of Mazi Shirakh, Erlyne Giesler, Dave
3 Ashuckian, Patrick Saxon and, of course, Commissioner
4 Andrew McAllister. It is largely due your efforts this
5 package includes an historically large increase in
6 energy savings, while still providing an unprecedented
7 level in design flexibility, and still maintaining
8 sensitivity to increased costs. We've sort of hit the
9 sweet spot here.

10 And so once again, thank you. If there are any
11 questions, please.

12 COMMISSIONER MC ALLISTER: Thanks, Bob, for your
13 leadership. You know, I don't have necessarily that
14 whole historical perspective over the last 30 plus
15 years, but certainly, you know, working with all the
16 stakeholders, and manufacturers, and just ironing the --
17 doing the heavy lifting and ironing out the details has
18 been a real key part of getting here.

19 I mean, we're obviously not to the finish line,
20 as you said, so want to hear what everybody has to say.
21 We have a really good, solid foundation and it's in
22 large to your marshalling your members and really making
23 sure that we can have a productive conversation as we
24 went step by step through all of this. So, thank you for
25 your involvement.

1 MR. RAYMER: Well, thank you.

2 MR. SHIRAKH: Thank you, Bob. You know, I've
3 been here a long time, but I haven't been here the
4 entire time that the standards have been updated, but
5 Bill Pennington has. And he verifies that this is the
6 first time, actually, we're entering the formal
7 rulemaking with an agreement with CBIA, which is very
8 gratifying.

9 So, we're going to -- if there are no other
10 questions, anyone? This is being webcasted, too, so
11 we're going to get presentations or questions online,
12 too. So, if there's no other general questions, then
13 we're going to get into the actual code language as
14 indicated on the agenda.

15 The format of the presentations are going to be
16 that we're going to be presenting summary of the updates
17 in a Power Point or a PDF format. We're not going to be
18 going through the detailed language of every change
19 because, simply, there would not be any time.

20 Standards have been posted for how long now, 15
21 days or something. So, you know, you can go online and
22 look at them. And if you have any questions, you can do
23 so, again, and give us your feedback.

24 There's going to be a couple of exceptions to
25 these rules, where we're actually going to present you

1 the full language of certain topics that have had
2 significant chance since we posted the 45-day language.
3 So, for those measures we'll show you the full proposed
4 language.

5 RON: We have a question from NEMA. If you want
6 to unmute yourself and ask your question?

7 MR. SHIRAKH: Question from NEMA, please, if you
8 can -- sorry, folks, there's some technical
9 difficulties, you know, we're working on it.

10 MR. STRAIT: Yeah, we're going to be -- we're
11 trying to find which of the unassociated call-in lines
12 is NEMA's call-in line, so that we can unmute it. We
13 might just have to go and unmute all these guys.

14 All right, NEMA, can you speak so we can
15 identify you?

16 MR. BOSENBERG: This is Alex Bosenberg, from
17 NEMA. Can you hear me?

18 MR. SHIRAKH: Yes, we can, Alex. Go ahead.

19 MR. BOSENBERG: Well, thank you. I'm Alex
20 Bosenberg, the Manager of Regulatory Affairs for the
21 National Electrical Manufacturers Association.

22 I wanted to ask Mazi and the Commissioners if
23 there will be any response to our numerous comments
24 submitted over the last six to eight months. We made a
25 lot of substantive comments and none of them appear to

1 be reflected in the code language. And so, we are
2 confused as to what, if any, there will be any response
3 to those.

4 MR. SHIRAKH: Yes, this is Mazi. We've got your
5 comments and we will be responding to each and every
6 comment, whether we agree with them or not, so they will
7 not be ignored.

8 MR. BOSENBERG: I appreciate that, Mazi. Well,
9 the last time I was waiting for an official comment,
10 that we needed for legal reasons, was in Title 20, not
11 necessarily 24. But it was 12 months before the final
12 statements came out. What is the timeline for your
13 response on this code cycle?

14 MR. STRAIT: Well, I can speak to the timeline
15 that we have right now. We're in the 45-day comment
16 period, currently. We're going to be compiling all of
17 the comments that we get and reviewing them. The ones
18 that we feel are appropriate to make changes in the code
19 language we will do so, and publish that as 15-day
20 language.

21 Following the 15-day language, if we don't have
22 additional changes we have to make, we'll go through
23 with adoption.

24 Following adoption, we'll be publishing the
25 final statement of reasons and the final response to

1 comments. So, we would anticipate having that, I
2 believe, close to the middle point of the year.

3 MR. SHIRAKH: Alex, I think --

4 MR. STRAIT: Can we remute some of these lines.

5 MR. SHIRAKH: -- we have a lot of background
6 noise, if folks can mute themselves.

7 MR. STRAIT: Can you unmute the line that NEMA
8 was just -- all right, NEMA, can you speak? Is this your
9 line?

10 MR. BOSENBERG: This is me, can you hear me?

11 MR. STRAIT: Yes, yes.

12 MR. BOSENBERG: Thank you.

13 MR. STRAIT: You are, for the record, call-in
14 user eight.

15 MR. BOSENBERG: Thank you. I appreciate that
16 response. However, it doesn't afford us the ability to
17 see if our comments were misunderstood until after
18 adoption. We have some concerns about that.

19 We've met with staff many times over the last 12
20 months and each time thought we were being understood,
21 but now it appears that we weren't, and we want to
22 rectify that.

23 MR. SHIRAKH: So what I can offer you is after
24 these hearings, maybe later this week or early next week
25 for us to have another phone conversation and go over

1 your comments. Again, some of your comments, the ones
2 we've agreed with, they've been reflected in the 45-day
3 language. The ones we disagree has not been reflected,
4 but we do have a response for each and every single one
5 of them, and we can share those with you.

6 MR. BOSENBERG: Well, thank you. I look forward
7 to that.

8 MR. SHIRAKH: Okay, any other questions or
9 comments here in the room or online?

10 There's a written comment. I think Ron is going
11 to read it.

12 RON: Yeah, we have a question here or a
13 comment. "CBIA's main focus is residential new
14 construction. Do they also specifically approve of the
15 nonresidential sections of the standards, as well as the
16 sections covering residential additions and
17 alterations?"

18 MR. SHIRAKH: I'm going to have -- Bob, do you
19 want to respond to that, you're willing to try?

20 MR. RAYMER: Bob Raymer with CBI. And the answer
21 to that is we don't have a position on the
22 nonresidential standards. We support the CEC's efforts
23 for existing homes, as well. But right now we have no
24 suggestions on the nonres. We do have some suggested
25 tweaks that we're going to be suggesting for the

1 CalGreen provisions in Part 11, but we have no position
2 on the nonres right now.

3 MR. SHIRAKH: Who was that commenter, do you
4 know? Ross King.

5 Okay, any other questions or comments? Okay, I'm
6 going to proceed with the first presentation of the day.
7 This is Part 1, Administrative Regulations. Fairly minor
8 changes to this section. This is Section 10-1 thru --
9 I'm sorry, 10-101 thru 10-114. And most of it fairly
10 minor edits, except a couple of sections where, you
11 know, we have some major changes.

12 Sections 10-103(a) and (b), they contain
13 regulatory language for ATTCPs, and those sections we're
14 presenting tomorrow because it's mostly nonres.

15 And what I'd like to talk about here is 10-
16 103(a)3B. And this is the section where we describe the
17 requirements for CF2Rs, also known as certificate of
18 insulation.

19 With the 2013 standards, we set up a system
20 where all the forms, CF1Rs, 2Rs, and 3Rs, had to be
21 uploaded into a HERS providers' data registry. And those
22 registers are up and running and every single form that
23 is associated or included in the 2013 package is now --
24 has the capability of being uploaded electronically into
25 the CalCERTS data registry. You know, we have for both

1 new construction and newly constructed buildings, and
2 alterations.

3 We received comments related specifically to
4 CF2Rs. These are certificate of installations where a
5 contractor goes out and he puts in, say, a new air
6 conditioning system. He tests it, does the refrigerant
7 charge, and all that.

8 And the request was that instead of having that
9 installer or the contractor upload that information into
10 HERS Provider Data Registry, we allow an authorized
11 representative to do that transaction for them.

12 So, we looked at that request and, you know, so
13 we've come up with a procedure to accommodate that.

14 We also made another change here, related to
15 CF2Rs. And the forms that need to be uploaded are listed
16 here, all certificates of installation for which
17 compliance requires HERS field verification. You know,
18 those must be updated. And all other certificate of
19 installation except those exempted by the Energy
20 Commission.

21 So, it gives the Commission an opportunity or
22 the capability to exempt certain non-HERS forms from
23 being uploaded. Like, say, some worksheets that don't
24 necessarily have to be updated, or some other forms that
25 are rarely used. You know, so through some action we can

1 exempt those forms from being electronically updated.

2 But the more important thing that I wanted to
3 talk about was the delegation of the signature
4 authority. We talked to our attorneys and we came up
5 with this proposed language that will allow the
6 installers to delegate the signature authority to
7 actually anyone. It doesn't have to be a HERS rater.
8 It's probably going to be, generally, a HERS rater, but
9 this authorized representative could be anyone. Could be
10 me.

11 And the requirements for that is between the
12 responsible person and the person to be designated,
13 there has to be an agreement between them, specifying
14 the authorized representative may sign the certificate
15 of installation on behalf of the responsible person.

16 But what's most important is iii, specifying
17 that the legal responsibility for construction or
18 installation, and applicable specification for the scope
19 of the work will remain with the responsible person.

20 So, you know, you're the installer, you're
21 installing equipment, you're delegating your signature
22 authority to a HERS rater, or some other person, but the
23 responsibility will remain with the installer. So,
24 that's clearly specified in iii.

25 That is signed by both the responsible person

1 and the authorized representative and is retained in the
2 HERS provider's data registry, where all the other forms
3 are. You have to upload that agreement. And that
4 agreement is accessible to others, like a building
5 department, if they want to check on it.

6 So, if you have an agreement that meets these
7 requirements, yes, you can go ahead and delegate the
8 signature authority.

9 This is actually fairly similar to the process
10 that was followed in the 2008 standards. So, for those
11 of you who did that, this should be fairly straight
12 forward. Any questions on this topic? Anybody in the
13 room? Or on the line?

14 Okay. Oh, Mike Hodgson?

15 MR. HODGSON: Mike Hodgson, CHEERS. Good
16 morning, Commissioners.

17 I think there's one issue here, Mazi, that we
18 need to not talk about, but make sure we're clear. And
19 that is in the section of conflict of interest. And so,
20 as we work through these and you explain how the
21 signature authority is going to work on the certificate
22 of installation that we make sure there's no -- that
23 there's also a concurrent explanation on what's a
24 conflict of interest and what's not.

25 Because there is an issue in the field, now,

1 specifically about this with conflict.

2 MR. SHIRAKH: That's a good point. Thank you,
3 Mike.

4 Any other questions on Part 1? So, I'm going to
5 go to the next presentation, which is changes to --
6 basically, the definition section, 100 of the standards.
7 This is going to take all of 30 seconds.

8 Peter, can you help me with this? Oh, here, I
9 think I found it. I found it, yeah.

10 So, now, we're getting to Part 6, which is the
11 energy code. And again, there were very few changes to
12 the definitions and rule of construction. We updated
13 various definitions for ANSI, ASME, AHI, ASTM, ASHRAE,
14 and other references to reflect the latest relevant
15 language. You know, mostly updating the dates that were
16 associated or the revisions that were associated with
17 these documents.

18 We added and revised definitions for direct
19 vendor appliance, doors, electrical power, distribution
20 systems, integrated energy efficiency ratio, or LEER,
21 integrated part-load value, IPLV, the definition of
22 luminaire, luminaire efficacy, recessed luminaire
23 optimum start controls, stop controls, commercial fuel
24 sales canopies and thermostats.

25 So, these were either minor revisions to these

1 definitions or we created new ones for them. So, that's
2 it for Part 1.

3 Any questions on those? Gary?

4 MR. KLINE: Gary Kline, with Gary Kline
5 Associates. I don't understand how you get LEER from
6 IEER, integrated energy efficiency ratio? Is that just a
7 typo or is that something that's missing? That's all.

8 MR. SHIRAKH: So, IEER, I should say, not LEER.
9 Yeah, sorry, it's a typo.

10 MS. WALTNER: Meg Waltner, with NRDC. Good
11 morning, Commissioners.

12 Just briefly, in general we support the proposed
13 standards in the 45-day language. We do have a few areas
14 that we've been pointing out over the course of this
15 process, where we think the Commission should be going
16 further and make further modifications, and we'll be
17 going through those today.

18 But quickly, on the definition section I wanted
19 to point out we'll be submitting some written comments
20 on the definitions for plug loads and data centers. In
21 particular, we want to make sure that data center rooms,
22 within individual buildings, are still included. We've
23 cut the definition of computer rooms, so we want to make
24 sure we don't create a loophole that way.

25 And we'll also be recommending using the term

1 plug-in equipment, instead of plug loads, to align with
2 the way the terms are used with the PUC and the
3 utilities. So, we'll be submitting written comments on
4 that.

5 MR. SHIRAKH: Thank you, Meg. Sir?

6 MR. INTAGLIATA: Good morning, Shawn Intagliata,
7 Unico, on behalf of the small-duct HVAC industry. We
8 have been working with the California Energy Commission
9 since about March of 2012. We have received nothing but
10 awesome help, support. Mark Alatorre, Commissioner, we
11 met in July of '13. Commissioner Douglas was gracious
12 enough to meet with us in March of '12.

13 I will probably be popping up quite often. My
14 apologies ahead of time.

15 We actually, our industry, small duct, actually
16 has its own product class at the Department of Energy,
17 codified into Federal law through the American Jobs and
18 Technical Corrections Act of 2012.

19 The bill was actually introduced on the house by
20 our good friend, Congressman Henry Waxman, and had the
21 full support of the House, save for two Congressional
22 members, who vote no on everything. And then 100 to
23 nothing in the Senate. And the President was gracious
24 enough to sign that legislation in December of 2012.

25 Our ask, at this time, is that the definition of

1 small duct high velocity be added to definitions of HVAC
2 systems, especially in light of its own product class
3 Federally, and the great support we've had here at the
4 Commission. Thank you.

5 MR. SHIRAKH: Thank you. Any other questions or
6 comments?

7 So, we're going to move, now, to Sections 110.0
8 thru 110.11, and Mark Alatorre is going to present that.

9 MR. ALATORRE: Okay, I'm going to be presenting
10 the changes we made to Sections 110.0 thru 110.11.

11 In Section 110.0 we moved the certification
12 requirements that were found currently in Section
13 100.OH, to this section. We didn't change any of the
14 certification requirements that are required by the
15 manufacturer, we just changed the location of the
16 requirements. We felt it was cleaner this way, given
17 that 110.0 already was talking about certification, to
18 have it all in one place.

19 Also, there are additional changes to 110.0 and
20 110.1, and those changes mainly only are for cleanup and
21 clarity.

22 The changes to 110.2, as Mazi mentioned in his
23 intro, these were updated efficiencies that keep in line
24 with ASHRAE. Every standard cycle we update our
25 efficiencies to align with ASHRAE. In this case, ASHRAE

1 90.1 2013, the tables that were affected were for
2 unitary air conditions and condensing units, unitary and
3 applied heat pumps, water chilling packages, PTACs,
4 terminal heat pumps, heat rejection equipment and gas
5 and oil-fired boilers.

6 Payam?

7 MR. BOZORGCHAMI: This is Payam Bozorgchami. I'm
8 going to be talking about the requirement for
9 fenestration. What we did here was for our air leakage
10 requirements of Section 116(a)1, we added two footnotes.
11 We are also requiring pet doors to meet the air leakage
12 requirements.

13 And also, talking to a lot of window
14 manufacturers, fenestration manufacturers, they
15 requested that we add this equivalency note there for
16 air leakage, if the fenestration meets an AAMA/WDMA/CSA
17 requirement, they're also equivalent to ASTM E283. That
18 is 75 Pascals.

19 And then we did some cleaning up for labeling a
20 fenestration product. What is actually a temporary
21 fenestration label. A lot of what we've noticed is a lot
22 of people are peeling that right off, the label of the
23 fenestration as soon as it's installed. And we just want
24 to make sure that that's not happening.

25 Section 118, we did a little bit of cleanup.

1 There was part of this section that is dedicated for
2 nonresidential buildings, only, and there were sections
3 that were dedicated for residential. And we wanted to
4 just move them or relocate them to the appropriate
5 sections of the mandatory minimum requirements.

6 MR. ALATORRE: Okay, in Section 110.9, we added
7 a function, a malady parameter for sensing controls.
8 Those sensors include occupancy motion and vacancy
9 sensors.

10 The functionality is that they shall be capable
11 of turning off all or part of the lighting no longer
12 than 20 minutes after the space has been vacated.

13 Also, added reference to JA8 for high-efficacy
14 lighting sources.

15 And the last bullet is associated to Section
16 110.10, and it was a clarification that when referencing
17 stories for when solar-ready was applicable, it was --
18 it's only for habitable stories. So, we put in the word
19 "habitable" to make it clear.

20 Also that we created a new Section 110.11, which
21 was applicable to electrical power distribution systems,
22 which require that low voltage, dry type distribution
23 transformers be certified to the Energy Commission.

24 There is exceptions. There's about 13 different
25 product types that are exempted from time to be

1 certified, and those are listed in that section.

2 Any questions? Shawn?

3 MR. INTAGLIATA: Shawn Intagliata.

4 Commissioner, Mr. Chairman, in this section we would
5 respectfully request that our minimum efficiency
6 standards be placed into the record for the standards
7 upcoming. So that we have different test standards, we
8 have different efficiency minimums, we have different
9 operating parameters around our technology, and we would
10 request, respectfully, that we be included in the tables
11 in this section, as well. Thank you.

12 COMMISSIONER MC ALLISTER: Thanks for your
13 comments. So, maybe, Mazi, you could, or somebody from
14 staff could explain sort of what -- how different
15 technologies fit into the scheme of things in terms of
16 getting them incorporated into code as alternatives or,
17 you know, how that process sort of works. Because I
18 think a clarification along those lines would probably
19 be helpful at this point.

20 MR. STRAIT: Certainly. There's several routes
21 by which folks can bring different types of technologies
22 and have us accommodate them in the standards.
23 Obviously, there's this process today, where we'll take
24 those comments and try to be responsive and incorporate
25 them directly into the regulations.

1 There's also compliance options that we can
2 pursue. There's exceptional methods that we can pursue.
3 In an inter -- how would you say it, in an inter-cycle
4 basis, so we don't have to wait for another three years
5 if there's someone else that comes in with a new
6 technology, say next year, or the year after.

7 So, staff are absolutely here to be responsive
8 to these types of requests.

9 COMMISSIONER MC ALLISTER: Yeah, so I guess
10 I'm -- so, thanks for that. And I'm thinking, so we have
11 -- you know, we have the standard prescriptive approach,
12 and then we have options, and tradeoffs, et cetera, and
13 we have alternative methods to deal with technologies
14 that would necessarily need to be judged relative to the
15 energy budget that's in the prescriptive approach,
16 right.

17 So, I guess, you know, developing an alternative
18 method for a specific technology, maybe you could just
19 put a little more detail into that process.

20 MR. STRAIT: Sure. Basically, we have to rely on
21 -- what we need is certainty that any estimate of a
22 product's performance will really be reflected in what a
23 person will experience in the field, once it's
24 installed. So, a lot of it has to do with determining a
25 path between what that laboratory performance is and

1 what we would actually realize in the field.

2 And we have that bridge built, when we know that
3 we're going to have that certainty, then we can say in
4 the software you will get credit based on these numbers,
5 or you'll get some calculation applied to give you
6 credit for the anticipated performance as it exists in
7 the building.

8 And that even involves a lot of -- depending on
9 the technology that can involve some staff research. If
10 it's existing Federal law, like there is in this case,
11 that tends to make our job easier. But it is a lot of
12 internal, I guess -- I'm trying to think how I would
13 explain it. There's a lot of internal staff work that's
14 involved in making sure that the consumers, that are
15 actually going to be living in these buildings, that
16 have these technologies, get what's promised.

17 COMMISSIONER MC ALLISTER: Yeah, so I guess what
18 I would say is, absolutely, you know, good new
19 technologies, you know, we want to find ways to get them
20 eligible to be implemented and everything, but always
21 being accountable for producing the savings that they
22 represent. And, you know, there needs to be a record
23 that supports that.

24 And you are -- you know, I commend you for doing
25 so much work at the Federal level and developing the

1 technology, and sort of getting the ecosystem put
2 together. And then, you know, there are a few steps that
3 need to be taken to make sure that what -- you know, if
4 and when that goes into code that the package is full,
5 and accountably so, and transparent. So, that's -- I
6 think the overall message is absolutely, you know,
7 welcome technologies that produce savings and that
8 provide comfort for Californians. And, really, it's kind
9 of walking the necessary path to make that formal.

10 MR. STRAIT: And simply for the clarity of the
11 record, when he was referring to "our equipment", I'm
12 assuming he's referring to the small duct high velocity
13 units that he mentioned before, and he's nodding yes.

14 MR. NITTLER: Good morning, Ken Nittler, with
15 Enercomp. In addition to working on the building
16 standards, I also operate a business that does NFRC
17 simulations, and also does the component modeling
18 approach that's part of our standard here.

19 I have some comments on Section 110.6(a). It's
20 in Sections 2, 3 and 4. There's an exception written
21 into the standard that allows the use of equation
22 defaults in cases where products are unrated.

23 You know, I've been working in this area a long
24 time and it's pretty unusual. The standards have
25 required NFRC ratings as the primary way to get product

1 performance, both on residential and commercial, dating
2 to the 1990s.

3 The residential market virtually completely
4 transformed in the 1990s. Here we are in 2015, and I
5 really think it's fair to say that the commercial market
6 has barely budged at all. I think a majority of the
7 buildings going in out there, especially large buildings
8 with storefronts, and curtain walls, and slope glazings
9 don't have rated product. And if you don't have rated
10 product, you don't really know what's going into it.

11 So, I request that the exception be removed. It
12 was reduced from a 10,000-square-foot exception to a
13 1,000-square-foot exception, which certainly should
14 help, but I don't think it goes far enough.

15 Because right now, what's happening out there in
16 practice, when I look at compliance jobs, when I look at
17 compliance documentation is that projects of all sizes
18 are using this exemption. And I think it's -- given the
19 impact of glazing on a building's performance would be
20 really critical to consider this.

21 In the very least, if it's chosen not to remove
22 these exceptions, we at least need to get something
23 added to the nonresidential ACM language that requires
24 approved ACM software to enforce the 1,000-square-foot
25 limit.

1 MR. SHIRAKH: Ken, can I ask you a couple of
2 questions?

3 MR. NITTLER: Sure.

4 MR. SHIRAKH: So, the reason for having that
5 exception obviously is not to burden small projects with
6 high cost. And so, is it your understanding that the
7 cost of CMA, and going through that NFRC certification
8 has it come down far enough where small projects can be
9 using the procedure without --

10 MR. NITTLER: Yeah, we've certified a number of
11 small projects. You know, basically, the component
12 modeling approach, most of the testing is done in
13 advance by the frame supplier. And so, when a glazing
14 contractor comes forth with a job, it's just a case of
15 matching the glass with the frame.

16 So, if they're using a standard frame, I believe
17 the answer to that question is yes.

18 There are certainly projects where they're using
19 custom frames, but it would be unusual in a small
20 project like you're describing.

21 MR. SHIRAKH: So, just for the record, I mean
22 the reason we have that exception is, again, exactly
23 that. It's to make sure that for small projects, you
24 know, we're not imposing a requirement that may be
25 really costly for them.

1 But if, you know, we think that is not an issue,
2 we can have further conversation with Ken and take a
3 look at that exception.

4 Payam, do you have anything to add to that?

5 MR. BOZORGCHAMI: No, but I think at this time
6 we may not be able to remove the 1,000-square-foot
7 limitation. But we could probably add something into the
8 ACM, when we have some time for that.

9 MR. NITTLER: Okay. Well, I'd welcome the
10 opportunity to discuss it further.

11 COMMISSIONER MC ALLISTER: Yeah, thanks for your
12 comments.

13 MR. SHIRAKH: Any other questions or comments on
14 material presented by Mark and Payam? Anything online?

15 So, now, we're going to move into the really
16 exciting stuff to today, the high-performance attics and
17 walls, following by lighting improvements in
18 residential.

19 So, Bruce Wilcox will be presenting. Here you
20 go, Bruce.

21 MR. WILCOX: Thank you, Mazi. Good morning,
22 Commissioners, and thank you all, the rest of you, too,
23 for showing up.

24 I think you maybe to some extent can tell those
25 who have been around for every proceeding on this topic

1 by the color of their hair and beards. At least that's
2 true for some of us.

3 COMMISSIONER MC ALLISTER: Or lack thereof,
4 yeah.

5 (Laughter)

6 MR. WILCOX: Okay, so I'm going to talk about
7 the mandatory features and devices, and the performance
8 prescriptive compliance -- performance and prescriptive
9 compliance requirements for attics, ducts and walls.

10 And just can't acknowledge too much, I think,
11 the contribution of the utility CASE programs to all of
12 these efforts. Most of the work has been done under
13 their auspices and most of the stuff I will be
14 presenting here was actually produced by the Codes and
15 Standards Programs. So, thank you for that.

16 There's one significant -- well, there are
17 actually two significant changes in the mandatory
18 requirements. One is a very simple requirement that says
19 that if a manufacturer requires a liquid line filter
20 dryer on an air conditioner, then it has to be
21 installed. This is a pretty simple and straight forward
22 improvement that improves reliability, and so forth, in
23 air conditioners and heat pumps.

24 There's another change in the mandatory
25 requirements, but I'm going to talk about it under the

1 high-performance attic section because it's really
2 clearer if we do that.

3 Okay, sorry, this is very small buttons for
4 people like me.

5 So, the proposed code change for attics and
6 ducts is one of the big steps forward in these proposed
7 standards. And there are -- it's a little complicated.
8 As Mazi said earlier, the Commission was trying to leave
9 things open for builders to do what they thought was the
10 best thing for them, and give a lot of flexibility, and
11 that's reflected in this prescriptive standard.

12 So, there are requirements for a high-
13 performance attic, which we sometimes shorten to the
14 acronym HPA. And those requirements apply to climate
15 zones 4, and 8 through 16. And this is a change from the
16 earlier workshop presentations. The 45-day language has
17 reduced the number of climate zones that this is
18 applicable to. So that's -- if you're following this
19 topic, that's something that's important here.

20 And the prescriptive packages options are based
21 on ducts and duct locations. So, if you have ducts in a
22 high-performance attic that's case one. Then you are
23 required to actually, in the prescriptive standard, have
24 a high-performance attic.

25 I'm going to talk in a minute about roof deck

1 insulation options. R-38 ceiling insulation is required.
2 And ducts have to have R-8 insulation and they are
3 required to be tested for a 5 percent leakage level. And
4 this is a change because up until now the testing has
5 been at 6 percent. So, this is a slight reduction in the
6 tested leakage level.

7 And this is the other mandatory requirement
8 because the ducts not in conditioned space requirement,
9 for 5 percent leakage, is a mandatory requirement and
10 it's applicable even if you don't have to do a high-
11 performance attic.

12 So, you either can do this HPA, our option
13 number one here, or the second option is you can have no
14 ducts or air handlers in any attic, or unconditioned
15 space.

16 And there are two ways to do that. One is what
17 we call ducts in conditioned space, sometimes called by
18 the acronym, DCS. And in order to achieve that, you have
19 to locate the ducts and the air handler in conditioned
20 space, and you have to demonstrate that you've really
21 achieved that by having a HERS verification that there's
22 no significant leakage from that system to the outside.
23 So, the whole system is really inside the conditioned
24 space.

25 Or, you can also achieve the same end here by

1 using a ductless HVAC system. So, a system that has no
2 ducts or a system that you can that the ducts are
3 really, entirely in the conditioned space is an
4 alternative to high-performance vented attics.

5 And then there's an exception to the whole
6 requirement for HPA attics and ducts, which is if you
7 are doing an addition to an existing house, and the
8 addition is less than 700 square feet of floor area,
9 then you don't have to comply with the HVA requirement.

10 If you're doing a high-performance vented attic,
11 there are several optional ways you can comply with the
12 roof deck insulation. You can either do continuous
13 insulation above the roof rafters, and the requirements
14 there, prescriptively, depend on what kind of roofing
15 you have. If you have tile roofing that includes an air
16 space and has a significant R value, then the
17 requirement is for R-6 above the deck, or R-6 between
18 the roofing and the roof deck.

19 If you are using roofing with no air space, such
20 as asphalt shingles, or metal roofing systems, then the
21 requirement is R-8.

22 Or, if you want to put the insulation below the
23 roof deck, inside the attic, which is called here below
24 deck insulation at the roof rafters, in that case if you
25 have roofing with an air space, for example tile, the

1 requirement is R-13 insulation. And if there's no air
2 space, then the requirement is R-18 insulation.

3 But if you're doing the below deck options, the
4 radiant barrier requirement goes away. So, the R value
5 of the insulation is calculated including the fact that
6 the radiant barrier is not typically possible on that
7 type of insulation.

8 And no matter what insulation option you pick,
9 R-38 ceiling insulation is required. And so, that's the
10 roof deck insulation or the attic roof deck insulation.

11 The other requirements, as I mentioned earlier,
12 if you're going to put ducts in this high-performance
13 vented attic then you have to put in R-8 insulation. On
14 the ducts, that's an increase over many of the current
15 requirements for ducts in attics.

16 And then, this tested 5 percent mandatory
17 leakage standard, which is somewhat tighter than we've
18 had up until this point in the standards.

19 If your ducts are in other locations, then
20 there's no change from the 2013 requirements.

21 I think I'll maybe wait -- well, okay. So, to
22 put this in perspective, the current code requirements,
23 where we are right now, and what will be replaced by
24 these new requirements, as in the 2013 standards which
25 are currently in effect. Duct leakage testing is

1 mandatory at 6 percent and ceiling insulation is
2 mandatory at R-30. The prescriptive requirements call
3 for R-30, ceiling insulation in climate zones 2 to 10.
4 And R-38 insulation is required in climate zone 1 and 11
5 to 16.

6 So, moving to the R-38 insulation is also an
7 increase in ceiling insulation in climate zones 8
8 through 10.

9 And the duct insulation, as I said earlier, is
10 currently R-6 in the milder climates. And if you're
11 doing an HPA prescriptive solution, you'll be required
12 to upgrade that to R-8. It was already R-8 in the more
13 severe cooling climates, so there's no change there.

14 So, that's the prescriptive requirements for
15 high-performance attics. I think we all are aware of the
16 fact that a majority of the code compliance efforts that
17 are done in single-family residential, for sure, are
18 carried out using the performance approach, which allows
19 both flexibility for trading off all different measures.
20 And you have to achieve the same level of performance as
21 the prescriptive standard, but you have a significant
22 amount of freedom in how you do that.

23 The standard design assumptions for that, which
24 are not -- are proposed to be unchanged here, are that
25 the ducts and the equipment are located in -- well,

1 these are the current design assumptions for the 2013
2 standards. Ducts and equipment are located in an
3 unconditioned space. If it's a single-story house, 100
4 percent of the ducts and the equipment are in the attic.

5 In a two-story or more house, 65 percent of the
6 duct service area is located in the attic and 35 percent
7 is assumed to be inside the conditioned space.

8 The supply duct surface area is assumed to be 27
9 percent of the conditioned floor area. So, this is a
10 very large -- think of the duct system as a large,
11 poorly insulated heat exchanger that allows you to
12 recover heat from your attic in the summertime, and do
13 efficient cooling in the wintertime because it's colder
14 in the attic then.

15 So, one of the big options in the performance
16 method is actually reducing the size of that duct
17 system, which is a big efficiency measure that I think
18 is highly underrated in the industry.

19 We also assume that 1 to 300 attic ventilation,
20 and when the prescriptive standards requires a whole-
21 house fan, then the attic ventilation is increased. I
22 think the intention is that we're going to reduce the
23 amount of increase that is required and that's a topic
24 we're working on in terms of the 2016 performance
25 approach.

1 So, there's lots of different options to comply
2 under 2013. And the same approach will be carried
3 forward under the 2016 standards. And I don't want to go
4 through these in great detail, but you can take the
5 ducts out of the attic, you can use roof deck
6 insulation, you can do a cool roof with lower solar
7 absorptivity than the prescriptive standards require.
8 You can do verified low-leakage air handler and reduce
9 duct leakage. You can increase duct insulation and bury
10 the ducts in the ceiling insulation. You can do a duct
11 design that has a reduced duct surface area, as I
12 mentioned earlier, and that provides significant
13 benefits. And you can use increased attic insulation and
14 raised heel trusses to improve the performance of the
15 ceiling insulation.

16 Any combination of any of all of these things is
17 basically within the decision-making power of the
18 builder, based on what they see as providing
19 performance, and lowest cost, and the least hassle for
20 them.

21 Another part of the context here is if you look
22 at requirements for attics and ducts in the 2012 IECC,
23 that's the International Energy Conservation Code, which
24 is the model code that applies to most of the rest of
25 the United States, outside of California, and a couple

1 of other states like Florida.

2 Just for comparison, the IECC requires R-38
3 insulation for most of California. So, that's very
4 consistent with the proposal here.

5 It allows R-30 if the insulation is uncompressed
6 at the edges of the attic, using a raised heel truss.
7 That's pretty consistent with the performance analysis
8 where that attic edge effect is built into the software.

9 Supply duct insulation is R-8 in the attic, in
10 the IECC, just as we are proposing for the HPA
11 requirements.

12 Duct sealing is also mandatory in the IECC and
13 they make it so that you can't really compare very well
14 because they use a different metric, which is cfm 25 per
15 hundred square feet of conditioned floor area.

16 Whereas the California standards are based on
17 the air flow of the cooling system.

18 But if you look at a 2,100 square foot home,
19 with a three and a half ton system, that gives you about
20 the same duct leakage as our 6 percent duct leakage
21 requirement in the 2013 standards.

22 So, depending on which house it is, by going to
23 5 percent we might be reducing the duct leakage a little
24 below what the IECC requires.

25 And the IECC requires low-leakage tested air

1 handlers, which we're not requiring, I don't think, but
2 we are requiring the 5 percent duct leakage which is
3 going to be difficult achieve without the low-leakage
4 air handling.

5 So, current standard practice in 2013, or
6 evolving from the 2008 to the 2013 standards. Ducts and
7 air handlers are in-vented attics. All the insulation is
8 at the ceiling. The measured duct leakage rate is
9 consistently less than 6 percent, meaning that the
10 industry really has transformed itself in the last 15
11 years from very high duct leakage rates down to very
12 tight ducts. Very, very successful education and
13 technology transformation. In part, largely driven, I
14 think, by the building standards, so it's a great
15 success story.

16 Duct insulation, depending on the climate zone,
17 is a mixture of R-4.2, R-6 and R-8. So, this proposal
18 will attempt to raise that.

19 And people generally don't use duct design, they
20 generally default the duct surface area, which is one of
21 the areas we could improve things, I think.

22 So, what is the performance or what's the
23 advantage of a high-performance ventilated attic? The
24 big effect here is to reduce the attic temperature in
25 cooling, particularly in peak cooling events.

1 Mazi mentioned earlier, if you have not cool
2 roofing, and you have no roof deck insulation, and you
3 have the minimal ventilation, it's not unusual at all to
4 get temperatures in the attic above 140 Fahrenheit on a
5 day when it's, you know, 100 outside.

6 And because the ducts and all that equipment,
7 and that big heat exchanger is sitting there, you're
8 really degrading the performance of the air conditioning
9 system in that period when, you know, peak electric
10 consumption is very important to the State of
11 California.

12 So, that's the big deal here. That's what the
13 high-performance attic is intended to supply.

14 A second advantage is that, you know, people
15 have been talking about doing ducts in conditioned space
16 as a goal for 20 years. And all that talk has had
17 minimal impact on the real designs that builders are
18 building in the field, up to this point, anyway.

19 But if you do a high-performance vented attic,
20 that has a small, incremental change to standard
21 practice. You still put your ducts and your air handler
22 in the attic. You can use basically the same system that
23 you use now. And the only thing that changes is that we
24 change the environment in the attic by using insulation
25 and various other measures to reduce that temperature.

1 As I said, there's no change to the duct and air handler
2 location.

3 And if you do a good job on a high-performance
4 attic, an HPA, the savings are actually similar to what
5 you get by putting the ducts and air handler in the
6 conditioned space. So, it's a really remarkable
7 alternative that we'll see what the builders decide
8 they're going to do.

9 So the lifecycle cost analysis for the high-
10 performance attic. This is based on the proposal, R-13
11 fiber insulation below the roof deck, R-38 insulation at
12 the ceiling, R-8 ducts with 5 percent tested leakage.
13 And this shows, the table has got 16 rows, one for each
14 climate zone 1 through 16.

15 The first column is the present value of the TDV
16 energy savings from the high-performance attic package.
17 So, this is comparing a high-performance attic to an
18 attic using conventional practice on the 2013 standards,
19 and looking at the standard Energy Commission equations
20 for present values.

21 And you can see that it saves energy in every --
22 or it saves money in every climate zone, but the range
23 is really big. Climate zone 15, which is the biggest
24 cooling energy climate in California, the savings are
25 over \$5,000 present value.

1 Whereas in climate zone 7, where that's San
2 Diego on the beach, where you can basically go outside
3 and be comfortable, it saves \$343.

4 So, the cost depends on the climate zone,
5 because this is incremental cost, so it depends on what
6 the 2013 standards are, but it ranges from a low of \$589
7 up to \$1,042.

8 And if you subtract the incremental cost from
9 the incremental savings, you come up with the lifecycle
10 savings. And as you can see, in one, two, three, four
11 climate zones, the lifecycle savings are negative,
12 meaning that it's not cost effective.

13 But in all the climate zones where the
14 Commission is now proposing to make this a requirement,
15 which is 4 and 8 through 16, the savings are
16 substantially -- in most cases, substantially more than
17 the initial cost. So, that's the basis for this
18 requirement.

19 There are lots and lots of options for how to
20 achieve or how to meet this requirement. For the above
21 deck insulation or above rafter insulation, you can use
22 various board insulation, expanded polystyrene, extruded
23 polystyrene, polyisocyanurate, polyurethane, et cetera.
24 There's a little diagram here on the right, showing how
25 above deck insulation fits into a standard truss roof

1 system.

2 There are issues with all of those in terms of
3 fire ratings, and attachment, and ventilation, and
4 moisture management, and so forth. And there's been a
5 lot of discussion at the -- in the workshops, and so
6 forth, and I think that people are beginning to
7 understand what those issues are and understand how to
8 deal with them.

9 Here's a picture of an experiment that I carried
10 out several years ago, for the Energy Commission, on a
11 PIER project. And this was a house of one of the well-
12 known people sitting in the audience, who we won't point
13 out here or anything. And this is using expanded
14 polystyrene that's put down over the top of the
15 waterproof membrane on the roof, underneath the tile.
16 And this system performed very well in our measured
17 experiments.

18 There's people coming forward with a new
19 generation of products, including things like this
20 insulated roofing tile, which provides a significant
21 layer, level of insulation.

22 The insulation manufacturers are developing new
23 products for doing insulation below the roof deck. This
24 is a fiberglass insulation, blown-in system that's being
25 developed and experimented on in California.

1 And then there's the spray foam insulation,
2 which is being very actively pursued by quite a number
3 of people in California, and there are dozens of spray
4 foam insulated houses that have been produced, recently.

5 So, that's the presentation on attics. I don't
6 know if we want to stop and have questions on attics
7 separately, Mazi, if you want to do that?

8 MR. SHIRAKH: I would suggest going through both
9 walls and attics and then take questions.

10 MR. WILCOX: Okay. All right, so now we're going
11 to shift over and talk about high-performance walls, the
12 other big, prescriptive change here in making the
13 building envelopes move toward a zero net energy ready.

14 The proposal is to change the prescriptive U
15 factor for exterior walls to .051. And this is based on
16 an analysis of a two-by-six framed wall, with R-19
17 cavity insulation and R-5 sheathing. And the requirement
18 is proposed to apply to climate zones 1 through 5 and 8
19 through 16. So, everywhere, except the Southern
20 California Coast Zones of San Diego and LAX, basically.

21 And it applies to all low-rise residential
22 buildings, except a complicated statement about what
23 happens in additions and extensions of existing wood
24 frame walls in alterations, and so forth. Where, if you
25 have a two-by-four system in an existing building, you

1 can keep building a two-by-four system in the extension
2 or the addition using R-15 insulation. And if there's
3 two-by-six, then you have to go to R-19. So, you don't
4 have to go to a different wall system on your addition
5 just to meet this requirement.

6 So, the context for this is if you look at the
7 current and recent requirements, prescriptive
8 requirements for walls, in the 2008 standards we had R-
9 13 insulation and a two-by-four wall required in most of
10 the climate zones. In the hot Central Valley, climate
11 zones of 11 to 13, we went to R-19. And in the most
12 extreme climates, including the cold Mountain Zones, we
13 went to R-21. But there was no requirement in those
14 cases for continuous sheathing and so that was a
15 relatively high U factor.

16 The 2013 standards made a big step forward and
17 took the U factor down to .065 by requiring, basically,
18 R-4 continuous insulation with R-15 cavity insulation.

19 And in the 2013 standards you could comply with
20 lots of other wall systems, SIPs, ICFs, advanced wall
21 framing, et cetera. Although, I don't know that there's
22 actually a very large share of the market that's doing
23 anything, except to the R-15 plus R-4 kind of stuff.

24 So, there was a similar lifecycle cost analysis
25 done, as the one I presented a minute ago for the

1 attics. It used the Commission's CBECC-Res simulation
2 program, 2016, time-dependent valuation, value of
3 energy. The two standard prototypes we've been using for
4 the last two or three cycles of standards development,
5 so we do a combination of a two-story, 2,700 square-
6 foot-house, and a one-story, 2,100 square-foot-house,
7 assuming 55 percent of the new construction is the two-
8 story and 45 percent is the one-story.

9 And then, we compare it to a baseline, which is
10 the minimum compliant 2013 requirements in the same
11 house as the .065, which is a two-by-four, with R-15
12 cavity insulation and R-4 continuous.

13 The measure called QII, for short, quality
14 insulation installation is not required in any of these
15 cases so it doesn't apply to anything in this analysis.

16 And the CASE team looked at a whole range of
17 possible insulation systems and did costing of that, and
18 spent a considerable amount of time working with the
19 builders to get some agreement on the costing, and I
20 think made great strides in that area.

21 So, if you look, the first row here is the 2013
22 prescriptive baseline, the .065. So, for the lifecycle
23 cost analysis we assume that that's the starting place
24 and that's zero cost. And then we look at the
25 incremental cost going above that for the combination of

1 our two-story and our one-story prototypes, with their
2 wall areas and so forth.

3 So, the two-by-six, with R-19 insulation and R-5
4 sheathing, one-inch expanded polystyrene, I believe.
5 That is what achieves the .051 U factor. And the
6 consensus is that that costs \$517 per house, weighted
7 size house.

8 And then there's another way to make that same
9 wall using R-21 cavity insulation and R-4 sheathing, and
10 that gets you the same U factor. So, a builder, you have
11 a choice. The cost estimates say that that's more
12 expensive, so we're going to say we don't choose to use
13 that one.

14 And then, there's a whole range of other systems
15 here that will do better than the .051, you know, and at
16 somewhat higher or substantial higher costs.

17 All these walls systems are assuming to be --
18 assuming 16 inches on center framing. A more aggressive
19 framing system could work better, but we're not going
20 there, yet.

21 So, the lifecycle cost analysis here, it's the
22 same approach as I've shown you in the previous table.
23 I've limited this table just to showing the net present
24 value, which is the -- you take the savings and subtract
25 the cost, and if it's positive then it's cost effective.

1 And you can see that it's positive in every climate
2 zone, except 6 and 7, and that's where we're not
3 proposing to require it.

4 Just to review, this is a wall with two-by-six
5 framing, R-19 cavity insulation, R-5 continuous
6 sheathing that achieves a U factor of .051, and the cost
7 for our prototype house is \$517.

8 This is proposed to be the prescriptive
9 requirement. If you're not doing performance, this is
10 what you have to do. It's in climate zones 1 through 5
11 and 8 through 16. And again, as I said, it's cost
12 effective using the R-19, R-5. There are many other
13 options, including going to advanced wall framing, and
14 so forth.

15 This is a kind of a busy picture that shows
16 advanced wall framing. This is a system that's defined
17 in the Energy Commission rules as a system, and it
18 minimizes the number of pieces of wood that's in the
19 wall by making the system more efficient by lining up
20 vertical studs with the studs in the wall above, so that
21 the loads are carried efficiently down, and so forth.

22 This is a system that, with sufficient training
23 and organization, can deliver, we think, a lower-cost
24 solution, but that remains to be seen.

25 So, you know, there's a list of the benefits of

1 advanced framing, reduced material cost, reduced labor,
2 reduced thermal bridging. But there is the challenge of
3 the learning curve, and the additional planning, and
4 maybe some redesign of the houses. And in California,
5 where we have earthquake requirements, we have to be
6 very careful about how all the stuff's done, so it's not
7 completely free. But the American APA Construction Guide
8 is available on this subject, if you're interested.

9 So, that's the prescriptive and mandatory
10 changes to the low-rise residential standards. So,
11 questions?

12 MR. SHIRAKH: Thank you, Bruce. Any questions on
13 the high-performance? Sir? Well, Gary and then you.

14 MR. KLINE: Gary Kline, Commissioner. Could you
15 go back to the slide, Bruce, where you show the --

16 MR. SHIRAKH: Your house?

17 MR. KLINE: No, way back, near the beginning. It
18 was in the ceilings. You said I had to wait. So, it's
19 the one where you're comparing ducts in attics to
20 ductless. I had a question that will be in context. Near
21 the beginning. That one -- the one before it. I'm sorry,
22 go forward. That one, yes.

23 My question has to do with the ductless HVAC
24 systems. We're very clear about where ducts can and
25 can't be located. But I got a silly question. Where do

1 we require the location of the refrigerant tubing in a
2 ductless system? Because isn't that where all the
3 energy's being carried? And is that an issue or am I
4 missing something, again?

5 MR. WILCOX: Well, it's true that's where all
6 the energy's being carried. And I don't know, Gary,
7 we've never analyzed the losses from the refrigerant
8 piping. I know it's an issue and refrigerant piping is
9 often insulated. And I don't know, maybe there's some
10 mandatory requirement that I'm not familiar with, but --

11 MR. KLEIN: I'm not sure we can do anything with
12 it at this time, but I just raise it as a point of
13 something to think about.

14 MR. SHIRAKH: The intake, which is the high-
15 pressure, high-temperature, generally they don't require
16 insulation. It's the section where you may want to have
17 some insight and there is currently. So, we can talk
18 about it, but we haven't really nailed down the details
19 of ductless systems, so that would be one of the topics
20 for that.

21 MR. KLEIN: The insulation's required on the
22 tubing, and that's normally always the case. But it's
23 probably similar in new value to what we're proposing
24 for ducts, and it's got all the energy carried in a
25 smaller surface area. I get all of that. But I'm just

1 wondering if we ought to encourage it being in the same
2 locations as we require ducts.

3 MR. SHIRAKH: Okay, thank you. Sir?

4 MR. WILCOX: There's a question about the
5 temperature differences, too, which are -- it's not --
6 you know, there's the high-temperature side of the air
7 conditioning refrigerant lines is actually pretty high
8 temperature, and it's actually good to lose heat from
9 that as part of the -- part of the process. So, anyway.

10 MR. MURDOCH: Hi, my name is Jay Murdoch. I'm
11 with Owens Corning, the Government Affairs Office, in
12 cold and icy Washington, D.C. right now, so it's great
13 to be in Sacramento.

14 I'm speaking, really, to the point of the
15 subject of the high-performance attics work, and the
16 good work that the Commission and staff has done here.

17 But as a recovering Federal employee, that
18 worked on the American with Disabilities Act guidelines,
19 and getting to meet Mr. Raymer when I had a full head of
20 curly hair, it's kind of remarkable. My compliments to
21 staff where they're supporting. Because I read their
22 comments in the early '90s on the ADA guidelines that I
23 was drafting and I could feel the veins sticking out of
24 the neck through the letter, and then I got -- so,
25 anyway, my compliments to staff.

1 MR. SHIRAKH: Thank you.

2 MR. MURDOCH: I want to speak to two issues,
3 mostly in part because it looks like this group is very
4 familiar with the California process. I have either the
5 benefit or the burden to work in many states. So, I want
6 to compliment the Commission and staff on kind of due
7 process and transparency. So, really put a lot of value
8 in that and no surprises is really comforting for a lot
9 of manufacturers, like my peer companies.

10 MR. SHIRAKH: Thank you.

11 MR. MURDOCH: Also to staff, you know, looking
12 at being available to answer questions, sometimes
13 probably very naive and unfamiliar questions about your
14 process here, so I want to thank you for being open to
15 that process, and also your candor and coaching.

16 Third point is really around foresight to kind
17 of broaden the scope of options in both walls and attics
18 because -- and not getting constraining language that
19 kind of ties the hands of the marketplace and the
20 homebuilders. The homebuilders crave flexibility. The
21 marketplace is brutally efficient and very humbling.

22 So, I think the architecture that you've laid
23 out here with the prescriptive and performance language,
24 and giving options and tradeoffs really -- and not
25 having being anchored by the performance level that

1 you're trying to hit. So, that's the performance level
2 that you have set and then you've kind of said, okay,
3 get there. How are you going to get there? That's really
4 refreshing because the end result is that you're going
5 to end up with a code, I think, that does not pick
6 winners and losers. So, you're setting the performance
7 specification, you're letting the marketplace figure out
8 how it's going to go.

9 And as a former regulator, sometimes it's you
10 really want to do some crystal ball gazing and try to
11 figure out which way the marketplace is going to do, and
12 you want to do that, anticipate as much as you can. But
13 then you've also got to have the courage and discipline
14 to make sure there's enough flexibility for the
15 marketplace to seek its own level, so thank you for
16 that.

17 I'm really talking about the air permeable
18 option for unvented attics and high-performance attics.
19 That might be a new concept to many people. You know, my
20 company makes fiberglass insulation, but the language
21 that you have crafted is very inclusive and would allow
22 all my peer manufacturers to be in that space. That's
23 anyone making fiberglass insulation, (inaudible)
24 insulation, and even the recycled blue jean type of
25 material, and other products that I'm not listing. So,

1 that's really what we look to compete in the marketplace
2 and we don't want -- we don't like being constrained by
3 code. So, I wanted to compliment staff and the
4 Commission on the direction it's taking. I'll be happy
5 to answer any questions later on. Thank you.

6 COMMISSIONER MC ALLISTER: Thanks for being
7 here.

8 MR. SHIRAKH: Thank you, Jay, for the comments.
9 Go ahead.

10 COMMISSIONER MC ALLISTER: No, just thanks for
11 being here.

12 MR. SHIRAKH: Okay.

13 MS. WALTNER: Meg Waltner, with NRDC. I'll start
14 with our comments on attics, and ducts and conditioned
15 space. Overall, we're strongly supportive of these
16 measures. These are some of the key measures that have
17 been identified to reach zero net energy, and they've
18 been done in a way that will provide flexibility to
19 builders and really encourage the marketplace to start
20 implementing these. So, we're really strongly
21 supportive.

22 In particular, we're glad to see the fix to the
23 ducts and conditioned space language. In the draft
24 standard there had been sort of a loophole where ducts
25 and other unconditioned spaces would have been allowed,

1 and we're glad to see that language fixed in the 45-day
2 language.

3 We do have some concerns with the change to the
4 mandatory ceiling requirements. I understand there's
5 been some modeling done that shows that R-22, at the
6 roof level, can be equivalent to R-30, and that you
7 can't reach R-22 unless you're using a spray foam. Or,
8 you can't reach greater than R-22 with a single spray
9 foam application.

10 But we think we should limit that exemption just
11 to that insulation that's installed at the roof level,
12 not across the board. Think that as it's drafted
13 currently it would be backsliding, compared to today's
14 regulations.

15 So, encourage you to sort of consider crafting
16 that a little less broadly just to target that intended
17 market.

18 But, yeah, so that's sort of our overarching
19 comments on attics and ducts.

20 On walls, we strongly support updating the wall
21 requirements. Again, this is another measure that's been
22 identified as a key measure to reach ZNE.

23 We're concerned that the levels proposed aren't
24 the levels that were the highest levels that were found
25 to be cost effective in the case analysis. We had argued

1 at the draft standards that the Commission should
2 consider a .044 U factor. The IOUs' analysis proposed a
3 .046. We'd still encourage the Commission to strongly
4 consider those levels, which are the highest levels that
5 were found to be cost effective.

6 You know, it's really important that we're
7 adopting the highest levels that the analysis today
8 shows to be cost effective if we're going to reach that
9 zero by 2020. And I'd point out that the builders have a
10 lot of flexibility in meeting these requirements. You
11 know, most of these levels are going to be traded off
12 for the performance path. There's also the PV tradeoff.
13 So, there's sort of no reason not to be going for the
14 highest levels that the analysis shows to be cost
15 effective. Thank you.

16 MR. SHIRAKH: Thank you, Meg. I can respond to
17 some of your comments. On the walls, why we ended up
18 with R-19 and R-5. As you know, we looked at many
19 different permutations, cavity insulation versus
20 continuous insulation. And there were, at times, there
21 seemed to be products that were promising, but they
22 never quite materialized at the time, you know, when we
23 were considering this.

24 And also, we have to look at the cost of the
25 package. And like, if we went to a more aggressive, like

1 R-21 cavity insulation, you would save more energy but
2 some of the climate zones would drop out.

3 So, it was a balance between having a little bit
4 lower U factor with covering more climate zones versus
5 having a lower U factor and losing a bunch of climate
6 zones.

7 So, there was all kinds of things, you know, we
8 had to consider. And so, again, we decided that this was
9 the right level for this round of standards.

10 I'm sure the manufacturers out there are still
11 innovating and looking at new products.

12 On the methodology, I appreciate your support.
13 And I think when CBIA, Owens Corning, and NRDC all say
14 that, you know, we're on the right path by creating this
15 benchmark of performance and letting market decide. So,
16 I think that was the right thing to do, in hindsight.

17 The mandatory measure, R-22, so for the whole
18 history of standards the mandatory requirement for
19 ceiling insulation was R-19. Late in 2013 standards,
20 when we lost the high-performance attics and walls, you
21 know, we raised the mandatory requirement to be R-30,
22 which was basically the lowest requirement in all the
23 climate zones.

24 And then, when we started looking at the high-
25 performance attics and how you do tradeoffs between

1 ceiling insulation and the roof deck insulation, we
2 found that the R-30 could actually result in less than
3 optimum insulation levels. Because in many cases, a unit
4 of insulation at the attic is far more effective in
5 blocking heat transfer than at the ceiling.

6 I mean, you can pile up your ceiling insulation,
7 go to R-50, R-60, it doesn't make a whole lot of
8 difference. But even like R-2, R-3, R-4 at the roof deck
9 makes tremendous difference.

10 So, again, the simulation that you alluded to,
11 you know, we looked at those and we decided R-22 is
12 pretty much the sweet spot for that.

13 You know, you made a point that you have to make
14 a distinction between sealed attics and vented attics.
15 We could do that. One of the things, you know, we are
16 trying to do is basically simplicity in the standards,
17 having one requirement that everybody understands, even
18 though if it means losing a little bit of an efficiency
19 which may or may not be the case.

20 So, the simplicity basically drove us to having
21 one R-22 for both the sealed attic and on vented attics.
22 But we can have more discussions about that.

23 MS. WALTNER: Yeah, thank you, Mazi, and I look
24 forward to follow-up conversations on this. Thank you.

25 MR. SHIRAKH: Nehemiah, then George.

1 MR. STONE: Nehemiah Stone, the Benningfield
2 Group. Very quick comment. It is really laudable to
3 provide greater flexibility to the builders. At the same
4 time, it raises the need for making compliance simpler
5 for the building departments.

6 Because a lot of building departments have told
7 us that their field staff know the prescriptive and the
8 mandatory measures really well, and that's what they
9 inspect, regardless of what the compliance documentation
10 says.

11 So, we need to pay even greater attention to
12 making sure that we have the compliance paths clear and
13 easy for building departments to deal with.

14 MR. SHIRAKH: Thank you, Nehemiah.

15 George.

16 MS. NESBITT: George Nesbitt, HERS rater. I was
17 not going to get up the extra hour and a half early this
18 morning to come to a 9:00 meeting. But apparently, Mazi,
19 you did not have enough to go on and on that you stayed
20 on schedule, and you started early on this section.

21 Are you covering 150.2?

22 MR. SHIRAKH: That's the --

23 MR. NESBITT: Alterations.

24 MR. SHIRAKH: Alterations. You can ask, yeah.

25 MR. NESBITT: Because you didn't present

1 anything, although you didn't mention it occasionally.

2 MR. SHIRAKH: Well, we haven't changed much,
3 that's why we're not presenting.

4 MR. NESBITT: Okay, I'll just -- I'll go to
5 150.0, mandatory. I do think that reducing the minimum
6 ceiling insulation from R-30 is probably not a good
7 thing.

8 In section (c), in the walls, two-by-fours are
9 required to have a minimum of R-13 and two-by-sixes are
10 required to have a minimum R-19. I think we need some
11 language in there that says wall cavities have to be
12 filled if it's an air permeable insulation. So, if I
13 build a two-by-eight wall, I can, I guess, well, put in
14 what I want because it doesn't actually even say what I
15 have to do. Is it a two-by-six or a two-by-four, and I
16 can throw in R-13 or R-19, not fill the cavity, and we
17 know it won't work. Which is, of course, filling the
18 cavity is required in QII.

19 In section (d), I noticed you fixed the
20 inconsistency of the language in floor insulation and
21 made it the same as wall and ceiling, so thanks for
22 doing that.

23 In section (j), (j)3, pipe insulation, the
24 wording is that pipe insulation and protection is only
25 required in unconditioned space. Yet, I think we need to

1 protect pipes and insulate them even in conditioned
2 space. So, that's something that should be changed.

3 Section (k), in 2013 I think we made the change
4 that said all recessed lights had to be air-tight
5 insulation contact rated. Which essentially means a non-
6 ICA AT recessed CAM light is really not -- can't be sold
7 in California, but I don't know if the supply houses
8 know that.

9 MR. SHIRAKH: That doesn't mean that it means in
10 newly constructed buildings. You can put in alterations.

11 MR. STRAIT: Also, as a quick note, we will be
12 talking about lighting and water heating later, so this
13 is the presentation on --

14 MR. NESBITT: Yeah, I can bring this back up in
15 lighting. In section (o), we reference, of course,
16 ASHRAE 6022 for mechanical ventilation. I think in the
17 standards it should say which year of 6022 we're
18 referencing, because I don't think we necessarily want
19 to change that mid-code cycle, anyway.

20 So, 150.1, it's good to see that the name of the
21 chapter has changed and you removed "new construction".
22 Because, obviously, it's not just about new
23 construction. Because additions and alterations mostly
24 refer back to it with some exceptions.

25 The section (c)8A ii, which is the water heating

1 requirements. As I've said previously, I've violated
2 this section in the past and put in commercial water
3 heaters, prescriptively, no questions asked. Yet, the
4 code basically, previously, has only required a water
5 heater rated with an energy factor.

6 And you've added an exception for a commercial
7 water heater. If you go to --

8 MR. SHIRAKH: So, George, can we talk about
9 high-performance attics and walls? That's the topic that
10 was --

11 MS. NESBITT: Yeah, that's --

12 MR. SHIRAKH: You're talking about water
13 heating, commercial water heating, and everything else.
14 I mean, we're going to be talking about those topics
15 throughout the next two days, but I would appreciate --

16 MR. NESBITT: On the -- well, tomorrow's mostly
17 nonres.

18 MR. SHIRAKH: Yes.

19 MR. NESBITT: So, this is residential water
20 heating, which is part of 150.1.

21 MR. SHIRAKH: But we're going to be -- we
22 haven't presented that, yet.

23 MR. NESBITT: Okay. I did not see plumbing on
24 the agenda.

25 MR. SHIRAKH: Well, it is right after Bruce, Dee

1 Anne's going to talk about the water.

2 MR. NESBITT: Okay, all right. And are you going
3 to present -- you're not going to present on
4 alterations, specifically?

5 MR. SHIRAKH: Alterations, no, because we're not
6 proposing any changes.

7 MR. NESBITT: Okay.

8 MR. SHIRAKH: But you can make comments at the
9 public area.

10 MR. NESBITT: Okay. I'm going to hit on one
11 thing on the ductless, that Gary mentioned, on
12 refrigerant lines. Of course, refrigerant lines also,
13 you know, exist in split systems.

14 But we have been, in the past, penalizing
15 ductless systems in the performance method, in how we're
16 comparing it. In 2013, we still are because, apparently,
17 when you model a ductless system you're getting compared
18 to a ducted system in the attic, with ducts in the
19 attic.

20 High-performance, I think ducts in conditioned
21 space, I think the high-performance attic or ducts in
22 conditioned space is fine. Whether people are going to
23 do it or go to performance and do something else, I
24 don't know.

25 I guess the one question would be how this

1 applies in multi-family? Is there any -- would there be
2 any difference in multi-family how we're applying this?

3 MR. WILCOX: Well, if you were to have ducts i
4 n a vented attic, in a multi-family building, then this
5 would apply.

6 MR. NESBITT: Okay.

7 MR. WILCOX: But that's not typically what the
8 situation is with multi-family, as I understand it,
9 because of fire codes, et cetera, that ducts are not
10 typically in the attics. So, it has a minimal impact on
11 those buildings, really.

12 MR. NESBITT: Okay. All right, that will be it
13 for now.

14 MR. SHIRAKH: Thank you, George.

15 Bob?

16 MR. RAYMER: Thank you, Mazi. Bob Raymer, with
17 California Building Industry Association.

18 And while I suspect we, at CBI, will be
19 supporting one or two of NRDC's other proposals today,
20 we are very resistive of changing the U value for the
21 walls.

22 As you mentioned in your sort of opening, as the
23 stakeholder groups got together, the .050, .051 was
24 pretty much sort of a borderline where you could get a
25 maximum number of climate zones into that. And reducing

1 that further to either .044 or .046, you were going to
2 lose several other climate zones in that package.

3 In addition, when we got the groups together
4 back in May, for the first of the -- or April, for the
5 first of the energy forums, and once again in November,
6 for the last one, of all four items being proposed as
7 changes to the residential standards, there's no
8 questions that advanced wall systems was effectively the
9 one that was giving everyone pause, for one reason or
10 another.

11 We've got to be very careful, as we move away
12 from two-by-four to two-by-six, that we don't trigger a
13 series of litigations over water penetration. Like we
14 saw in the late 1990s, there's any number of other
15 issues that come into play here.

16 But the bottom line here is the wall, the
17 advanced wall system represents a dynamic change, a
18 quantum leap, if you will, from what we've been doing
19 for the last 60 years.

20 And the Energy Commission has sort of pressed
21 the envelope here, if you excuse the pun. But the fact
22 is 0.51 -- 0.051 seems to be that sweet spot.

23 We are going to have to pretty much retrain our
24 entire framing crews throughout the State. And of those,
25 half of them still aren't back to work in the

1 residential sector. And so as we move forward in the
2 next couple of years, a whole lot of people are going to
3 be coming back.

4 To me, in looking at the way our industry can
5 make changes like this, it's going to be a heavy lift to
6 get this in place and doing it well by 2020's change.

7 I anticipate that we're going to be using other,
8 alternative tradeoffs initially, in 2017, going to more
9 efficient HVAC systems, using the solar PV credit
10 tradeoff. That is the one place where I see that having
11 great benefit here.

12 And so right now, I think the Energy Commission
13 has found the sweet spot in the 0.051. Thank you.

14 MR. SHIRAKH: Thank you, Bob.

15 Any other questions from the audience on high-
16 performance attics and walls?

17 Nehemiah, did you want to make a quick
18 statement?

19 MR. STONE: Let me give a little background
20 while it's going up.

21 MR. STRAIT: Before we get started, roughly how
22 long is this presentation?

23 MR. SHIRAKH: I asked Nehemiah to keep it to
24 around five minutes.

25 MR. STRAIT: Okay, which of these files is it?

1 The one at the bottom, NIS?

2 MR. STONE: That will happen.

3 MR. STRAIT: Sir, which file? This one, the
4 title NIH, March 2nd? Okay.

5 MR. STONE: So, the point of this
6 presentation -- by the way, let me back up a bit,
7 Nehemiah Stone, with the Bennington Group.

8 This research that I'm about to present was
9 funded by PG&E in order to address a serious issue about
10 housing affordability.

11 So, as recently as August of this last year, we
12 have two important insights into the cost of homes. One
13 is that -- by NHB, that every time we increase the cost
14 we are kicking more people out of the market.

15 And the second, by BIA, that the cost of
16 regulations are increasing the home prices and making
17 homes unaffordable.

18 To understand the relationship between that,
19 PG&E asked me to work with the UCLA Anderson Forecast,
20 associated with the Anderson School of Economics. And
21 William, you -- he's here in the audience to take any
22 questions on that particular research, if there are any
23 questions.

24 The first thing we did was to survey about a
25 dozen builders, eight of which are large production

1 builders here, in California, to find out what the
2 biggest cost categories are in their cost of
3 construction.

4 And the second thing was to gather data on
5 construction costs, themselves. And there are six
6 sources for that data. The Turner Index, and a number of
7 other indices about specific materials and wages.

8 Then we compared those to the trends in home
9 prices over those same periods, using the CASE Index,
10 the widely respected index of the home prices, and the
11 Lincoln Institute of Land Policy.

12 I'm going to go through these next three graphs
13 really quickly because the fourth graph kind of pulls
14 that all together.

15 So, what you see here is the trends in
16 construction costs over the last, roughly, 30 years. And
17 it's pretty clear that they've risen pretty evenly, with
18 a couple of points, inflection points.

19 This one is the home prices. And you'll see that
20 they did not increase pretty evenly. In fact, they have
21 decreased a couple times, held steady at times, et
22 cetera.

23 This graph shows the relationship between those
24 two trends. So, a "1" means that there is a complete
25 correlation at that time, in that jurisdiction, between

1 the change in construction cost and the change in home
2 prices. A "0" would mean there is no relationship.
3 Fluctuations mean that there's a very tenuous
4 relationship.

5 So, correlation is clearly not there. Home
6 prices have moved much more rapidly than construction
7 costs. They have changed going up and down, whereas
8 construction costs have been relatively, consistently
9 increasing, but at a much lower rate.

10 The takeaway from that is that it's not
11 construction costs that drive the changes in homes. It's
12 typically land prices and it's typically demand for
13 homes. It's not driven by the cost of construction but,
14 rather, by the demand.

15 So, the conclusions from the Anderson forecasts
16 are that there isn't evidence, there isn't visible
17 evidence that the increase in construction costs will
18 cause higher home prices.

19 And further, there's not even clear evidence
20 that the construction, that these changes in
21 construction costs have any -- or that Title 24 has had
22 any relationship at all to these changes in construction
23 costs, much less the prices.

24 Go ahead. On the other hand, energy costs do
25 affect low-income households. They pay a much higher

1 percentage of their income than typical households for
2 energy, so it's extremely --

3 COMMISSIONER MC ALLISTER: Nehemiah, can I jump
4 in and just ask a clarifying question?

5 MR. STONE: Yes. Yes, sir.

6 COMMISSIONER MC ALLISTER: So, you said that
7 home prices don't reflect construction costs, that those
8 are two kind of fairly different things that aren't
9 correlated.

10 MR. STONE: Correct.

11 COMMISSIONER MC ALLISTER: So, but then I heard
12 you say that any additional -- so, the efforts required
13 to comply with Title 24, Building Efficiency Standards,
14 there's no evidence that those actually impact
15 construction costs, themselves?

16 MR. STONE: That's correct.

17 COMMISSIONER MC ALLISTER: Oh, okay, so you
18 found that in your --

19 MR. STONE: Yeah, can you go back a couple
20 slides? So, on this the vertical lines mark the places
21 where the Energy Commission changed the code in
22 significant ways.

23 And what you see is that, you know, if Title 24
24 standards had directly impacted construction costs, you
25 would see construction costs trend upward at those

1 points. Well, that's obviously not the case, from the
2 dotted line there.

3 COMMISSIONER MC ALLISTER: Okay, thanks. We
4 could dig in a little bit here, but I think I'll let you
5 go on.

6 MR. STONE: There will be a report available,
7 shortly, that has all the details and the algorithms in
8 it.

9 Go ahead. So, what this is basically telling us
10 is that when we're looking at people in affordable
11 housing that energy is a huge part of their monthly
12 costs, and that that they meet that with, on average,
13 less than half the income than people in -- the public
14 at large.

15 The report will be available soon. One final
16 comment I would like to make, and this is not from the
17 Anderson Forecast. This is from Nehemiah Stone, the
18 Benningfield Group.

19 When we take a look at cost effectiveness, we
20 look at the actual costs of the construction. This study
21 means -- to me, it means that we should probably
22 reevaluate that. And if the cost to homeowners of
23 increased energy efficiency is zero, and the benefit is
24 energy savings, then maybe we ought to completely
25 rethink the cost-effectiveness criteria.

1 Any questions before I sit down?

2 MR. SHIRAKH: Thank you, Nehemiah.

3 COMMISSIONER MC ALLISTER: Thanks. Thanks for
4 being here.

5 MR. SHIRAKH: Bob, you want to respond?

6 MR. RAYMER: Oh, yes. Okay, this is Bob Raymer,
7 Senior Engineer with the Building Industry Association.

8 While we certainly do agree that lower and
9 moderate income individuals, and households pay a
10 disproportionate amount for energy billing and whatnot,
11 and that energy efficiency certainly can help that out,
12 that's not in question.

13 However, if we look at the building code changes
14 that have been made by the State of California over the
15 last six to seven years, primarily the last two updates
16 to the Energy Efficiency Standards, the implementation
17 of the first set of mandatory green building measures
18 and, most importantly, mandatory residential fire
19 sprinklers in the State of California. We're one of only
20 two states to mandate that.

21 You've probably got -- and once you add the
22 upcoming energy efficiency standards and you put it all
23 together, you've probably got about a \$20,000 package of
24 code changes.

25 And the fact of the matter is on an \$800,000 to

1 a \$1 million home, the overall impact is somewhat
2 negligible. But you absolutely see the differential when
3 you get to the lower end of the market, the entry level
4 market. Look at what's been going on from Sacramento all
5 the way down to Bakersfield, and into Riverside,
6 projects focusing on that \$250,000 home have been
7 severely disrupted. Not only by the economic downturn,
8 sprinklers hit them like a ton of bricks. It was very
9 unfortunate.

10 It's a State mandate, we have to comply. The
11 industry's getting back on its feet. But I've got to
12 tell you that at the lower end of the market those
13 upfront initial construction costs do have an impact on
14 housing affordability and whether or not the project
15 goes forward, or not.

16 And so, we would disagree with the comments that
17 were just made on that aspect. Thank you.

18 MR. SHIRAKH: Thank you, Bob.

19 COMMISSIONER MC ALLISTER: Thanks.

20 MR. SHIRAKH: Any other comments?

21 COMMISSIONER MC ALLISTER: It sounds like we
22 need to see the report and sort of pick it apart, and
23 see what the merits are.

24 MR. SHIRAKH: Yes?

25 MR. HOROWITZ: Noah Horowitz, with NRDC. Just

1 really quickly, to put some of this in the context, and
2 thanks for the new research and we'll all take a look at
3 it.

4 The beginning of the workshop today we heard
5 that there's an incremental cost of around \$2,700 per
6 home. And there seems to be emerging consensus around
7 the numbers.

8 What hasn't been said is in your documentation,
9 I don't know if you're going to bring it up later, but
10 we're talking about economic impacts, you showed a \$3
11 billion net savings for the first year of the code.

12 So, this is new information. But while there are
13 costs, you're already showing very large net savings.
14 Just want to make sure that's part of the record. Thank
15 you.

16 MR. SHIRAKH: That's why we're doing this
17 because there are savings.

18 Any other questions or comments on high-
19 performance attics and walls? We kind of digressed a
20 little bit from those topics. Anything on that?

21 So, with that, thank you, Bruce. And we're going
22 to go to water heating measures. It does appear we're
23 falling a little bit behind, so those of you who are
24 hungry, hang in there.

25 COMMISSIONER MC ALLISTER: Hey, Mazi, I'm going

1 to step in and just let everybody know, my Adviser, Pat
2 Saxton, has been up here for a little while now. And I
3 just want to acknowledge him and thank him for his help
4 working with you guys on pushing this stuff forward. So,
5 he'll be taking copious notes.

6 MR. STRAIT: And, actually, while we have a
7 quick break I just want to mention, for folks that are
8 tuning in remotely there's a raise-your-hand button.
9 That's what signals us and lets us know that you want to
10 make a comment. So, be sure to click that button if you
11 want to say something for one of these presentations.
12 Thank you.

13 MR. SHIRAKH: So, this is the third, one of the
14 largest, the main measure that we're proposing for the
15 2016 standards. Historically, we haven't really touched
16 water heating, as far as the water heaters are concerned
17 in the standards, since the inception of the standards.
18 But we think we're going to change that this time
19 around. And Danny will talk about that.

20 MR. TAM: Hi, Danny Tam, CEC staff. I'll be
21 going over the water heating changes.

22 Okay, jumping back to Section 110.3, the
23 mandatory section. We're proposing to add a new
24 mandatory measure for instantaneous water heater. When
25 you install it to have isolation valves installed. This

1 will greatly simplify the maintenance process. This will
2 allow plumbers and homeowners to perform the flushing
3 procedure very easily.

4 So, this will keep the unit running at peak
5 efficiency level and also prolong the lifespan of the
6 unit.

7 Okay, Bruce already mentioned this, liquid line
8 dryer filter, under Residential 150.0. So, the filter
9 removes non-condensable and contaminant from the
10 refrigerant. So, a lot of times it's already included
11 with the unit, but a lot of times it's not installed, so
12 we want to make that a mandatory measure.

13 Continuing the mandatory section, we want to
14 delete the section pertaining to external insulation
15 wrap with storage gas water heater. This was a legacy
16 language that made sense back when insulation was very
17 bad. I think back then it was like R-4.

18 But with the new filed standard, it's minimum to
19 be two-inch of insulation, about R-16, so that makes
20 this requirement a little obsolete.

21 Okay, moving on to the prescriptive section.
22 We're proposing to change the primary prescriptive
23 option to instantaneous water heater. That meets the
24 Federal minimum standard.

25 Mazi mentioned a .82 energy factor. That's the

1 minimum standard beginning in April. The efficiency
2 descriptor is changing in the near future. It's going
3 from energy factor to a uniform energy factor. So,
4 whatever that Federal minimum is in uniform energy
5 factor that will be the standard.

6 Okay, and this will also set the basis for the
7 standard design for the performance approach. I just
8 want to emphasize that this is not a mandatory measure.
9 It's a prescriptive measure.

10 So, under performance you're allowed to use any
11 kind of water heater you want. You can use storage. You
12 can use condensing. You can use, you know, combined
13 hydronic. It just has to be compared to instantaneous
14 water heater.

15 Okay, and for people who doesn't want to use
16 instantaneous and they don't want to do performance, we
17 also developed some prescriptive alternative for
18 storage. So, if you have a storage less than 55 gallon,
19 you can meet the prescriptive requirement by also
20 installing QII, plus one of the following, either a
21 compact hot water distributing system or insulating all
22 the hot water pipes. You know, QII has proven to be cost
23 effective and those two are currently
24 (inaudible) -- you can take in the performance approach.

25 Okay, we also added a third option. So, the

1 Federal standard is a little different when your tank
2 size is under 55 versus over 55. Over 55 it's a little
3 more stringent and we want to recognize that difference.

4 So, if you install a water heater over 55
5 gallon, you don't have to do QII. You just have to do
6 either the compact hot water distribution or insulating
7 all the hot water pipes.

8 Okay, and again under 150.1, we want to delete
9 the electric in storage plus solar fraction option.
10 That's currently an option when natural gas is not
11 available. Realistically, it's a very expensive option
12 that's probably never used in reality, so we want to
13 delete that. So, that will simplify the standard and
14 reducing the number of standard design to one that will
15 apply to all situations.

16 Okay, and all the changes in 150.1 is applicable
17 only to single-dwelling units. So, if you have essential
18 hot water system that serves multiple units, this does
19 not apply to you. And it's only for an addition that a
20 water heater is part of the addition. This will not
21 affect retrofits.

22 Okay, so that's all the water heating changes.
23 We're now opened up for questions.

24 MR. SHIRAKH: Questions on water heating for
25 Danny? Gary.

1 MR. KLEIN: Gary Klein, Gary Klein and
2 Associates. So, I have a question regarding the hot
3 water as a system sorts of questions. I realize we've
4 gone mostly after equipment and some about compact
5 design has been discussed in the standards.

6 We've made a bunch of changes in things other
7 than the building energy codes this past year, that
8 might be of relevance to this proceeding, one of them in
9 California and one of them nationally. And I'd just like
10 to mention them for a minute, if that's okay.

11 MR. SHIRAKH: Sure.

12 MR. KLEIN: So, in California, the California
13 Utility Allowance Calculator has been under discussion
14 and revision for a few years now. And late last year, a
15 group presented to the Energy Commission staff about
16 what changes had been made. And in particular, relevant
17 to hot water, was a method that had been developed to
18 count how much water is being used, either up or down,
19 compared to some base case, and then separately count
20 the energy attached to that water.

21 So, you can get credit in that method for water
22 use efficiency, in particular on the hot side. It also
23 covers cold water, but for relevance here it's hot
24 water.

25 If you cut consumption from a standard operating

1 case by 25, 30 percent, you'll save water and the
2 heating energy attached to it. That's not currently
3 allowed in the Title 24 method, as far as I'm aware.

4 However, if you cut the hours of operation
5 needed to heat the water, you spend a little bit more
6 time in standby. And that standby energy, in this
7 method, is separately calculated to go up slightly, so
8 it tracks energy well.

9 If you, in that same method, cut structural
10 waste from half-a-gallon or a gallon per event, waiting
11 for a shower or a sink to be used for hot water, you
12 would -- you cut the structural waste. So, you'd cut the
13 volume of water to do that.

14 If, however, you ran a 24/7 recirc loop to make
15 that viable, you'd pay the energy penalty rather largely
16 and the method accommodates that.

17 So, we have a model that we should be thinking
18 about very seriously for incorporation into Title 24, if
19 we're going after net zero ready buildings, net zero
20 buildings, hot water is one of the biggest chunks of
21 what's left, right? And so, nominally half from what I
22 can see in the data that you presented earlier today,
23 Mazi.

24 The similar effort has been undertaken at
25 RESNET, for the HERS Program nationally. It was

1 presented at the RESNET Conference, where Commissioner
2 McAllister was a keynote speaker last week, two weeks
3 ago, and was well-received by the industry.

4 It is a similar, but different method of scaling
5 the hot water consumption to the size of the home. I
6 highly commend both methods to this body for
7 consideration. I realize we're in 45-day language, but
8 we have stuff that we could adapt within a few days, if
9 you were willing to listen to it. So, I appreciate your
10 time thinking about it. Thank you.

11 MR. SHIRAKH: Thank you, Gary.

12 COMMISSIONER MC ALLISTER: Thanks, Gary. Has any
13 of this discussion taken place already or is this
14 introducing it just today, into the process?

15 MR. KLEIN: I have not had a chance to speak to
16 staff since we spoke.

17 COMMISSIONER MC ALLISTER: Okay.

18 MR. SHIRAKH: Again, you know, we'll be happy to
19 hear him out and there's probably -- I mean, we've
20 learned a lot interacting with Gary, or with hot water.
21 But I suspect at this point we're too late for 2016 to
22 make major changes to our modeling assumptions. But
23 again, you know, it's never too late to start it for
24 2019.

25 COMMISSIONER MC ALLISTER: I also want to back

1 up a little bit just, you know, high level we don't do
2 plumbing code in this process. And so to the extent, so
3 Gary has basically laid out an accounting method to take
4 account of the hot water and that sort of puts the
5 pieces, you know, puts the chips where they're supposed
6 to be in terms of attribution, really. Which helps our
7 cost-effectiveness case and we could do that, right?

8 I see Bill coming up and he might want to
9 comment on this.

10 But I wanted to sort of jack it up to the 30 or
11 50 thousand-foot level. And, you know, in order to
12 impact design, now we can do -- we encourage people to
13 do water columns, and short runs, and that kind of
14 thing. But really, if we wanted to design from the
15 ground up low-water systems that would both conserve
16 water, and the energy associated with it, that's
17 probably a multi-agency effort.

18 And so, I think there's a relative importance in
19 gaining traction or gaining an importance the idea that
20 we would start a conversation, you know, with HCD and
21 the necessary trade bodies to have a discussion about
22 what that might look like. Because I think in the water
23 front and on the energy front this is one of the
24 remaining areas where there's actually quite a bit of
25 progress that can be made.

1 So, I'd like to see that conversation go
2 forward. And, you know, no time like the present.
3 Obviously, it's never going to be easy because, you
4 know, it's never a good time to have a new baby, right.
5 But I think starting early on, even for the 2019 cycle
6 would -- or starting now would help us make the right
7 progress for whenever we have the opportunity to figure
8 out a path forward. Whether, you know, it's in the next
9 updated Title 24, or elsewhere.

10 So, anyway, I would like to sort of get that on
11 the radar screen.

12 MR. SHIRAKH: Thank you. Bill.

13 MR. PENNINGTON: Bill Pennington, with the
14 Energy Commission staff.

15 So, you know, I have to really agree with Mazi
16 that we're not in a position, I don't think, to adjust
17 things at this point in the rulemaking proceeding. But
18 we are interested in these ideas.

19 And a couple of possibilities, we're in dialogue
20 with RESNET related to how, perhaps, California's rating
21 system could be more closely aligned with RESNET. And
22 so, if there's some progress being made on this there,
23 that might fit into those conversations.

24 Also, as Peter was saying earlier on, between
25 rulemaking cycles the Energy Commission has the ability

1 to do compliance options and we might be able to do
2 something there, too, so --

3 MR. KLEIN: Thanks.

4 MR. SHIRAKH: Thank you, Bill.

5 MR. TAM: And, Gary, we are updating the ACM
6 Reference Manual later in the year. And this sounds like
7 a conversation better suited for that. Maybe start out
8 as a credit and maybe for 2019 we can look into adopting
9 it.

10 MR. WILCOX: Yeah, Gary, I'd like to say, too,
11 that -- Bruce Wilcox -- that we're going to be starting
12 a process to revise the whole water heating calculation
13 in the performance method this spring.

14 (Applause)

15 COMMISSIONER MC ALLISTER: It sounds like we
16 have an interest of the stakeholder group that wants to
17 have that discussion, so that's great.

18 MR. SHIRAKH: Okay, just a second, Gary.

19 MR. KLEIN: Thank you very much for considering
20 this. I realize it's very late in this proceeding and I
21 agree with the idea of making it credit-worthy, first.
22 Right, we can do that.

23 I would also offer the fact that SoCal Gas
24 actually has a hot water demo lab, where we are able,
25 literally next week, if we chose, to mock up anything

1 we've written in the standard and see if we like the
2 answer from a policy or other point of view. And if we
3 don't, let's not keep putting it in the standard. Pick
4 things that work and what we're satisfied with.

5 And I know that Mike's been to one of these
6 meetings there and it's very, very instructive. And I
7 think that that's -- I open it for all of you. We pay
8 for it, and so it's possible to do.

9 COMMISSIONER MC ALLISTER: And I want to just
10 also point out, you know, the trades are an important
11 piece of this discussion. So, you know, I think somebody
12 has to actually build these systems when they go in and
13 that's pretty important to involve them from the get-go.

14 MR. SHIRAKH: Go ahead.

15 MR. STIMSON: Good morning, Mark Stimson, with
16 Bosch Thermal Technology. Commissioners, staff, commend
17 you on the hard work in improving the energy efficiency
18 standards.

19 Bosch does support the mandatory, as well as
20 prescriptive language in the hot water recommendations
21 for the new standards.

22 Specifically, just some validation from a
23 manufacturer who's been in the hot water business since
24 1932, in terms of technology performance. There were
25 some questions in some of the earlier language with

1 respect to performance of product over longer periods of
2 time.

3 I think the industry, the manufacturers have
4 shown that tankless technology, in particular, will
5 effectively perform for 15 years plus.

6 And then there was the issue of water hardness
7 with respect to the California market, in particular. I
8 think the mitigation of those two issues are addressed,
9 one, in the mandatory requirement of isolation valves to
10 allow proper maintenance, but also water softeners in
11 many cases can mitigate the issues with respect to
12 scaling.

13 Thank you very much.

14 MR. SHIRAKH: Thank you. I must say that this
15 proposal was a great educational opportunity for staff.
16 We learned a lot by interacting with the manufacturers,
17 especially conversations we've had with you related to
18 maintenance issues, for both the performance side for
19 both the tankless water heater and storage, and the
20 actual maintenance practices. So, that was all very
21 useful. Thank you so much.

22 Meg?

23 MS. WALTNER: Meg Waltner with NRDC. We strongly
24 support the update to the baseline in the prescriptive
25 option to tankless water heaters for gas homes.

1 As we've been voicing throughout this process,
2 we do have some concerns with the limitations on
3 installing heat pump water heaters, or sort of the
4 impediments to installing heat pump water heaters in the
5 way the code is currently structured.

6 Under the prescriptive path there's no way to
7 install a heat pump water heater. And under the
8 performance path you may install one, but there's a TDV
9 penalty that you take from switching from a gas to an
10 electric water heater.

11 We're concerned with this because a conventional
12 gas water heater today actually results in higher carbon
13 emissions than the high-efficiency heat pump water
14 heater. And we're worried that TDV doesn't accurately
15 capture this long-term tradeoff between using gas and
16 electricity.

17 What we've argued in our previous comments, and
18 continue to urge you to adopt, is removing the bias
19 between gas and electric, and just making it a neutral
20 path. So, have a prescriptive option for a heat pump
21 water heater in the prescriptive pathway. And then, in
22 the performance pathway have it two different options.
23 So, if you're using a gas in your built design, we'd
24 also like to see that in the reference home. But we'd
25 like to see an option where you have a heat pump water

1 heater in the reference design and then can use that in
2 the built home, as well. So, thank you.

3 MR. SHIRAKH: Thank you, Meg. Again --

4 COMMISSIONER MC ALLISTER: Well, I guess, so I
5 think it boils down more or less to cost effectiveness,
6 right, in terms of --

7 MR. SHIRAKH: It's a combination of cost
8 effectiveness, preemption, and several other factors
9 that went into play in this.

10 COMMISSIONER MC ALLISTER: Yeah.

11 MR. SHIRAKH: And so, ultimately, you know,
12 there's some concerns about the language there, the gas
13 availability, how we could have changed that.

14 So again, what we thought would work and avoid
15 preemption is the language that we propose, that it will
16 use standard -- I mean, tankless water heater as the
17 standard for both the prescriptive and performance. And
18 there's -- you know, we know that over 95 percent of the
19 newly constructed building in the State complies using
20 the performance path, anyways. So, under that
21 circumstance, you know, people can easily switch from
22 tankless to high performance heat pumps for water
23 heating.

24 And again, the whole construct was basically to
25 avoid preemption issues.

1 COMMISSIONER MC ALLISTER: Preemption, yeah.

2 MR. SHIRAKH: And the gas availability language
3 that was giving us some problem.

4 COMMISSIONER MC ALLISTER: Yeah, and then there
5 is some accounting for emissions in TDV, right?

6 MR. SHIRAKH: Yes.

7 COMMISSIONER MC ALLISTER: Maybe it's not the
8 full, you know, that probably NRDC would like to see,
9 but we are kind of where we are with cap and trade, and
10 the value that we've got out there and some projections
11 forward.

12 But that preemption issue is a big one.

13 MR. SHIRAKH: And we had several iterations of
14 that language that included some kind of an electric
15 water heater, but we ran into problems with those and
16 that's why we --

17 COMMISSIONER MC ALLISTER: So, have you had this
18 conversation and are just kind of disagreeing still
19 or --

20 MS. WALTNER: Yeah.

21 COMMISSIONER MC ALLISTER: Okay.

22 MS. WALTNER: So, I think we should have a
23 further conversation on the preemption issue. I think
24 with the new standard that requires 55-gallon or above
25 electric water heaters to be heat pumps there's a way to

1 cross the language to avoid preemption. So, I don't
2 think that's an insurmountable challenge. So, let's have
3 some further discussions, please.

4 MR. SHIRAKH: Okay, we can talk. I think Bill is
5 the eminent authority on --

6 MR. PENNINGTON: We'd definitely like to make
7 sure we talk this through with NRDC.

8 One comment I would say is that I don't think
9 TDV strongly affects the energy associated with water
10 heating, electric water heating because that's not
11 really coincident with peak in a strong way. And so, I
12 don't think there's a big impact there.

13 MS. WALTNER: Just to follow up, on the runs
14 we've done looking at a heat pump water heater to a gas
15 water heater there is a TDV penalty if you switch from
16 gas to electric.

17 COMMISSIONER MC ALLISTER: I would encourage
18 that, in particular the -- so, you know, our crystal
19 basically is telling us that electric heating
20 technologies are going to be important going forward,
21 both for hot water and for HVAC.

22 And in fact, you know, part of the Governor's
23 goal is to clean up our heating fuels. And that in part,
24 at least, means electrifying those loads. And, you know,
25 big long-term TBD in terms of what that really looks

1 like in terms of the marketplace.

2 But I think we certainly want to make sure that
3 we're keeping the pathways forward as open as we can for
4 those various technologies. So, I think this discussion
5 has something to do with that, so thanks.

6 MR. SHIRAKH: Thank you, Meg.

7 George.

8 MR. NESBITT: George Nesbitt, HERS Rater. I
9 forget who it was that said that the building
10 departments do a good job enforcing the mandatory and
11 the prescriptive requirements, even if you have a
12 performance document. I'll disagree with that because I
13 have, on a number of occasions, performed work that
14 required HERS verification or would have required a
15 prescriptive installation of a water heater with an
16 energy factor.

17 Although, I did energy calcs, the building
18 department never got them.

19 So, I think when we get to alterations we have
20 long had a problem with compliance on the water heater
21 issue. And that also extends to recirc pumps.

22 Now, you have to have a demand pump, but I'm
23 sure most people will keep putting in what they have
24 been.

25 The option for the -- essentially, allowing you

1 a commercial water heater, the language actually is up
2 to 105,000 Btus per hour, which keeps you to either the
3 low-efficiency commercial water heaters or a few small
4 high-efficiency ones, but not the high capacity, high-
5 efficiency water heaters.

6 Requiring, I think QII, as well as the plumbing
7 measures on this is honestly a non-starter. It sure as
8 hell is a non-starter in alterations. There's no way you
9 can comply.

10 And I think the Energy Commission needs to look
11 at the CEC appliance database --

12 MR. TAM: So, George, this is for new -- sorry,
13 this is for new construction, it's not for alternations.

14 MR. NESBITT: No, we've removed new construction
15 from the title of the chapter. This does apply in
16 alterations. And this is an -- this is something you
17 need to understand. Alterations almost universally have
18 to comply with every mandatory measure and every
19 prescriptive measure or the performance path, with some
20 exceptions. There are some where it explicitly says,
21 yes, you don't need that level of wall insulation or
22 roof, but not for water heating. So, it is very
23 important.

24 The Energy Commission appliance database
25 includes some old information on commercial, high-

1 efficiency commercial water heaters with energy factors
2 in the 80 percent range.

3 When you do energy modeling, I haven't done it
4 so much in the 2013 software, but 2008 and past, when
5 you modeled a high-efficiency commercial water heater it
6 was anything from a slight penalty to a slight credit,
7 depending on standby loss. Yet, I think we have evidence
8 that a high-efficiency tank water heater blows away a
9 .58 energy factor water heater.

10 The other thing I've noticed is in the
11 prescriptive path you're allowed one water heater per
12 dwelling unit, if you're serving dwelling units with
13 individual water heaters versus a central in multi-
14 family.

15 Yet, I think when we get to alterations, or
16 additions specifically, you're allowed to install a
17 second water heater as long as it meets the
18 requirements. So, why do we allow one in new
19 construction, but two in an addition?

20 The other thing you didn't mention, and you may
21 cover it later, but I'll hit on it right now because
22 we're talking about hot water, I noticed the point of
23 use credit in the performance method was moved from the
24 HERS-verified section to the non-HERS-verified section.

25 The reality I think, out in the real world, is

1 if it's not HERS verified, it's not verified.

2 MR. SHIRAKH: Thank you. Greg, do you have a
3 respond to that?

4 MR. KLEIN: Not a response, a new comment, if I
5 may.

6 MR. SHIRAKH: Okay.

7 MR. KLEIN: Gary Klein, again.

8 MR. SHIRAKH: I'm sorry, folks, I kind of --
9 there's a line by the --

10 MS. CHRISTIANSON: Good morning, or afternoon,
11 as it may be. Thank you, Commissioner for hosting today
12 and allowing us to come and have these comments. My name
13 is Sue Christianson and I'm with SoCal Gas.

14 We've been working for the better part of two
15 decades to move forward the topic of energy efficiency,
16 and we will continue to do that. That is part of our DNA
17 as an industry. But I don't think it's any secret here
18 that we had some concerns surrounding the instantaneous
19 water heater.

20 What I do want to address is the staff, in
21 particular, and the process in general, in that it was
22 very amicable, everyone's impressions and thoughts were
23 taken into consideration. We had some really, really
24 great conversations with many of the stakeholders and I
25 think we've come to some good compromises here.

1 Whether our concerns will bear out fruitful or
2 not time will tell. But I think that the addition of the
3 QII and then the over 55-gallon is a great move to find
4 some sort of consensus.

5 And I want to highlight, specifically, Bill, and
6 Mazi, and Danny for being fantastic in this process. And
7 I appreciate their help along the way.

8 And then Gary, who's in line again, I guess,
9 yes, we have a water heating demo lab at our ERC in
10 Downey. So feel free, anyone who wants to partake of
11 that option just let us know. Thank you.

12 COMMISSIONER MC ALLISTER: Anybody who just
13 happens to be in the neighborhood of Downey.

14 (Laughter)

15 MS. CHRISTIANSON: I could leave you the address
16 and you can just drop by and do some testing.

17 COMMISSIONER MC ALLISTER: That would be great.
18 That would be great, thank you very much.

19 MR. SHIRAKH: So, I do want to briefly mention
20 that, yes, we did work very closely with the gas
21 company, Martha Garcia, your predecessor, on this. And,
22 obviously, we take their comments very seriously. And
23 this was a kind of complicated issue, a lot of different
24 aspects to it and we really tried to consider all the
25 comments we received.

1 And we think the proposal that, you know, we've
2 put forward probably represents the best compromise that
3 we could, but there's always the possibility to improve
4 it. Thank you.

5 Mike.

6 MR. HODGSON: Mike Hodgson, ConSol, representing
7 the building industry. I just wanted to support Gary
8 Klein's comments about water heating as a system.

9 As we're getting just smaller and smaller
10 regulated loads, we really need to look at how we can
11 improve our compact design for water heating and
12 increase -- or decrease our energy use and increase our
13 efficiency for water heating. Those are really the two
14 big areas, the unregulated or miscellaneous loads and
15 water heating.

16 So, I believe there's an opening already for us,
17 because we have a credit for compact design, and I think
18 that plays along with what Gary, wherever he is, was
19 saying. And maybe we can examine that in the ACM
20 process, not in the 45-day language process.

21 The other thing is that as we worked as a
22 building industry with the Energy Commission, and
23 especially in these standards where the utilities have
24 stepped up so large to say we're going to assist
25 builders in doing design incentives for high-performance

1 attics and high-performance walls, I would make that
2 appeal, let's also work on water heating.

3 I think there's a huge opportunity that there
4 could be an incentive there to encourage compact design,
5 and I would just like to say the building industry would
6 be 100 percent behind that. Thank you.

7 COMMISSIONER MC ALLISTER: Thanks a lot, Mike. I
8 have been involved in the solar side of hot water for a
9 while, you know, through involvement with industry
10 groups. And, you know, now the conversation I think has
11 just a lot more technologies in the mix, and we need to
12 push the envelope that much farther. So, I think the
13 time is ripe to have the hot water discussion in
14 probably more earnest than we have in the past, even
15 though we already have the compliance path -- or the
16 credit pathway.

17 MR. SHIRAKH: Thank you. Gary.

18 MR. KLEIN: Gary Klein. Now, I'm back in line.
19 So, I want to thank everyone for being willing to help
20 have this discussion and I look forward to having it as
21 soon as you're able to have the bandwidth to do it. I
22 realize we're in the middle of the end, so we'll move
23 forward at deliberate speed.

24 COMMISSIONER MC ALLISTER: Great. I wanted to
25 also just point out that there is a pretty bright line

1 between retrofit and new construction here so, you know,
2 existing buildings are pretty much a whole different
3 kettle of fish in terms of, you know, we don't have the
4 option to go compact. We can't redesign the systems in a
5 typical retrofit situation.

6 And so, maybe there are two pathways that we
7 need to think about pretty independently on this. You
8 know, new construction is really the huge opportunity to
9 get it right so --

10 MR. KLEIN: Absolutely. And I realize today is
11 on residential. But in case I don't make the hearing
12 tomorrow regarding this, it's as big an issue in
13 nonresidential applications as it is in residential.
14 Different issues, but very much as big.

15 So, I actually had a different comment right now
16 to share. I suspect folks here at the Commission are
17 aware of grid-interactive water heating or storage water
18 heating systems. We used to do stuff related to turning
19 on water heaters at 2:00 in the morning, with off-peak -
20 - with methods using electric-resistance water heaters,
21 store lots of hot water when the grid is being under-
22 utilized, and turn them off during the day and during
23 peak so that you're not causing peak issues.

24 Well, that technology has gotten much more
25 sophisticated now that we have an internet and I think

1 that we ought to be very cognizant of that and think
2 about how to enable them in the standards process.

3 COMMISSIONER MC ALLISTER: Great point. Now,
4 they do that -- there are places they do that already,
5 right, Australia.

6 MR. KLEIN: Absolutely. We actually do some in
7 the U.S., too. And the big benefit now is that we're
8 going to be creating excess solar or wind at times that
9 are odd and we might want to capture it when we've got
10 it, rather than just dumping it to ground. That's one of
11 the ways you make the whole system more efficient.

12 COMMISSIONER MC ALLISTER: Yeah.

13 MR. KLEIN: And I realize that the Building
14 Efficiency Standards are really about what's going on in
15 the building. The broader goal of the Energy Commission
16 is overall system efficiency and we ought to think about
17 that. Thank you.

18 COMMISSIONER MC ALLISTER: Thanks for the point.

19 MR. SHIRAKH: Thank you. Any other water-related
20 questions online?

21 Okay, so we're going to move to the last topic
22 for the morning, which is residential lighting. It looks
23 like we're about 20 minutes behind schedule. You know,
24 we'll still have the full one-hour lunch and I expect
25 that we'll still get out of here before 4:00, which I

1 consider a victory.

2 MR. STRAIT: Of course, now that you've said
3 that, you've jinxed it.

4 (Laughter)

5 MR. SHIRAKH: Okay. So, this section deals with
6 the residential lighting. I must say, this was one of
7 the more exciting projects we had this time around. It
8 involved a lot of lively debates and comments on both
9 sides related to the quality of the sources.

10 You know, we had experts disagree on many of the
11 points related, you know, to the information we're
12 presenting, especially the color rendering index.

13 And, yeah, the manufacturers disagree on some of
14 these points and we had people from the academia, and
15 other places.

16 So, what we have here is basically the staff's
17 proposal. You know, what we had to consider to come up
18 with this proposal is to look at see what really serves
19 the best interest of California consumers and the
20 homeowners, and results in persistence of energy
21 savings. After, you know, really an exhaustive debate
22 with all of the stakeholders throughout this whole
23 process, over the last few months.

24 So, I'm going to present the highlights of
25 residential water heating, subchapter 7, low-rise

1 residential buildings, mandatory requirements and
2 devices. And for those of you who have been involved
3 with this, all of the lighting requirements for
4 residential are mandatory requirements. There are no
5 prescriptive requirements, which means you can't trade
6 it away.

7 We greatly simplified and reduced the volume of
8 language in this section, and simply by taking advantage
9 of big advances in lighting technology. The LED lighting
10 comes right now. Again, many of you have probably walked
11 through the home improvement centers, Home Depot, Lowe's
12 and Costco, and you've seen the variety of LED products
13 that's out there, both in dedicated and medium-based
14 format. And the cost and the quality which allowed us
15 to, you know, make the single most important change in
16 lighting standards, in the history of standards that I
17 can remember.

18 So, the requirements for the 2016, the proposed
19 requirements are all luminaries installed in residential
20 dwellings must be high-efficacy.

21 So, in the past, you know, we always had
22 exemptions for low-efficacy lighting in the kitchens, in
23 the support areas. You know, we also had some archaic
24 rules that if you did something for the outdoor lighting
25 you'd get an allowance for incandescent lighting indoor.

1 So, all of that's gone. So, you know, it's a lot simpler
2 right now.

3 Screw-based luminaires, other than downlights,
4 considered high-efficacy if sources meet the JA8
5 requirements. Again, this is a big change from all of
6 the past requirements and the standards where we are now
7 saying it is okay to have a high-efficacy source that is
8 screw-based.

9 But again, this is where all the issues came in
10 is that, you know, if we are basically replacing
11 incandescent sources. And we know we've heard very
12 little complaints about incandescent sources, we wanted
13 something to replace it that, to the extent possible,
14 looked and performed like an incandescent source, so
15 people don't have to replace those sources.

16 And so, some of the attributes, you know, are
17 later on spelled out in JA8, that include the color
18 rendering. That, you know, people want to look good in
19 their homes. I know, I don't need to look any worse than
20 I do, already. So, color rendering definitely comes into
21 play.

22 And there was a lot of -- there's been a lot of
23 discussion about CRI, whether it should be considered,
24 or whether it should be something we ignore. And in the
25 end we decided that, you know, it is important for us to

1 have color quality in there, otherwise there's the
2 likelihood that these sources will get replaced. We can
3 talk about that a little bit more later on.

4 Downlights must have dedicated sources. So,
5 where we allow screw-in luminaires, everywhere expect in
6 downlights. And the reason for that has to do with the
7 heat performance and some of the heat issues related to
8 downlights, and how you can impact the life of the
9 sources that are not really designed to work in that
10 environment. And the chances would be greater if we
11 allowed screw-based sources in the downlights.

12 All sources and screw-based sources must meet
13 the JA8 requirements. We'll go through those
14 requirements. And all phase-color dimmers shall comply
15 with NEMA SSL7A.

16 And, basically, this fifth requirement is there
17 to make sure there is no flicker when you dim these
18 lights. These lights, which could be very annoying, and
19 it is a problem that's still being observed. I know I
20 have that in my own home and it's not something we want
21 to go into other people's homes.

22 Controls, in Section 150.0(k)2J, bathrooms,
23 garages, laundry rooms and utility rooms at least one
24 luminaire in each of these spaces shall be controlled by
25 a high-vacancy sensor. So, you know, one luminaire has

1 to be controlled by a vacancy sensor, not all of them.

2 Dimmers or vacancy sensors must control all
3 luminaires required to have light sources compliant with
4 reference JA8, except in hallways, closets, and places
5 less than 70 square feet.

6 Outdoor lighting, clarified language to state
7 that the motion sensor photo controls and astronomical
8 time clocks bypass controls that override to an on shall
9 not be allowed unless the override automatically returns
10 to the photo control and automatic time control to its
11 normal operation within six hours.

12 So, you know, if you override it, it has to go
13 back to default automatically controlled within six
14 hours.

15 This table, 150.0(a), basically describes -- it
16 has two columns. These are the light sources in this
17 first column on the left. Light sources in this column,
18 other installed recessed luminaires are classified as
19 high-efficacy and not required to comply with JA8. So,
20 if you have any of these items here, one through five,
21 you don't have to comply with the JA8, the high-quality
22 requirements.

23 These are pin-based linear or compact
24 fluorescent light sources using electronic ballast.
25 These are mostly legacy products that have been

1 developed by lighting manufacturers, that are currently
2 being used to meet the current requirements of the
3 standards. And these are generally fluorescent-based,
4 and most of them don't involve LED technologies.

5 The second one is pulse-start metal halide. The
6 second one is high-pressure sodium. The fourth one is
7 GU-24 sockets containing sources other than LEDs.

8 I was just told this morning, by Simon, that
9 this requirement is actually changing and we're going to
10 allow any GU-24 socket, even the ones that include LEDs,
11 as in this column, so it doesn't have to comply with
12 JA8.

13 So, you know, if you have an LED-based GU-24,
14 they don't have to meet the JA8 requirement, which
15 includes the CRI, the color, temperature, and everything
16 else. So, that's a new change since the 45-day language
17 was released.

18 Luminaires with hard-wired, high-frequency
19 generators and induction lamps that are rarely used in
20 residential applications.

21 So, in this column we have the light sources
22 that must comply with JA8. All light sources in recessed
23 luminaires. Again, the second one is GU-24 sockets
24 containing LED, which is moving to this column. And the
25 last one is any other light source not otherwise listed

1 above, they must comply with the JA8 high-quality
2 requirements.

3 So, this next list describes the highlights of
4 JA8 and what we mean when we talk about high-quality
5 light sources. So, when you are installing one of these
6 sources that meets -- must meet the JA8 requirements,
7 then that source must meet all of these criteria.

8 Colors are LED sources, as well as other sources
9 not listed, and that we just looked at. The light
10 source, including the ballast and driver must be
11 certified to the Commission. The light source must be
12 equal or greater than 45 lumens per watt, which is not a
13 very high bar, but that's basically -- this is the
14 Federal standards that's going to go into effect soon.

15 Must have a power factor of at least .90,
16 capable of corrected color temperature of 3,000 degrees
17 or less. What it means as capable, you know, there are
18 actually products out there that you can tune or change
19 the corrective color temperature. You can go from 2,700
20 to 5,000, that's fine. You know, they can install that
21 as long as it can meet the 3,000 degrees Kelvin
22 requirements.

23 CRI of 90, with an R-9, which is for red, of at
24 least 50. So, what's going on with CRI is the CRI
25 currently is based on a sample of eight palettes, which

1 does not include red. And red happens to be one of the
2 colors that makes people look, actually, better.

3 So, to cover that, you know, not only are we
4 requiring the CRI, we also are requiring, we're
5 proposing to require that it must meet an R-9 of at
6 least 50.

7 We understand the way the CRI is calculated is
8 just the average of those eight palettes. So, when you
9 go to a lower CRI of 80, or below, you know, it's quite
10 possible that some light sources could be deficient
11 significantly in one of those palettes and still meet
12 the 80 CRI.

13 So, it probably would not be a surprise to
14 actually have two different CRI of 80 products that
15 would perform differently. Because, again, it's an
16 average of those colors, it's not an absolute value.

17 We're proposing that the source must be dimmable
18 down to three percent. Earlier, we proposed ten percent,
19 but we got comments that ten percent isn't really dim
20 enough for most residential applications and we should
21 go lower. Especially people have like home entertainment
22 centers, where they want to dim the light, and ten
23 percent appeared to be too bright.

24 LED sources controlled by phase-cut dimmers must
25 meet NEMA's SSL7A as type one and type two. Again, this

1 is to deal with flicker. Light sources in combination
2 with the specified controls shall provide reduced
3 flicker. So, and there's some criteria here, at 100
4 percent and 20 percent, you know, they have to be tested
5 at those points as having percent amplitude modulation
6 less than 30 percent at frequencies less than 200 Hz.

7 The light sources shall not be very noisy,
8 there's no humming that can come. So, there's a
9 requirement for that under bullet ten.

10 The start time must be less than half-a-second,
11 which is from when you flip the switch to full
12 brightness should be about half-a-second or less.

13 Lumen maintenance of 86.7 percent after 6,000
14 hours.

15 The last criteria include a minimum rated life
16 of 15,000 hours. Recessed and enclosed fixtures, light
17 sources, elevated temperature light output ratios and
18 lumen maintenance.

19 And then, number 15 says, light sources not
20 integral to luminaires, recessed luminaires totally
21 enclosed. Luminaires shall meet all of the elevated
22 electrical temperature requirements. So, this is
23 basically to deal with some of the possible heat issues
24 that may emerge.

25 And then the last one is the labeling, the

1 maximum rated input wattage, total luminaire flux, CCT,
2 CRI of the light source must be listed on a permanent
3 factory-installed label on the light source, or the
4 housing. And the product must contain marking indicating
5 California Title 24 JA8 compliant.

6 So, this is basically a convenient way for
7 anyone, the homeowner, the builder, installer to
8 identify readily that this source is, indeed, you know,
9 compliant with JA8 and Title 24.

10 So, that pretty much includes all the
11 requirements and I'm happy to take any questions related
12 to that. Any questions in the room?

13 Meg, from NRDC.

14 MS. WALTNER: Meg Waltner, from NRDC. Overall,
15 we're strongly supportive, as you know, to the proposed
16 updates to the residential lighting requirements. The
17 proposed updates will ensure that we have a high-
18 quality, high-efficacy bulb in every fixture. This is
19 one of the largest energy-saving measures estimated by
20 the IOUs to cut the average energy used by lighting in a
21 home by over 50 percent. So, in general we're strongly
22 supportive.

23 In particular, we're supportive of the separate
24 requirement for recessed fixtures that require the use
25 of dedicated fixtures. They are -- allowing screw-based

1 bulbs in these fixtures would lead to potential heat
2 management issues and backsliding if consumers do remove
3 the bulbs, and lower-efficacy alternatives are allowed
4 there by the Federal minimums.

5 In terms of the elevated temperature
6 requirements, I think we're in align with the CEC here.
7 But our concern is that the language doesn't actually
8 require bulbs to meet an elevated temperature
9 requirement for totally enclosed fixtures. So, we just
10 want to make sure on your number 15, there, that the
11 intent of what that is, is actually reflected in the
12 language.

13 We also support the dimability and flicker
14 requirements, that those are important aspects to
15 quality and so glad to see recommendations there.

16 On the CRI issue, I know we've been back and
17 forth on this a lot. We agree that light quality is a
18 really important issue and color rendering is a key
19 issue in how consumers -- whether consumers are
20 satisfied with their light source.

21 You know, we've sort of coalesced around the
22 minimum of an 80 CRI in the industry. And we're still
23 unaware of any evidence showing consumers'
24 dissatisfaction with the CRI of 80, and are concerned
25 with the increased cost and efficacy hit that you take

1 moving to higher CRIs.

2 One approach that we've proposed is to align the
3 Title 24 requirements with what's been proposed in Title
4 20 to sort of thread that needle on CRI. So, thank you.

5 MR. SHIRAKH: Okay, thank you, Meg.

6 Loren.

7 MR. WHITEHEAD: Thank you. I'm Loren Whitehead,
8 a Professor at the University of British Columbia, in
9 Vancouver, and it's a pleasure to be here today.

10 I think I should briefly introduce myself and
11 then talk about the one topic I'd like to discuss today,
12 which is color rendering index.

13 My background, as a professional engineer and
14 also a business person in the lighting industry, and
15 also a university physics professor, sorry to scare you
16 with that. But my area in physics is understanding the
17 mathematics of the color rendering index.

18 And I work with a number of experts on that
19 topic, both with people in the International Lighting
20 Commission and also the IES. So, I think I'm right up to
21 speed on everything that is happening there.

22 I should also add, I don't have any interest in
23 this. You know, I'm here just as a scientist,
24 representing a number of other scientists who do feel
25 very strongly about this issue, but there's no gain in

1 it for me. I'm not paid to be here. I don't have a
2 metric I'm pushing. There's just no agenda.

3 Just a very simple message, from a large number
4 of people who really understand that. And the message,
5 fortunately, is simple. For good lighting, we should
6 have high CRI. That's it, high CRI.

7 Unfortunately, this simple idea is being
8 attacked by people who don't quite get it. And it's very
9 understandable. It's a complicated topic, it's easy to
10 have misunderstandings. And the source of those
11 misunderstandings are people who have a vested interest.
12 So, that doesn't mean that everybody you're hearing from
13 has a vested interest, but the data that they're
14 reporting is data that came from people who did.

15 So, the net result is there's a lot of
16 misinformation and that's really the topic today. So,
17 I'll give you an example of an argument you may have
18 heard. Have you heard this? If you show somebody a
19 choice between two lamps, one or both lamps looking
20 similar, but with different CRI values, they'll
21 sometimes say they prefer the lower CRI lamp. Well, if
22 that's true, doesn't that mean the CRI doesn't work and
23 that we should ignore it? How many have heard that
24 argument bandied around? It's a common argument.

25 Well, it's nonsense. That argument isn't a

1 little bit wrong, it's just complete nonsense, even
2 though it sounds a little bit reasonable at first.

3 And there are a few reasons for that. The first
4 one is the CRI doesn't measure personal choice. It was
5 never intended to. It measures something much more
6 important, which is accuracy of color relative to
7 natural light. It does that very well.

8 But secondly, and this is more important,
9 actually, you can't predict or properly generalize from
10 the isolated quick choices of a few people to real-life
11 uses. It's improper to do that and I'll come back to
12 that point.

13 But most importantly, and this is really
14 critical, it's well-known that quick choices in isolated
15 environments usually don't reveal what is best for
16 people. They just don't.

17 So, when you hear arguments based on preference,
18 you're hearing arguments that don't meet the required
19 standard for public policy. And I should be very clear
20 about this. I'm not saying that scientists who ask
21 people in laboratories which bulb they'd choose are
22 doing bad science. There's nothing wrong with the
23 science. What's wrong is the interpretation of that
24 science as a guide for what's best for people. That just
25 doesn't work.

1 And to use an analogy, which I don't think is at
2 all a stretch, imagine if the U.S. Department of Energy
3 prepared their food or nutrition guidelines based on
4 personal test choices. Well, everybody knows people
5 prefer salt, sugar and fat when given the choice. Even
6 if they don't realize it's there, it seems to make
7 things taste better. But if we based guidelines on food
8 with that, it would be very, very unhealthy.

9 And that's actually a relevant example, the
10 USDA, because they do make guidelines and they do have
11 very professional procedures as, of course, you do for
12 making guidelines. But the procedures require, in the
13 case of food policy, bringing in experts who are
14 unbiased and really understand the issues, and not
15 asking them what to do, but asking them how to decide a
16 procedure. How to design a procedure for determining
17 what's best for people.

18 And I can assure you that's a procedure that is
19 isolated from business interests to the maximum possible
20 extent, and basically starts with an understanding of
21 the big pictures. If you focus on details, and everybody
22 has their own favorite detail, that will move you
23 astray. It's the whole question of what's best for
24 people that matters.

25 So, returning to CRI, first of all I applaud the

1 JA8. And I guess I just have to say that this fine
2 organization clearly has a choice. The choice is to be
3 strong and continue to uphold high CRI, or to bow to
4 pressure and a low a descent to low CRI.

5 So, the difficulty, of course, is that there are
6 good people pushing for low CRI. And how do you deal
7 with that? How do you make a distinction between these
8 two sorts of arguments, recognizing that you can't be
9 experts at everything.

10 Well, I think there are two things that I would
11 suggest as guidelines. Now, the first one definitely, if
12 you hear an argument based on preference, based on
13 laboratory preference measurements, it's just not sound.
14 Ignore it. There's no possible way that data is relevant
15 to the question. There's lots of other ways of getting
16 relevant data, but that's just not meaningful for the
17 reasons I've already mentioned.

18 The second one is if the source of the data is
19 an interest group, even if the interests are good, it's
20 going to be distorted. So, look to people who actually
21 aren't biased, who actually have an understanding of the
22 overall picture of what's best for human beings, and
23 there's lots of knowledge on this. But they're the
24 people you can turn to, and my recommendation.

25 So, I'm going to wrap up just with a statement

1 of four facts about the CRI. Now, these are facts that I
2 firmly know to be true. And I don't know any credible
3 scientist who disagrees with these facts.

4 So, the first one is that light and health are
5 linked together. We didn't know that in the 60s, when we
6 introduced fluorescent lamps. But we know today that
7 light is a health issue. And the established standard
8 for good light is and always has been high CRI. So, what
9 you're saying here is not new territory, it's well-
10 established.

11 The second thing, and this is the great news, is
12 we were facing a problem. It was becoming difficult to
13 afford high CRI in a world of energy restrictions. That
14 problem is gone. LEDs make it possible to have high CRI
15 in a very practical way. First of all, high CRI lighting
16 no longer requires more power. It does not require more
17 power. Secondly, it does not need to cost more today. It
18 no longer needs to cost more. That's the great news.

19 The third thing is the CRI, the CIE color
20 rendering index, is working just fine right now. For the
21 purpose intended, as described here, it's just fine.
22 There are some improvements underway and, by the way,
23 coming along very well, which will keep it fine in the
24 future. But it's perfectly fine for now.

25 And the last thing I think is a philosophical

1 point, but a very powerful one. Where does the burden of
2 proof lie? So, when you hear somebody say there's no
3 proof that CRI matters, well, I say the burden of proof
4 lies with those who propose moving down to low CRI. We
5 already know it's natural, we know what people like. It
6 doesn't cost more. It's readily available. What would be
7 the reason to go to poor light? That's the key question.

8 So, I would just wrap up by saying, in short,
9 high CRI is sound policy. In contrast, those pushing low
10 CRI, I think, arguably, are promoting unsound policy.
11 And I'd like to just end by thanking you for the
12 opportunity to say these words. Thank you.

13 MR. SHIRAKH: Thank you, Loren.

14 COMMISSIONER MC ALLISTER: Thanks for being
15 here.

16 MR. SHIRAKH: Nehemiah.

17 MR. STONE: Nehemiah Stone, Benningfield Group.
18 I want to preface the comment by saying that I used to
19 be chief building inspector in Humboldt County, and I
20 now facilitate a group called the Compliance Improvement
21 Advisory Group.

22 Can you go to the next slide there, Mazi? The
23 last thing on this slide here is important for being
24 able to make it so that the enforcement community can
25 deal with what you could not argue, or not complex

1 requirements here for lighting. But it doesn't go far
2 enough.

3 And I don't know whether the Commission has the
4 authority, but I would highly recommend that the
5 Commission require all lamps that don't meet California
6 Title 24, JA8, be labeled, and maybe in red, this lamp
7 does not meeting Title 24, JA8.

8 If you think about inspectors going through a
9 building, if they don't see a label on it, they're going
10 to figure that that's probably okay. If they see a label
11 on it that tells them it's not okay, they will enforce
12 that. Thank you.

13 MR. SHIRAKH: It would be a first if you ever
14 tried something like that, Nehemiah, I don't know.

15 MR. STONE: I've been the first to do a lot of
16 things.

17 MR. SHIRAKH: We'll see.

18 George.

19 MR. NESBITT: George Nesbitt, HERS Rater. I
20 won't go into all the technical appendices. It looks
21 like, from just an organizational stand point, you moved
22 a lot of the technical details into the appendices and
23 sort of pushed it out of the standards, correct?

24 MR. SHIRAKH: And again, all of these
25 requirements here, they're in Joint Appendix 8. These

1 requirements here are still in the Section 150.0(k),
2 including this table.

3 MR. NESBITT: And so, it's high-efficacy, all
4 high-efficacy fixtures, bathroom/kitchen one vacancy
5 sensor. And we are -- sorry, I got distracted when you
6 were talking earlier. So, screw-based fixtures are still
7 allowed --

8 MR. SHIRAKH: Yes.

9 MR. NESBITT: -- with a high-efficacy bulb.

10 MR. SHIRAKH: With a high-efficacy bulb that
11 meets the JA8 requirements.

12 MR. NESBITT: Okay, and so that --

13 MR. SHIRAKH: You could have a decent LED screw-
14 based, then that's considered high-efficacy.

15 MR. NESBITT: Okay, great. Now, I like that
16 flexibility because, personally, I actually find a lot
17 of high-efficacy fixtures use more energy than I could
18 with a screw-in bulb so --

19 MR. SHIRAKH: Yeah, this is a big improvement.

20 MR. NESBITT: Yeah. Back to the issue of
21 recessed CAN lights, so all fixtures have to be high-
22 efficacy and --

23 MR. SHIRAKH: They have to be high-efficacy and
24 dedicated. They can't use a screw-based, but they can
25 use like quick connect.

1 MR. NESBITT: Right.

2 MR. SHIRAKH: And you've seen them, it's really
3 easy, it just sort of snaps in, or they can use Zhaga,
4 or something else.

5 MR. NESBITT: Okay, right. So, all recessed
6 lights have to be hard-wired, high-efficacy.

7 MR. SHIRAKH: Hard-wired and high-efficacy.

8 MR. NESBITT: And then the issue of the air-
9 tight insulation contact, I think in 2013 we changed the
10 language that said all recessed fixtures have to be
11 insulation contact, air-tight rated.

12 MR. SHIRAKH: Right.

13 MR. NESBITT: Correct. And so, even if it's in
14 an uninsulated floor between conditioned floors?

15 MR. SHIRAKH: It's an enforcement issue. We got
16 comments back from building departments. They don't know
17 what's above the drywall up there. And so, some of them
18 may have insulation, some don't. And so, it was a
19 question of where does each go.

20 And, you know, we've also looked at the cost of
21 ICAD-rated in the CANS, versus non-ICAD. You know,
22 again, going through Home Depot, which is my playground
23 these days, the difference is no more than a couple of
24 bucks.

25 MR. NESBITT: Right. But are you still

1 finding -- are we still -- we still have non-air-tight,
2 IC-rated CANS that we can buy?

3 MR. SHIRAKH: They sell them in Home Depot, yes.

4 MR. NESBITT: Yeah, although the code says, you
5 know --

6 MR. SHIRAKH: Well, you know, I think this is
7 for new construction. In existing homes, if you have a
8 non-ICAD CAN, you can replace it with another non-ICAD
9 CAN. We don't regulate that.

10 MR. NESBITT: The Section 150.2 specifically
11 includes all of Chapter 7, 150.0, with the exception of
12 solar-ready.

13 MR. SHIRAKH: The building standards is for
14 construction, that's Title 20 is where you would -- if
15 you wanted to ban them from the Home Depot, that's where
16 you go. But we're not proposing that.

17 MR. NESBITT: Okay.

18 MR. SHIRAKH: Thank you. Jim.

19 MR. BENYA: Good morning, James Benya, I'm Benya
20 Burnett Consultancy, Davis, California.

21 I've been serving this process for quite a few
22 years, as someone said earlier, when our hair was not
23 gray and beards weren't, either. And I'm serving in this
24 particular process as a sub-consultant to Bruce Wilcox,
25 and his team.

1 But there's a job that I perform, and have
2 historically provided to the Commission in the process
3 of Title 24, dating back in the 1980s. And that job, I
4 felt, is sort of to bring a dose of reality and
5 experience to the process, as well as all the building
6 science that everybody else is bringing.

7 And one of the things that I do that helps is I
8 actually design homes, both single- and multi-family. I
9 design them at the low end, I design them at the middle
10 end, and at the high end. So, I'm familiar with the
11 design problems facing lighting designers, architects,
12 contractors, and everybody in the process.

13 I like to bring that process in because it's
14 difficult to bring all these things together and make
15 sure that what we develop is a code that people like and
16 can work with. And usually, if we get all these things
17 together we do a good job, and we have a good code.

18 This particular issue, I'm very pleased with
19 this language. The issue concerning color rendering, and
20 Loren stated it pretty well, I happen to, by the way,
21 have a pocket spectrometer. And just for everybody's
22 information, the canned downlights around the back edge
23 are now all outfitted with JA8-compliance LED lamps. And
24 you're free to come and take a look at this, if you'd
25 like.

1 (Applause)

2 MR. ~~PENA~~ BENYA: But what's important about this
3 is these were readily obtained at a local building
4 supply. And I believe very strongly, and I support
5 Professor Siminovitch and Papa Michael, who really got
6 me into this dialogue in the first place, that compact
7 fluorescents historically achieved a relatively low
8 level of acceptance. They had problems with color, they
9 had problems with flicker, and they had problems with
10 dimming.

11 All of these are being addressed here to present
12 us with another race to the bottom. Compact fluorescents
13 have proven themselves to be wholly unacceptable to most
14 people. A very small percentage of people are fine with
15 them. A lot of people don't care, but there's a lot of
16 people that don't. We think we can do better. Here's the
17 time to do it right and all we have to do is take a
18 stand.

19 So, the stand is really on color. Everybody
20 seems to agree on everything else.

21 I want to point out one other critically
22 important thing, though, and this is a critically
23 important change in the standards in 2016. We've
24 historically had architects, interior designers,
25 homeowners complain about the inability to just get a

1 regular, inexpensive luminaire, and screw a lightbulb in
2 it and, once again, have a new luminaire or at least a
3 rejuvenated one.

4 When we went through the compact fluorescent era
5 we went through a lot of problems, and a lot of expense
6 for many homeowners getting something special. Be it the
7 special base, the GU-24 base, or be it a ballasted
8 compact fluorescent, or something. Thank goodness those
9 days are over.

10 Here's an opportunity for us to embrace a
11 worldwide phenomenon of screw-based lamps. We just want
12 to make sure that people like them as well as we think
13 that they should.

14 So, once again, I'm -- you know, on behalf of
15 the work that I've done, both personally and
16 professionally as part of the team, this is great
17 language and I hope we stick with it. Thank you.

18 COMMISSIONER MC ALLISTER: Thanks very much. I
19 wanted to actually ask a question to both you, maybe,
20 and Loren. And I guess I'm hearing that this tradeoff
21 that we hear about, of efficacy, cost and color, kind of
22 at the margin, you know, in the 80 and up range. You
23 know, I think, Loren, I heard you basically say that was
24 a myth.

25 And I kind of want to hear more about that

1 because, you know, I think many of us hear that, hear a
2 lot about that. You know, that there's some additional
3 cost and some efficacy penalty for higher color. And,
4 you know, I think very much appreciate your historical
5 perspective. I mean, both of you, your reputations
6 precede you on this front.

7 But to maybe sort of put this in broader
8 perspective to try to tell us where, you know, is there
9 a convergence happening in a way that we need to take
10 into account today for, you know, having all of the
11 above in a way that really keeps us at that gold
12 standard.

13 MR. WHITEHEAD: I'm not sure if I should go
14 first, but I'll try, and appreciate Jim's response as
15 well.

16 Well, look, nobody can change the laws of
17 physics, so there's a very slight tradeoff between
18 efficacy and color rendering. At the high end, in the
19 range that we're talking about, it's of order 10 to 15
20 percent.

21 However, there is a myth. The myth is that
22 efficacy matters at the level of 10 to 15 percent. It
23 simply doesn't. And in addition, if you look at human
24 choice and ask people, you know, are you comfortable
25 with high color rendering and 15 percent less lumens,

1 they say what do you mean less lumens? You can't see it.

2 Now, if you were to walk out of this room for a
3 minute and walk back in, and if in the course of you
4 being out of the room the light level had risen 15
5 percent or dropped 15 percent, which it actually might
6 do with grid fluctuations, you wouldn't be able to see
7 it. So, it's in the noise.

8 Whereas, in contrast, the color rendering
9 difference is absolutely visible, it's not in the noise.
10 If you look at two different lamps of CRI 80, and look
11 at the way they render colors, they're radically
12 different, everyone can see it.

13 COMMISSIONER MC ALLISTER: Thanks.

14 MR. ~~PENA~~ BENYA: Yeah, CRI 80, as Professor
15 Wendy Davis, who's now down in New Zealand, but used to
16 be with NIST in Washington, D.C., proved, you can have a
17 lamp with a CRI of 80 that literally does not render the
18 color red. The color red is essential in making people
19 look good, and particularly in residences.

20 When we talk about residences versus commercial
21 lighting, there's a lot of debate these days in
22 commercial lighting whether we could use different color
23 temperatures, 4,000, 5,000 K, we all know that. Not in
24 residences. You'll find very few people who will accept
25 a high color temperature.

1 So, we are first and foremost talking about low-
2 color temperature sources, 3,000 and below.

3 Secondly, you're absolutely right, we cannot see
4 the small differences between a 600 lumen lamp and a 660
5 lumen lamp. And we're getting down to the point where
6 the difference between 80 and 90 CRI, and the difference
7 between lumen output is absolutely in those very small
8 numbers. Public acceptance is not going to be affected
9 by that. This is strictly a matter of it costs a little
10 bit more to make a 90 CRI than it does an 80. It has to
11 do with ~~phosphor~~ proper design, primarily.

12 COMMISSIONER MC ALLISTER: Uh-hum.

13 MR. ~~PENA~~ BENYA: And it costs a little bit more.
14 It costs a little bit more to make a flicker-free lamp,
15 but everybody's kind of having to make those because the
16 flickering ones aren't very good. It costs a little more
17 to make it dim down to three percent. But again, the
18 industry trend is in that direction because people know
19 that they want better than 10 percent.

20 All we're doing is picking up on one standard
21 that we know will make a difference. Because if we allow
22 80, we will get poor color rendering lamps. Not just low
23 coloring, really poor. They will be red-deficient will
24 be the most common outcome. And there will be too much
25 blue.

1 As to your point about human health and
2 wellness, it's been proven that light sources with more
3 blue, more exaggerated blue, present greater risks than
4 those that don't. And the higher CRI lamps tend to have
5 a better balance between red and blue than it does with
6 the lower CRI lamps.

7 For all of these reasons, this is a really good
8 idea. And I think I'm disappointed that, frankly, it's
9 not a national program. But I think we're leading the
10 way, which we've done in the past, and we ought to keep
11 doing it.

12 COMMISSIONER MC ALLISTER: Okay, thanks very
13 much.

14 MR. SHIRAKH: And the staff had to consider all
15 of these comments and then decide, you know, if these
16 lights are going to be there for 15 years and, you know,
17 what would be the chance of them staying in there. And
18 so our decision was that, you know, high quality is
19 basically what would ensure the persistence of these
20 measures.

21 I think Jon McHugh wants to make a -- has
22 promised me a very quick presentation because we're all
23 hungry.

24 MR. MC HUGH: Hi, I'm Jon McHugh, I'm one of the
25 three CASE authors on the California Statewide CASE

1 Study, along with Mike McGaraghan here, in the back of
2 the room, and David Douglas, over at TRC.

3 And there's been a number of comments about
4 whether or not this proposal limits customer choice. And
5 the point is here is that this proposal substantially
6 decreases the amount of energy consumption in homes.
7 We've estimated about a 60 gigawatt-hour-per-year
8 savings. It's the largest efficiency measure of all the
9 efficiency measures we're looking at for this code
10 cycle.

11 This proposal still allows the legacy, high-
12 efficacy luminaire, so even though we're doing this, I
13 think, great step forward for screw-based lamps in terms
14 of requirements for quality, we're still allowing the
15 older, high-efficacy light sources so that for some
16 people, who may want to choose to use lower-quality
17 sources in other places they can.

18 The issue is that those are actually going to be
19 the most expensive light sources to use. The economies
20 of scale associated with manufacturing screw-based lamps
21 allow the costs to come down and this is exactly what
22 we've seen over time with cost differences between high-
23 efficacy and -- I'm sorry, high color rendering index
24 lamps and lower coloring rendering index lamps. The
25 costs have decreased. The energy consumption between the

1 two have also decreased, as the lamps have gotten more
2 efficient.

3 And the only person who's actually limited by
4 this standard is actually the builder. The first light
5 source actually has to be a high-quality light source.
6 If the consumer decides that they don't like the light
7 source, for some reason, this actually allows them to
8 change it.

9 So, we actually have a lot at stake in making
10 sure that the homeowner has a high-quality, long-life
11 lamp in that socket.

12 Next slide, please. And, you know, one of the
13 questions are, are there enough products? And we
14 actually already have a JA8, which requires many of the
15 color issues that have been brought up as sort of the
16 key sticking point.

17 And as noted, there's almost 7,500 products in
18 the current JA8 database. And it's not, you know, a
19 single manufacturer, so there's 47 different
20 manufacturers that have products in the database,
21 currently.

22 And this database only includes integral
23 luminaires, so the LED is actually part of the
24 luminaire, itself, or the LED light engines. And we're
25 about to expand that broadly by also including all of

1 the screw-based lamps that will enhance the -- or
2 increase the amount of light fixtures that are
3 available. All those light fixtures that currently have
4 screw-based or other traditional incandescent bases.

5 The next slide, please. So, this is a -- just
6 looking at the Energy Star database for lamps. These
7 are, you know, potentially the candidates that would now
8 become JA8 lamps. And what this shows is that there are
9 a number of models from many of the large manufacturers
10 for a variety of these different light sources, whether
11 they're the A lamp, or the reflector lamp, or the
12 parabolic reflector lamp, or luminized reflector lamp,
13 or the MR-16 type lamp. So, there's products for a
14 variety of different traditional incandescent bases.

15 The next slide. This one, there was some
16 discussion about the acceptability flicker. This is a
17 study from the LRC. And what this points out is that as
18 you go into the upper, left-hand corner, you can see
19 that the acceptability flicker decreases as you increase
20 the magnitude of flicker, and as the frequency with that
21 flicker applies decreases.

22 The next click, please. And this is the area,
23 this is the historic area of what we call -- that's not
24 low-flicker operation. And so, that's the area of the
25 type of lamps that would be not allowed.

1 The next click. And this next shaded area is the
2 area that is recommended by the IEEE PAR 1789 Group,
3 that's looking specifically at flicker.

4 So, our proposal for 2016 is very -- well, I'd
5 say it's not very stringent.

6 So, the next slide, please. And this is just
7 another picture of that same IEEE standard.

8 The next slide. We tested a number of lamps and
9 found that approximately half of the products would pass
10 the flicker test. So, there's a half-full/half-empty
11 thing here going on. One is it's half-full and, yeah,
12 the manufacturers can make products that don't flicker.
13 The half-empty part is that, yeah, there's actually a
14 lot of products on the market, that are being currently
15 sold, that cause problems with flicker and would be,
16 potentially, those lamps that are unacceptable.

17 The next slide. And thank you very much.

18 MR. SHIRAKH: Thank you, Jon. I just wanted to
19 add a couple of points that I forgot to mention. For
20 outdoor lighting, we actually do not have the CRI of 90
21 requirements. And, you know, we've changed that. That's
22 since the draft language was put out so, you know, they
23 can't put in a lower CRI of 80 for outdoor applications.
24 And also, for outdoor lighting, the color temperature of
25 a 3,000 degree requirement doesn't apply.

1 So, this is one of those points that we would
2 have liked to have the same requirement throughout the
3 house for enforcement simplification, but we probably
4 couldn't have justified that.

5 You know, I think in the long run this
6 distinction will go away in the future, we can probably
7 get rid of this exception. But for now, for 2016, we
8 will have different requirements for outdoor lighting
9 versus indoor lighting.

10 Jon?

11 MR. MC HUGH: Yeah, and my understanding is that
12 you're looking at a standard that for dedicated
13 luminaires that are rated for outdoor applications, that
14 those are the ones that they're not -- they're sort of
15 in that legacy portion of the table. So, my
16 understanding is it's not only just the outdoor
17 lighting, but also those few light sources that are GU-
18 24 would also be exempted from the JA8 standard. So, it
19 gives a lot of flexibility to people who, for whatever
20 reason, don't want to use a higher-quality luminaires.
21 Thank you.

22 MR. SHIRAKH: That's true. And, again, you know,
23 we think in a few years' time it's all going to be all
24 high-efficacy, high-performance lights out there,
25 anyways.

1 The other distinction is that Jon mentioned that
2 our lighting proposal represents the biggest savings in
3 the standard. It is true, but there's a point is that
4 lights are a nonregulated load, so it doesn't really
5 impact the budget that comes out of CBEC. But it does
6 impact the overall HERS rating of the house and the move
7 towards zero net energy. So, it is captured in that
8 area.

9 But the standard and the budget, and the
10 proposed budget to get out of CBEC, res does not
11 include, for compliance purposes, doesn't include the
12 savings for lighting.

13 Noah?

14 MR. HOROWITZ: Noah Horowitz, with NRDC. We're
15 extremely supportive of this proposal and the
16 opportunity to get an energy-efficient bulb in every
17 socket. This proposal will get us there.

18 I think the one point where there's still some
19 lack of consensus is on CRI. And we are on record, and
20 our points have been misinterpreted. We fully believe
21 color quality is important and that it matters. I think
22 the sole question here is how high do we go? What is the
23 minimum that the CEC should be setting?

24 And there's interaction, although we're not here
25 talking about Title 20, if we set it here does that mean

1 it also goes in Title 20?

2 So, we're open to a high number. We're hoping
3 this is a data-driven process. And we heard from a prior
4 speaker, if you offer people different bulbs to choose,
5 everything equal being CRI, ignore that. So, what are we
6 basing this number on?

7 We do know that a minimum of 80 is what the
8 industry is doing and consumers are generally happy. Can
9 we push that up? Now, let's try and do that. But there
10 are some tradeoffs here.

11 And counter to what you heard earlier, CREE is
12 the biggest selling manufacturer of LEDs at Home Depot.
13 There's a four- to five-dollar cost increment from their
14 60-watt equivalent, their 80 CRI, and their 90 plus CRI
15 bulb. They're on record, on the docket, saying that
16 price will come down. Let's try to better understand how
17 that will come down.

18 And there's also a four-watt penalty, so that's
19 a significant percentage. Hopefully, that will come
20 down. That's the part that we're concerned about. These
21 things will still be cost-effective for consumers. But
22 when we look at Title 20, if the cost of the bulb goes
23 up, then they may not be choosing the LED bulb.

24 GE chose a different path. While the CREE bulb
25 gives off the same amount of light and uses more power,

1 the GE bulb gives off 25 percent less light. So, whether
2 it's 5, 10, 12 percent, people can't tell the
3 difference, they will be able to tell the difference
4 with the 25 percent. And Mike put in the dimmer bulb. I
5 mean, they have a dimmer bulb and they might take that
6 out, and that's one of the concerns that we have.

7 So, we'd like to see this be a more data-driven
8 process. The industry isn't here. Hopefully, they've
9 provided some data or what do we go on here? Thank you.

10 MR. SHIRAKH: Thank you, Noah.

11 Any other questions on residential lighting?
12 Mike.

13 MR. HODGSON: Commissioner, Mazi, Mike Hodgson,
14 ConSol, representing the building industry.

15 Just we're familiar with CRI and we can find the
16 bulb. You know, you go through Home Depot and you see a
17 number. But I'm unfamiliar with how do you tell it's
18 high R-9. So, is there a labeling requirement that
19 you're coming up with, so that we can easily identify?
20 I'd like to pick up, also, on Nehemiah's comment, is
21 building officials need to have a very clear label. So,
22 I'm familiar with the label that says CRI and a number.
23 How do I tell it's high R-9, and is that going to be
24 something that's defined?

25 MR. SHIRAKH: So, if the label says it is Title

1 24 JA8 compliant, that implies it is R-9 compliant, too,
2 because that is part of JA8.

3 MR. HODGSON: Okay, so we'll just look for that
4 JA8.

5 MR. SHIRAKH: Right.

6 MR. HODGSON: Thank you.

7 MR. SHIRAKH: Mike?

8 MR. MC GARAGHAN: Hi, Mike McGaraghan, from
9 Energy Solutions, here supporting the California IOU
10 team.

11 I just wanted to start off by saying we fully
12 support the Commission's proposal. We've worked a lot
13 with the Commission and other stakeholders and think
14 it's come to a really positive direction.

15 I know there are a number of other stakeholders
16 who are in agreement. Not all of them could be here
17 today, but there are several comments on the docket from
18 other manufacturers in the industry, both lighting
19 manufacturers and component manufacturers, who really
20 supported the drive towards higher quality and higher
21 product performance to encourage retention of these
22 products in the sockets.

23 So, I won't read through those, but they are
24 there on the record, and I think it's great we've got
25 that support from a number of different stakeholders.

1 The other thing I just wanted to touch on, I
2 think there's been a lot of good discussion in the last
3 few minutes on the importance of color rendering, and
4 high quality, and also on product availability.

5 I wanted to touch on price, specifically. That's
6 something that we've been tracking very closely over the
7 last few years. Specifically, we have a tool set up
8 that's collecting price points from online retailers
9 every -- initially, it was every week, then it's every
10 couple of weeks, from nine different sources, collecting
11 hundreds of different product price points.

12 And I think our total, now, is something like
13 50,000 price points collected over the last 13 to 14
14 months. And the trends that we're seeing in that data is
15 really powerful, I guess is the word I would use. You
16 can watch prices come down month by month, and you can
17 slice and dice that data in a number of different ways.
18 So, we've done that. And I actually shared a slide the
19 last time we were here that showed some of those trends.
20 But 90 CRI A lamps' prices were coming down at a
21 dramatically faster rate than 80 CRI A lamps, and to a
22 point to where you can see them converging.

23 And, in addition, we have enough data that we
24 can run statistical analysis of the data and try to
25 tease out the role of different product performance

1 features.

2 So, you can actually set up a model to predict
3 what is the relative impact of changes in CRI. And when
4 we first did that, it was actually 2012. And we found
5 that there was about a 30 percent price increase for a
6 product that had high CRI and was Energy Star, relative
7 to a product that was not Energy Star and had lower CRI.

8 We did it again in 2014 and found that it was
9 about a 20 percent increase.

10 The most recent data poll that we've done and
11 analyzed, from a statistical perspective, found no
12 correlation in A lamps between CRI and price.

13 So, clearly, those prices are converging and the
14 prices that consumers are seeing are becoming -- you
15 know, if there's any difference, it's in the weeds.

16 If you want to look at specific price points,
17 there's a lot of great examples out, now, as well. Fite
18 is a manufacturer that has a kind of industry-leading,
19 \$9.00 CRI, 90 A lamp that's in Costco. They've got a
20 \$12.00 90 CRI BR lamp.

21 Noah mentioned Cree's A lamp still being a few
22 dollars more expensive, \$4.00 more expensive. If you
23 look at Cree's whole portfolio, you actually see a lot
24 of price convergence there, too. They've kind of one by
25 one, it seems like they're actually getting rid of their

1 80 CRI product line and replacing the products with 90
2 CRI, that are the same price point. So, their MR-16 is
3 now the same price point as their 80 CRI MR-16 was. And
4 they have a linear lamp at 90 CRI that's now the same
5 price point as their 80 CRI was.

6 So, in addition to the macro view, where you're
7 looking at 50,000 data points, if you start to look at
8 specific product offerings, you can see it there as
9 well. There's very low-priced, high CRI products readily
10 available throughout the marketplace.

11 So, that's something that we've been really
12 excited to see. We're glad that the Commission has
13 continued to push in this direction. Even though a
14 couple of years ago, when we started, it was a -- it
15 seemed like a taller ask at the time, but the industry's
16 responded and it's going in exactly the direction that
17 we'd all hoped when we started this a couple years ago.

18 So, thank you.

19 MR. SHIRAKH: Thank you, Mike, that was very
20 helpful.

21 Any other questions on res lighting in the room?
22 Any questions online?

23 MR. BANNISTER: Hello, can you hear me?

24 MR. SHIRAKH: Yes, we can hear you, go ahead.

25 MR. BANNISTER: Hi, this is Dave Bannister from

1 the (inaudible) -- we are an invited SME developing
2 electronics in this space for LED drivers. I'd just like
3 to lend my support to what is being proposed in JA8, but
4 perhaps question a couple of the figures.

5 I'm intrigued as to why it is that despite that
6 the dimming criterion has been moved from 10 percent to
7 3 percent, it is still the case that the maximum flicker
8 criterion still only applies down to 20 percent dimmed.

9 I wonder why that is? Whether, perhaps, that
10 should have been moved at the same time. Because the
11 point being made there is that 10 percent isn't dim. We
12 are being (inaudible) -- detector still looks 30 percent
13 bright.

14 So, you've now got a big delta between lamps are
15 meant to dim down to and get the lowest point to which
16 they're going to pass the flicker test. And I would
17 propose that the criteria should apply all the way down
18 the dimming range, really. There's, to my mind, no
19 logical reason why you shouldn't.

20 MR. SHIRAKH: Well, thank you for your comments.
21 I think Jon McHugh's going to respond to that.

22 MR. MC HUGH: Hi, this is Jon Mc Hugh.

23 MR. BANNISTER: Hi, Jon.

24 MR. MC HUGH: Hi. The reason that we selected
25 the 20 percent dimming level, so currently the proposal

1 is that the low flicker operation criteria would be met
2 when the lamp was tested at 100 percent of light output
3 and 20 percent of light output.

4 The reason that we selected 20 percent of light
5 output as compared to minimum light output is that the
6 current market, not the market in 2017, but the current
7 market, the vast majority of products would fail at
8 minimum light output. And at 20 percent light output, 50
9 percent of the lights would pass or 50 percent would
10 fail, depending on which side that you're looking at.

11 So, this is the first step. It's my expectation
12 that once everyone starts measuring flicker and how
13 easy, as you know, how easy it is to actually control
14 flicker once you're measuring it. The problem is
15 controlling something when you haven't measured it. But
16 once you've measured it, that I'm expecting that in a
17 future code cycle that we would likely, rather than
18 using the lax flicker requirement that we have now,
19 ideally would adopt the IEEE standard and, yes, test
20 that over the full dimming range of the lamp. Thank you.

21 MR. BANNISTER: Thank you. I fully support that.
22 The flicker criteria being presented here are not
23 stringent and they're certainly not compared with the
24 evidence that comes out of the peer-reviewed research,
25 and which is (inaudible) -- and so, I fully support this

1 being part of the process whereby the California codes
2 and standards (inaudible) -- eventually can converge.
3 That would be very useful.

4 MR. SHIRAKH: Thank you for your comment.

5 Any other questions?

6 MR. STRAIT: We have a number of callers that
7 are coming in online. We're going to just go through the
8 list by who has their hands raised. Who's going to be
9 the next person. Okay, so Alex Bosenberg.

10 MR. BOSENBERG: This is Alex Bosenberg.

11 MR. SHIRAKH: Go ahead, Alex, we can hear you.

12 MR. BOSENBERG: Okay, I wanted to ask if Mr.
13 McGaraghan would be so kind to submit, as a comment, an
14 analysis of his dataset that strips out only qualifying
15 lamps as proposed to the new JA8, and also to be sure
16 that any effects of rebate or other incentive programs
17 are removed.

18 It's our belief that once that's done, it
19 doesn't look quite as rosy. But I look forward to him
20 providing that, if he doesn't mind.

21 I'll just skip a lot of the comments that have
22 already been made. I would support Mr. Horowitz's
23 comments about wattage and cost tradeoffs. We share the
24 same assessment.

25 Lastly, I neglected early on to state that if

1 folks look around they won't see very many people in
2 industry present, myself included, and that's because
3 the agenda didn't come out soon enough for us to be able
4 to plan our travel. And that is a long-standing
5 complaint and we've tried to work with the staff on
6 that.

7 There are California-based lighting industries
8 and I don't mean to leave them out of this statement.
9 But I hope the Commission would recognize there are a
10 lot of not-California-based industries. And I want to
11 express sympathy for the gentleman calling in from
12 Britain, it's about 8:00 or 9:00 there.

13 We do our best to attend because we realize how
14 important it is to be there in person. But when things
15 are not put out soon enough, we can't, and we end up
16 trying to influence over the phone. It's very
17 challenging. Thank you.

18 MR. SHIRAKH: I think Peter Strait's going to
19 respond to your question on timing.

20 MR. STRAIT: Oh, right. Although a full agenda
21 was not posted until, I believe, two weeks ago, I
22 believe notice has been available online that the
23 hearing was occurring on March 2nd and 3rd, since
24 February 14th, I believe. So, if there has been a
25 greater amount of communication that we can pursue in

1 the future, then we're happy to and we'll definitely
2 take this as a lesson learned. We certainly don't want
3 to exclude anyone.

4 We also know there was a timing issue. There was
5 another obligation that the lighting industry was --
6 there was an Energy Star meeting. We, unfortunately,
7 couldn't schedule around that meeting, so we apologize
8 for that as well.

9 But certainly, if there's better communication
10 that we can have with you, we're happy to make
11 improvements.

12 MR. SHIRAKH: So, I have a question.

13 MR. BOSENBERG: I would appreciate that. The
14 Energy Star is a reason why I'm -- another good reason
15 why I'm not here.

16 But also, you know, lighting, it tends to be the
17 same people whether it's commercial or residential. And
18 I understand it may not be the same for other
19 industries, so your agenda tends to be residential one
20 day and commercial the next. But many of us find it
21 difficult to travel on the weekends, which was required,
22 and other things.

23 So, I sent schedules to the staff and they have
24 my number. We're happy to respond as quickly as possible
25 about feasibility of dates in the future.

1 MR. STRAIT: Certainly, and we're happy to
2 receive any comments that you have, either during this
3 hearing or in writing, in a public comment period to be
4 continued between -- I think we're asking, we prefer to
5 see comments by March 17th, but the public comment
6 period does extend to March 30th, if needed.

7 COMMISSIONER MC ALLISTER: So, I'll just jump in
8 and say, you know, thanks for being on the phone. I know
9 you've got a lot going on, on your end, as well. But,
10 you know, participation by phone, or by WebEx, or
11 however we set it up, is perfectly acceptable. So there
12 isn't an expectation, while certainly I see how, you
13 know, there's nothing like being there, we are trying to
14 use technology to keep this conversation going with as
15 broad a participation as possible.

16 Obviously, NEMA's an important stakeholder and
17 we want to have robust communication, not just on days
18 like today, but just ongoing. So, you know, I do value
19 your participation and trust that will continue, so
20 thanks.

21 MR. SHIRAKH: Thank you, Alex.

22 I have a question for Mike McGaraghan. I think
23 it was an interesting point that whether the cost points
24 that you've identified, they are inclusive of rebates or
25 not. I know rebates can muddy up the picture quite a

1 bit. I know we live in the SMUD service territory here,
2 and just looking at some of the Cree lights the other
3 day, a 60-watt high CRI is about \$10.00 more than an
4 equivalent for a low CRI. And I know most of that has to
5 do with the way rebates are and not the actual cost of
6 the product.

7 So, is there any response to that?

8 MR. MC GARAGHAN: Yeah, this is Mike McGaraghan.
9 It's a great question. And we have removed the effect of
10 rebates before doing our analysis. Given that I help
11 support the utilities, I also work very closely with
12 them in their rebate program, so have access to an
13 understanding of which products are being rebated at
14 which retailers. So, we're able to factor that in.

15 If we're going to -- I'll just use an example.
16 Well, I actually, probably shouldn't get into specific
17 product names and their price points. But if a product
18 shows up at a price of \$10.00, but we know that it had a
19 rebate of \$5.00 applied to it, we count that in our
20 analysis as a \$15.00 product.

21 MR. SHIRAKH: So, can you share that with NEMA?
22 Have you done that, you know, your data points?

23 MR. MC GARAGHAN: Not directly with NEMA. We've
24 shared it, we have a number of different analyses that
25 have been posted to the docket, and to DOE's docket but,

1 yeah.

2 MR. SHIRAKH: Okay.

3 COMMISSIONER MC ALLISTER: Mike, does that also
4 include the stripping out of the JA8 qualification, sort
5 in doing the analysis on the --

6 MR. MC GARAGHAN: No, all the comments that I
7 made earlier were specifically looking at the impact of
8 CRI, because that's the one that draws so much attention
9 for being -- people have made a lot of comments about
10 CRI being a driver of price.

11 So, there are a number of other factors in JA8
12 that don't draw that same sort of attention, things like
13 start time. I haven't heard anybody say that start time
14 is increasing the price of LED products.

15 But there are a few others where we have
16 specifically gone and looked to see if there is an
17 impact. For example, dimability is one where we've
18 checked. Especially recently and for most product
19 classes there's not shown any correlation between
20 dimability and price.

21 And then another one, we use Energy Star
22 sometimes as a proxy because Energy Star includes a long
23 list of requirements, many of which are the same as
24 Title 24's. In our most recent analysis, there's no
25 correlation there, as well.

1 It's hard to -- but it's hard to say,
2 definitively, you know, for all products and all
3 metrics. We kind of look at one at a time.

4 COMMISSIONER MC ALLISTER: So, to finish up the
5 rebate point, it doesn't matter whether it's SMUD, or
6 PG&E, which have different rebate philosophies, or
7 whatever, you're using the full retail, without the
8 rebate.

9 MR. MC GARAGHAN: Correct.

10 COMMISSIONER MC ALLISTER: Okay, thanks.

11 MR. SHIRAKH: Thank you. And again, I see Connie
12 from SMUD's there. And again, I'm curious why within the
13 same class, 60-watt Cree lamp, for instance, there's
14 such a huge difference in price, and the rebate.

15 Maybe, you know, we can talk about that a little
16 bit later on. But I do agree that we need to filter out
17 the effect of the rebates when we're talking about the
18 cost of these light sources.

19 Any other questions online?

20 MR. STRAIT: Yes, the next person is Chris
21 Primus.

22 MR. PRIMUS: Hi, this is Chris Primus from Max
23 Light. We're a manufacturer of light sources for fixture
24 manufacturers that are largely DU-24 CLFs and LEDs.

25 One thing, I really support the G-24 sockets

1 remaining and immediately high-efficacy source as
2 identified by your changes.

3 I'm concerned, when looking at JA8 for the other
4 screw-based lamps, and non-screw-based, that smaller
5 decorative lamps aren't being approached, particularly
6 candle-based lamps. Some of those requirements,
7 particularly groups in dimming, and labeling, and others
8 are going to be particularly challenging for some of the
9 more decorative lamps. One of the pushbacks on
10 decorative lamps or those miniature types of products is
11 the look of them. And to try to get that full
12 incandescent type look in a candle type of a product,
13 and not have a lot of electronics in the bottom, that
14 kind of goes away from the look of the product. It's
15 really tough to do. And to try to put in dimming is
16 going to be very challenging for some of those products.

17 I'm also curious as to why you picked the three
18 percent number. I know you wanted to go below 10
19 percent, but why the three percent number, particularly?

20 In addition, there's a statement at the very
21 end, on page 2, where you talked about life had to be
22 15,000 hours. Just curious, what lumen maintenance is
23 that and is that just life of the entire product?

24 MR. SHIRAKH: Jon McHugh is going to respond to
25 your questions, or Noah, I think. So, are you --

1 MR. STRAIT: I can speak to the lumen
2 maintenance. I think the lumen maintenance is based on a
3 6,000 hour. We're not expecting -- we understand that
4 between that 6,000 hour lumen maintenance and when you
5 hit 15,000 hours that there's going to be additional
6 drop off. We would just figure if you can hit that 86.7
7 target at 6,000 hours, that's still going to be
8 acceptable over the life of the product.

9 Whether the 15,000 hours is appropriate for
10 small candelabra or candle flame-shaped lamps, I'd have
11 to -- I think we'd have to go back and talk to our
12 subject matter experts and see exactly where we land on
13 those. But I think they work --

14 MR. PRIMUS: That's not a major concern. It was
15 more the other things, like dimming.

16 MR. STRAIT: Oh, okay.

17 MR. PRIMUS: And also labeling. You can't put
18 that kind of a label on that small of a lamp.

19 MR. STRAIT: Sure, we'd be happy to have some
20 thoughts. We're actually, internally, for having some
21 options for possibly having the label in some of the
22 other materials that might accompany the lamp. We're
23 just trying to strike a balance. Again, since we've had
24 a gentleman from the building industry -- I'm sorry,
25 from the building inspector side of things saying that

1 they really need to see something on the product. If
2 there's something smaller that we can come up with for
3 these smaller factors, then we're certainly looking into
4 that.

5 MR. SHIRAKH: Jon?

6 MR. MC HUGH: Just one comment. I specifically
7 looked at the candelabra lamps in terms of the real
8 estate that's available for labeling. And right now,
9 there's currently labeling for wattage and a number of
10 other things on the candelabra.

11 And using the same point font, there's -- I
12 looked at like five different candelabras and found that
13 all of them had enough real estate at that same font
14 size for having compliance for Title 24 JA8.

15 MR. SHIRAKH: Thank you, Jon.

16 Any other questions online?

17 MR. STRAIT: Yes, the next person to speak is
18 David Peak.

19 MR. SHIRAKH: David, are you there?

20 MR. STRAIT: David, are you able to -- is he
21 currently unmuted?

22 MR. SHIRAKH: David, you're unmuted on our end,
23 if you want to unmute yourself and make a comment. Or we
24 can go to the next commenter until he figures it out.

25 MR. STRAIT: Well, we can -- he sent in a

1 comment by text, as well. It says, "A normal chandelier
2 with medium-based sockets in the market, today, would be
3 marked with a re-lamping label that indicates max 100
4 watt, type A/type SCL/type SBLED. This is a safety
5 marketing. One of the new rules with this impact
6 compliance of a JA8 bulb's installed."

7 And I don't believe -- again, we can discuss
8 like whether we need to use a shorter phrase for showing
9 compliance with these lamps, but I do not believe it
10 would affect the safety labeling.

11 And he has two other -- okay. He also asked,
12 "Was CQS considered to be used, instead of CRI, for LED
13 luminaires?"

14 We are currently looking at several -- we do
15 know that there's developments on the side of different
16 metrics for measuring light quality, and the spectrum of
17 light, and scotopic quality elements.

18 We aren't -- we weren't at a point where we felt
19 we could move from CRI into some other territory, but we
20 are keeping a close eye on those to see if there's a
21 better metric that can be used in the future.

22 Then, "Why would you create two standards for
23 LED, one for GU-24 and one for all others? Big mistake."

24 I'm going to interpret that question as
25 rhetorical, but the comment is duly noted.

1 There's also a question, "How will dimability to
2 3 percent be measured?"

3 I know that we have a test for dimming, but I'm
4 not sure -- I mean, I don't know if that -- I'd have to
5 speak to the subject matter expert to find out if
6 there's some nuance with determining a three-percent
7 dimming, specifically. I'm not aware of any particular
8 difficulties with it.

9 MR. SHIRAKH: Simon, is there a test procedure
10 for determining dimming?

11 MR. LEE: For the dimming levels, that's based
12 on the Energy Star test methods. So, we're using the
13 same test procedures and requirements.

14 MR. SHIRAKH: Thank you, Simon. Any other
15 questions?

16 MR. STRAIT: Okay, the next person to speak is
17 Greg Merritt. Greg, you are unmuted.

18 MR. MERRITT: Hi, thank you very much, Peter.
19 Yeah, so this is Greg Merritt from Cree. I just want to
20 make a couple quick comments.

21 One, I wanted to thank the staff for their good
22 work and thoughtful consideration of the many diverse
23 viewpoints. So, I know that's no easy.

24 I want to reiterate our support for the
25 requirements for high-quality lighting, and including

1 high CRI, and R-9. And if our goal is to encourage and
2 enable 100-percent adoption, that requires us to not
3 make compromises on the quality of the lighting
4 experience by the customers.

5 Driving higher adoption will save more energy.
6 And I would just echo the comment that any performance
7 criteria requires some cost tradeoffs. So, this is no
8 different than three-percent dimming, or .9 power
9 factor, or anything else.

10 Also, there's been a number of folks referencing
11 Cree and our current pricing. And while I appreciate the
12 air time, I would caution against using a rearview
13 mirror to gauge the future. You know, we're continuing
14 to drive the cost down. I think you've seen that, right.
15 Not quite two years in the market we've gone from \$12.97
16 to \$7.97 on the 60-watt. So, I think by setting an
17 expectation and a bar for what the performance will need
18 to be will encourage, not only Cree, but other
19 manufacturers to try to figure out how to meet that
20 performance bar at the right price.

21 So, I guess I would just reiterate my support.

22 COMMISSIONER MC ALLISTER: I wanted to actually
23 follow up with a question. Thank you very much for
24 calling in, I really appreciate it. I know it's later in
25 Georgia than it is in California, although it's not

1 really --

2 MR. MERRITT: Well, we're in North Carolina.

3 COMMISSIONER MC ALLISTER: Oh, North Carolina,
4 sorry. Let's see, so I want to just -- so, you sort of
5 invited a question there, and I don't know if you can
6 answer it or not. But part of the concern you've heard
7 expressed is the cost differential between the high CRI
8 and the less high. And so, you know, and what the future
9 holds there. You know, I totally agree that looking in
10 the rearview mirror is not a good strategy. But to the
11 extent that the reality, as it unfolds, actually matters
12 here, it would be great if you could shed some light on
13 that, on what you think might happen.

14 MR. MERRITT: Well, so there is -- all other
15 things being equal, there is a cost increase -- there's
16 a cost delta for doing a 90 CRI. That number's -- you
17 know, it varies depending on your design criteria. But
18 let's say, for the sake of argument, it's 15 to 20
19 percent.

20 The difference is when the bulb is 15 bucks, you
21 know, that's a \$3.00 delta. When the bulb becomes 5
22 bucks, that becomes a \$5.00 delta. So, you know, I
23 wouldn't get wrapped up on the fact that there's been
24 folks that have referenced a \$4.00 difference or
25 whatever.

1 You know, as we continue to drive the
2 technology, the absolute price delta will become much
3 less. You know, I would encourage sort of the second
4 part of policy in California, as well as elsewhere, that
5 goes along with performance standards, is also in rebate
6 philosophy. So, I would encourage California to make
7 sure they line those two up.

8 COMMISSIONER MC ALLISTER: Thanks for that.

9 MR. SHIRAKH: So, Greg, this is Mazi. So, if I
10 understand you correctly, you know, you are anticipating
11 that the price differential will increase in the future
12 as the prices of all products go down. Is that correct?

13 MR. MERRITT: Yeah. So, you know, again,
14 anything that's a relatively constant percentage delta,
15 as the absolute prices come down obviously the price
16 delta comes down.

17 MR. SHIRAKH: And what do you see that
18 difference being like, you know, a couple of years when
19 these standards are going into effect?

20 MR. MERRITT: Oh, wouldn't you like to know,
21 Mazi.

22 (Laughter)

23 COMMISSIONER MC ALLISTER: That's why we're
24 asking.

25 MR. MERRITT: Less than it is today. Stay tuned.

1 MR. SHIRAKH: Okay. Any other questions or
2 comments online?

3 MR. STRAIT: Yes, the next person to speak is
4 going to be -- oh, it looks like the person was a
5 "Nathan", that had a comment, but he put his hand down.
6 Yeah, he did one of the typed comments, so I think we've
7 already gotten his.

8 Oh, no, he put his hand back up, so let's go
9 ahead and mute. Nathan, you are on the air.

10 We're not able to hear you. We've unmuted your
11 line, but we're not getting any audio from you.

12 So, you had the question about whether CQS was
13 considered, instead of CRI, and I think we've already
14 discussed that. If there is -- I don't know if you're
15 having technical difficulties. If there's another
16 question that you want answered and you want to enter it
17 by chat, we'll be happy to read it and respond to it.

18 MR. SHIRAKH: And also, if others have questions
19 that we can't get to, please submit it to us in writing.

20 MR. STRAIT: Oh, someone did -- oh, I'm sorry,
21 he did type in, saying he had to step away from his desk
22 for about 30 minutes and he wasn't sure if it was
23 answered.

24 The answer was we did consider some of the
25 alternate methods of getting to what the spectrum was

1 and what the scotopic properties were of lighting. But
2 we didn't see where we could step away CRI in this
3 particular code cycle. We certainly see there are a lot
4 of improvements on the horizon, but we weren't able to
5 make that move, yet. Okay.

6 MR. STRAIT: So, we still have a hand raised by
7 Alex. I'm sorry, we got him. Okay, I believe that's all
8 the online comments that we have.

9 MR. SHIRAKH: I think that includes all the
10 comments. So, we're about 1:07 or a little more than an
11 hour behind schedule. So, I suggest breaking for lunch,
12 if you guys are hungry, or we can continue on, if
13 there's a preference.

14 COMMISSIONER MC ALLISTER: Yeah, we have quite a
15 bit of ground to cover in the afternoon, so let's break
16 for lunch.

17 MR. SHIRAKH: So, let's come back in about an
18 hour at 12:00 -- I'm sorry, 2:10.

19 COMMISSIONER MC ALLISTER: Okay, 2:10 back here.

20 MR. SHIRAKH: Yeah, 2:10, and then we'll
21 continue. I think the afternoon agenda should be a
22 little bit lighter, less comments so --

23 (Off the record at 1:08 p.m.)

24 ///

25 ///

1 [On the record at 2:15 p.m.]

2 MR. SHIRAKH: So good afternoon. I think we're
3 going to get started, but before we get started we'd
4 like to bring up a point.

5 When we posted the 45-day language, there has
6 been some changes to that language since the posting,
7 and we've been keeping track of these changes in a
8 supplemental document that is also posted on the web,
9 and I'm going to ask Peter Strait to explain about this
10 document and where it can be accessed and the
11 information in it, but basically the information in this
12 document will be considered as part of the 45-day
13 language even though it wasn't exactly the marked up
14 language that you've seen.

15 Peter.

16 MR. STRAIT: Thank you. To be clear, this is
17 not a newer version of the 45-day language. For
18 procedural reasons we had to lock down the 45-day
19 language prior to publication, but in that interim we
20 continued to receive comments and continued to work with
21 stakeholders, so the results of those discussions, the
22 results of addressing those comments, are captured here
23 in this staff intended changes to address concerns with
24 45-day language.

25 These are changes that we are already

1 considering for 15-day language, things that we already
2 planned to address, so if folks have comments along
3 these lines and haven't yet seen this document, I
4 strongly recommend people to take a look at this
5 document.

6 This is on the same website that has our
7 express terms and has the notices that have been
8 released to date.

9 And for some comments that you may have, it's
10 possible that we've already taken steps to address or
11 resolve some of those issues, but it wasn't done in time
12 to be included in the 45-day language, so when you give
13 comments, the people that submit written comments during
14 the written public comment period, you may have to keep
15 this language in mind. And also if you have some early
16 comments to give on some of the changes that are being
17 proposed here.

18 This contains a description of the high level
19 work that staff's doing, it's not an underline and
20 strikeout kind of thing that shows you exactly what the
21 change we're working on it. Some of that is still, we're
22 machining out internally, but that's there to
23 communicate some of the work that we're doing behind the
24 scenes.

25 UNKNOWN: I noticed the docket number has

1 changed, it now says 15.

2 MR. STRAIT: Yes, the difference between the
3 dockets numbers -- actually, for those listening at
4 home, someone had asked why the docket number here is
5 15-BSTD-01. The difference is the 14-BSTD.01 for the
6 2014 docket we had was strictly for the pre-rulemaking
7 period, so as we enter the formal 45-day public comment
8 period there is a new docket that's opened that then
9 records the formal comments that we receive during the
10 formal rulemaking period. So if you have comments on
11 this process please use this new docket number.

12 This separate docket over here for 15-CALG-01
13 is for the CalGreen language. The CalGreen language
14 that's in Part 11 is being considered in parallel with
15 the changes to Parts 1 and 6 but is following a slightly
16 different rulemaking path so they are technically two
17 separate rulemaking actions that we're conducting at the
18 same time. So if you have comments that are specific to
19 the changes we're proposing to Part 11, please make sure
20 those get submitted to this 15-CALG-01.

21 We're trying to keep an eye on what we receive
22 and trying to make sure if somebody submitted to 14 but
23 really meant for it to be 15 or vice versa, that it gets
24 to the right place, but we can't catch everything. So
25 that's a very good question, thank you sir.

1 MR. SHIRAKH: Thank you, Peter, for that
2 explanation. Now we're going to go back to the agenda.
3 We got a few items. We actually are done with the
4 comments that probably would have generated most
5 comments, so afternoon should go probably a little bit
6 faster.

7 The first one is going to be by Dee Anne Ross,
8 and she'll be presenting the changes to the residential
9 and nonresidential ACM manuals.

10 COMMISSIONER MC ALLISTER: Actually, Gabe
11 Taylor is Commissioner Hochschild's advisor on energy
12 efficiency matters, or on many matters, and he's going
13 to be joining us on the dais in the afternoon, so thanks
14 Gabe for being here.

15 So go ahead, thanks.

16 MS. ROSS: So, this is on the ACM Approval
17 Manual, and I added this slide because I wanted to make
18 sure that people understood that, for starters, ACM
19 stands for Alternative Calculation Method, and as used
20 in this document it refers to software, and that we are
21 considering the approval manual.

22 The ACM Reference Manual is the document where
23 all the specific modeling details are found, and that's
24 not being considered right now, it's just the approval
25 manual which is the process for getting software

1 approved.

2 So, the term 'Compliance Manager' refers, it's
3 used extensively throughout this document and it means
4 the simulation and compliance rule implementation
5 software. it's the engine for all the software,
6 including public domain programs DBECC-Res and CBECC-
7 Com.

8 And I would just add a note that although the
9 public domain software is not technically an ACM, CBECC-
10 Res and CBECC-Com do follow the procedures in the
11 approval manual.

12 So the high points are that we combined the
13 residential and nonresidential approval manuals into one
14 document, and nonresidential really means all the other
15 standards other than low-rise residential, because it
16 covers high-rise and offices and all sorts of different
17 kinds of buildings, and it includes the process and
18 timelines for approving ACMS or software.

19 I'll cover the process of each type of
20 approval next, but we define the types of approval as a
21 functionality change that does not affect results.
22 They're made by the software vendor; bug fixes which are
23 made by the Energy Commission. They're not limited to
24 those cases where the compliance results do not change
25 because, in fact, the compliance results often do change

1 with a bug fix; and then there are minor and major
2 compliance manager changes.

3 So bug fixes occur when the software produces
4 unexpected results or stops working. If the only change
5 is a bug fix, there is no approval required. That should
6 make it quicker and easier for us to get bug fixes out,
7 but it is strictly limited to the bug fix. If it's
8 combined with anything else then we will have to
9 consider it a major or minor change.

10 So we included changes initiated by the
11 software vendor. These are called functionality changes.
12 There's no change to the compliance results, and these
13 changes also do not require approval by the Commission,
14 we just ask that we be notified of those changes by the
15 vendor.

16 So the process for the compliance manager
17 changes, we included a timeline for the updates for
18 major and minor changes. Most times vendors may not need
19 the full amount of time but as requested, we added some
20 flexibility to those timelines. So as noted here, it's
21 45 days or longer, 90 days or longer. And in the case of
22 major and minor updates, previous versions of the
23 software do expire whereas for minor changes and
24 functionality changes there's no expiration.

25 And whether the update is approved at a

1 business meeting or by the Executive Director is made by
2 the Commissioner with oversight.

3 The submittal requirements are contained in
4 this document, and although it's our firm belief that
5 the full set of tests should be run because you never
6 know what might happen, since we combined the
7 residential and nonresidential requirements into one
8 manual, as it's written the vendors will not be required
9 to conduct all the tests each time the software's
10 updated. And we also clarified that the fee is only when
11 the software is brand new or if they allowed the
12 approval process to lapse.

13 And then another source of confusion was
14 expired approval versus decertified, so we added
15 language to make it a clear distinction that software
16 that expires when modifications are made versus
17 decertification, which is lengthy legal process when
18 there's a defect in the software so that we can just
19 quickly and easily remove outdated software from the
20 approval process.

21 And we added to the approval manual language
22 previously only in the reference manual, and that
23 includes at a very high level how the compliance manager
24 determines the standard design and that additional
25 details are found in the reference manuals, and this is

1 kind of what they are, the appliance standards, the time
2 dependent valuation, climate zones.

3 And then last but not least, the user manual.

4 A cumbersome requirement was that the resolution
5 approving the software be included in the user manual.
6 We removed that requirement. We still post that approval
7 document at our website but it will eliminate that lag
8 from when they get their approval to when they can
9 release their software.

10 And that concludes my overview.

11 MR. SHIRAKH: Thank you Dee Anne. Any
12 questions for Dee Anne on ACM Manual?

13 George.

14 MR. NESBITT: George Nesbitt, HERS Rater. The
15 only real question at the moment goes back to the issue
16 of bugs versus minor changes versus major.

17 So last week you issued a new version 3.3C or
18 something like that. The previous version was, I think
19 December 30th of 2014, and then there had been like an
20 August version. So I guess my question is, are bugs
21 issued in between those releases and minor fixes versus
22 those major releases?

23 MS. ROSS: Well, as you know, bugs are
24 unexpected, so we did have a bug fix that was 3B1 and it
25 was strictly a bug fix. If we can, we try to combine bug

1 fixes and minor updates, especially given this first
2 CBECC is new to the industry right now so we try to
3 combine them, but if there is truly a bug, that will be
4 released on its own.

5 MR. NESBITT: I guess the question I have is
6 if I'm using CBECC and I've been using the December
7 version and there's bugs, how would I know until the
8 next full release, how would I get it?

9 And I guess the other question then becomes if
10 I'm using Energy Pro and Energy Pro issues updates with
11 some frequency, does that mean that that might include
12 bug fixes since the past release that I might not get if
13 I'm using CBECC directly?

14 MS. ROSS: Well, I happen to know -- that was
15 a little hard to follow, but I happen to know that we
16 kind of delayed the approval of Energy Pro because we
17 did find that bug. When we released CBECC 3B there was a
18 bug and we managed to get it so that Energy Pro didn't
19 have to issue a bug fix, because their approval when
20 they incorporated the compliance manager of 3B, it was
21 3B1 so it included the bug fix.

22 And in general, there are several versions
23 that are out there that are approved right now because a
24 lot of the changes we've made have just added
25 functionality changes like the ability to model mass

1 walls, so that doesn't necessarily mean that a previous
2 version expires.

3 I mean, you should be notified. As long as
4 you're on a email contact list from the software vendor,
5 you'll be notified if there's a bug fix.

6 MR. NESBITT: So essentially, if a new version
7 is released that would contain any changes, so it
8 wouldn't be changing in the background necessarily
9 between that.

10 MS. ROSS: Right, it would be a minor change,
11 if anything was changing in addition to a bug.

12 MR. STRAIT: The main thing that this is doing
13 is giving us some additional flexibility to say that
14 there are types of changes to fix bugs that don't need
15 the same approval process as a minor change, but we do
16 try to package those things together and be more
17 efficient about doing so. It's just the rephrasing that
18 we have in the language gives us a little additional
19 flexibility in the case that we do need to address a
20 bug.

21 MR. SHIRAKH: Any other questions on ACM
22 Approval Manuals? Anything online.

23 MR. STRAIT: Nothing online.

24 MR. SHIRAKH: Okay. So we're going to go to
25 the next topic, which is the PV credit.

1 So Dee Anne just introduced the two ACM
2 Manuals, the Approval Manual and the Reference Manual,
3 and she did say that the reference manual will not be
4 approved by the Commission until December, and that's
5 the manual that's going to actually have all the details
6 of the compliance options that would be incorporated
7 into CBECC-Res.

8 But we thought it was important to at least
9 mention this one compliance option because of the
10 interest that's in it and it's new and it's directly
11 related to the high performance attics and high
12 performance wall options that were measures that we
13 presented this morning.

14 So again, this is not going to be part of the
15 rulemaking package that's going to be adopted in a
16 couple or three months from now, but it is something
17 that folks should take note.

18 As we were developing the measures for the
19 2016 standards, the ZNE goals, we heard from the
20 builders that they're interested in having a PV credit
21 that would allow them to trade away the high performance
22 attics and high performance walls for those builders who
23 may not be comfortable from the onset to embrace those
24 two measures.

25 And you know builders like most of us, there's

1 plenty of them in the state and they have different
2 philosophies and approaches, and some of them are
3 already working on some of these concepts and they'll
4 probably be putting in high performance walls and attics
5 from day one if not sooner, and some of them are going
6 to be laggards, and we have to consider all that.

7 So the idea here was to come up with a
8 compliance option that would use a solar photovoltaics
9 to provide a credit that would be just enough to trade
10 away both high performance walls and high performance
11 attics. So that's bullet number 1.

12 And then the credit will be climate zone
13 dependent and it will vary based on the house size. So
14 as you can imagine, we have mild climate zones where the
15 high performance walls and attics don't require as much
16 credit to get traded away as opposed to, say, Climate
17 Zone 15, which is in the desert, Palm Desert, where high
18 performance walls and attics become extremely important,
19 so to do that tradeoff you need a larger PV system, so
20 the credit will take that into account.

21 And also, as you go up in the size of the
22 house from, I don't know, 1500 square feet to 4,000,
23 then obviously you need more PV to do the trade away. So
24 both of those factors will be part of this credit.

25 Number 3 says the credit will be flexible,

1 meaning they can use the trade away any other feature.
2 So even though we're fixing the amount of the credit to
3 be equivalent to trading away the high performance walls
4 and attics for that specific house in that climate zone,
5 the builder may choose to use that for almost anything
6 that they want, knowing that it is a limited credit.
7 It's a kind of a deal where if you use it for another
8 measure, then it won't be available for high performance
9 walls and attics.

10 For instance, there may be a builder who wants
11 to put in most west-facing glass than the five percent
12 limit or they may have more than 20 percent total, or
13 they may have other features. They can use this credit
14 to trade away those features, but what that means it
15 that now they have to put in either the high performance
16 wall, attic, or both, because it is limited.

17 And it's basically an idea that we are trying
18 to protect the integrity of the building envelope, that
19 efficiency and is very important because it's going to
20 be there for the life of the building and so we should
21 not trade away all of it in exchange for some amount of
22 PV.

23 So how that is going to work, the PV system
24 will have the following requirements.

25 For homes that are 2000 square foot or less

1 there will be a minimum of 2 kW PV system required, and
2 the amount of the PV credit is actually included in the
3 PV system.

4 Say for instance, you have a 2000 square foot
5 house in Sacramento Climate Zone 12, it probably takes
6 about 700 watts of PV to trade away the high performance
7 walls and attics. So if they put in the minimum 2 kW
8 system, that already includes that 700 watts, so with
9 that they can trade away the high performance attics or
10 any other feature.

11 If the house, however, gets larger than 2000
12 square foot, then the size of the PV would get scaled
13 up, and I'll show you a table in a second that will show
14 you how much it will go up. But the idea is basically
15 the larger the house, the more you need. And actually,
16 that extra requirement will be in addition to the 2 kW
17 system.

18 So 2000 or less, 2 kilowatts, chances are
19 you're good, you don't need any additional requirements.
20 More than 2000 square foot it depends on the size of the
21 house and the climate zone.

22 So bullet number 5 says if you do put in some
23 amount of PV, either the minimum or a little bit larger,
24 you don't get the credit for that entire PV system, the
25 2 kW system to trade away, there's only a portion of it

1 will get the credit.

2 But if you are moving toward zero net energy
3 and toward lowering your HERS score, that entire PV
4 system actually counts toward that zero net energy and
5 lowering the HERS score.

6 The example here is that the 4 kW system is
7 installed and 700 watts of it is traded away for high
8 performance attics, the balance, which is a 3.3 kW
9 system, can be used to lower your HERS score toward zero
10 and (inaudible) the builder (inaudible).

11 So that's kind of an important distinction
12 that even though that 3.3 system doesn't count anymore
13 toward any kind of a tradeoff for the regulated loads,
14 it can entirely be used to lower the HERS score.

15 And the exception that you see there is
16 basically the one that was put in 2013, that's where it
17 says if it is a solar ready zone for the homes that are
18 2000 square foot or larger is 250 square foot and for
19 homes that are less than 2000 it's 150 square foot, so
20 that kind of gave us a natural place where we could make
21 that distinction between the 2 kW system and the larger
22 systems.

23 So here's the table where it will show how
24 much beyond 2 kW you need for certain homes. And again,
25 we came up with these numbers in this table I think Ken

1 Nittler and Bruce Wilcox helped us run a series of
2 simulations, and this is a result of that.

3 So taking the 2700 square foot home in Climate
4 Zone 12, basically you need 2.23, that's another 230
5 watts, it's probably another panel or two on top of the
6 house to trade away.

7 So when you get in the hotter climate zones,
8 the requirement goes up a little bit. And of course when
9 you get into the larger homes, the requirement goes up
10 along with that.

11 So that's basically the general concept for
12 this credit. Bruce Wilcox tells me that in the next
13 release of CBECC this may include be one of the
14 features. Is that correct, Bruce?

15 MR. WILCOX: The plan is that the next CBECC
16 release will have a beta version of the 2016 performance
17 method, at least the primary features of that for people
18 to test including this PV.

19 MR. SHIRAKH: Thank you. So it's going to have
20 several additional features and this is one of them, so
21 builders and other folks can actually go experiment with
22 it and then see what the implication of the credit and
23 the other features of the building that we talked about
24 this morning.

25 So with that, I'm going to turn it over to

1 Nehemiah.

2 MR. STONE: Nehemiah Stone, Benningfield
3 Group. Two questions.

4 I notice that this is just for single family
5 and I'm wondering why solar credit is not allowed for
6 multi-family.

7 And the other question I have is, if this
8 solar credit is going to be included in the next version
9 of CBECC, I'm curious how the three story less than 2000
10 square foot exemption would be incorporated.

11 If I understood the exception correctly, you
12 can get solar credit and not have to have the same size
13 of a system. Is that correct?

14 MR. SHIRAKH: This exception you're talking
15 about?

16 MR. STONE: Yes. So what exactly does that
17 exception mean, then?

18 MR. SHIRAKH: This exception is the area for
19 the solar ready zone.

20 MR. STONE: So it's not an exception to what's
21 written above it, it's an exception to the solar, okay.

22 MR. SHIRAKH: No, no. Just basically we found
23 a natural break within the requirement for solar ready
24 zone where 2000 square foot was the threshold.

25 MR. STONE: Okay. If it's for solar ready,

1 that's fine. I thought -- coming where it is, I thought
2 it was an exception to the requirement for the size of
3 the system.

4 MR. SHIRAKH: No, no, no.

5 MR. STONE: All right. So then I only have one
6 question, which is why not multi-family?

7 MR. SHIRAKH: Bruce, do you have a --

8 COMMISSIONER MC ALLISTER: Yeah, Bruce.

9 MR. WILCOX: I don't remember ever being
10 involved in a discussion about multi-family or not.

11 MR. SHIRAKH: I don't see fundamentally why it
12 couldn't be part of multi-family, other than the limited
13 amount of roof that there may be.

14 MR. STONE: Well, there may be for some.

15 MR. SHIRAKH: You know, you could have as many
16 as ten units under that roof.

17 MR. STONE: But for a two-story multi-family
18 building, you have the same floor area to roof area
19 constraint that you have in a two-story single family,
20 so when you're talking about two-story it's the same
21 either way in terms of being solar capable.

22 So it looks like I should not have asked you
23 why not multi-family.

24 COMMISSIONER MC ALLISTER: If Bruce hasn't had
25 this conversation then I certainly have not either. So I

1 think that's a good sort of kickoff point to talk about
2 it.

3 Obviously, there are other complexities with
4 multi-family where you've got a lot of meters on that
5 one building with all that roof space that corresponds
6 to each unit, and so you get into kind of how to fit
7 that into the design and code application process,
8 right, which will look somewhat different from a single
9 family.

10 But to the extent that we're also trying to
11 look at ways to carve out from res and nonres parts of
12 code the items that apply to multi-family and then try
13 to develop some treatment of those and make that kind of
14 medium to longish term goal, this seems like it would
15 fit well under that process.

16 I can't say that among all the priorities
17 that's really the one that's moving on the fastest, but
18 I think it is on the radar. I've talked a little bit
19 with staff about this, how do we create clarity for
20 multi-family without having to go back from square one
21 and create everything for multi-family from scratch, and
22 this seems like it's kind of one of those issues that
23 would get swept up in an effort to figure out
24 pragmatically what we can do to help multi-family get
25 more clarity.

1 MR. STONE: Three very quick things on that
2 last point. Obviously, I'm continuing the conversation
3 we had in San Francisco; obviously I'm willing to help.

4 As far as your first comment, virtual net
5 metering takes care of that problem. You can have one
6 system and allocate the energy by agreement to all of
7 the units.

8 And I forgot what the second point was so I'll
9 sit down.

10 MR. SHIRAKH: So I guess one comment I would
11 make is that if we don't have this option for multi-
12 family, what's going to happen, they have to put in high
13 performance walls and attics.

14 MR. STONE: And that's exactly why I think
15 that it's important to have this, because if you think
16 about what makes a difference in different kinds of
17 buildings. In a single family home walls and attics make
18 a lot more difference. In multi-family they make a lot
19 less difference and water heating is the biggest issue
20 because you have a lot less wall for each apartment.
21 They don't have four walls around every apartment.

22 MR. SHIRAKH: This would be available for low
23 rise residential.

24 MR. STONE: Except multi-family, right? It
25 says single family on it. If that gets changed to just

1 say low rise residential, you've solved my problem.

2 MR. SHIRAKH: You see that single family under
3 the exception but there's nothing here about single
4 family.

5 MR. STONE: Yes, in 4A and 4B. If it said low
6 rise residential I would not be standing up here, I'd be
7 happy.

8 MR. SHIRAKH: Okay. Well, I need to look into
9 that because low rise residential is treated as
10 residential and the high performance attics and high
11 performance walls are the same requirement for low rise
12 and single family.

13 MR. STONE: You're speaking about 2016,
14 because 2013 that's not the case. 2013 you don't get
15 credit, in multi-family you cannot get credit for solar
16 even those climates under review.

17 MR. SHIRAKH: Let's talk about that.

18 MR. STONE: Okay. Thank you.

19 MR. NESBITT: George Nesbitt, HERS rater.

20 So if I'm understanding this right, this is
21 only a performance method credit.

22 MR. SHIRAKH: Yes.

23 MR. NESBITT: And your standard design of
24 course includes high performance walls and attic.

25 MR. SHIRAKH: Yes.

1 MR. NESBITT: So what you're saying is if we
2 don't want to do those, essentially the difference in
3 energy we have to make up with a solar system.

4 MR. SHIRAKH: Yes.

5 MR. NESBITT: Okay. And then it has to be a
6 minimum of a 2 kW.

7 MR. SHIRAKH: Yes.

8 MR. NESBITT: Is that AC or DC? Oh, bad
9 question.

10 MR. SHIRAKH: Two kW nominal is usually rated
11 in DC.

12 MR. NESBITT: Okay. And so then you've
13 basically figured out a 2 kW system produces more TDV
14 than the difference between high performance walls and
15 attics --

16 MR. SHIRAKH: In most climate zones. And for
17 the homes that are about 2000, 2500, I would say 2 kW
18 covers almost all of them. But if you get to homes
19 bigger than that in more severe climate zones, then you
20 may have to actually go beyond. But I would say for all
21 practical purposes 2 kW would cover it for 2000 square
22 feet homes.

23 MR. NESBITT: Okay. And then you said you
24 could use that credit for other things. So you could use
25 the credit but if you wanted more than 5 percent window

1 area or whatever else it was, didn't want to put in the
2 tankless water heater, you could offset that, but then
3 you would still have to then do high performance walls
4 or attics. So essentially it's a credit that you can use
5 one way or another.

6 MR. SHIRAKH: Any way you want. That's what
7 flexible credit means.

8 MR. NESBITT: Okay. And is the credit the same
9 whether you use it here or there?

10 MR. SHIRAKH: Doesn't matter. You get this
11 much credit, it's like money in the bank, you can use it
12 for high performance --

13 MR. NESBITT: Money in the bank, I'll check my
14 account.

15 MR. SHIRAKH: Yeah, when you go home check it.

16 But again, you get that credit, it's basically
17 unfortunately instead of money it's going to be in TDV
18 per square foot, and you can use that for high
19 performance walls or attics or you can use it for
20 another feature. You can even use it if you want to put
21 in a standard storage water heater, you can use it for
22 that, but that means you've used all your credit, then
23 you have to put in high performance walls and attics.

24 MR. NESBITT: Okay. I guess perhaps my last
25 question will be is the PV system HERS rater verified?

1 MR. SHIRAKH: We haven't really discussed that
2 detail. I'm sure you want it to, but we'll see, but the
3 answer is probably no.

4 Jon.

5 MR. MC HUGH: Hi, this is Jon McHugh, McHugh
6 Energy. I'm trying to understand a little bit about what
7 you're proposing here.

8 So you have a 2 kW system and it applies for
9 the high performance attic and high performance wall
10 regardless of climate zone; is that right?

11 MR. SHIRAKH: So for the climate zones where
12 high performance walls and attics are required, and I
13 think this morning that high performance attics are in
14 Climate Zones 4 and 8 through 16.

15 MR. MC HUGH: For those climate zones, okay.
16 So you can't use the PV credit in the climate zones
17 where there's not a --

18 MR. SHIRAKH: In the prescriptive baseline if
19 you don't have a high performance attic there's no
20 credit.

21 MR. MC HUGH: No credit, okay.

22 And then does 2 kW get you more credit in
23 Climate Zone 15 than it does in Climate Zone 10?

24 MR. SHIRAKH: No. All it means is that --
25 well, I don't have that table here, but say in Climate

1 Zone 12 for a 2000 square foot home, you need roughly
2 about 500 watts of PV to trade away high performance
3 attics and walls. In Climate Zone 15 I think it's about
4 900.

5 So what it means that with a 2000 square foot
6 you can still get the credit for both high performance
7 attics and walls for both in both climate zones, but in
8 one of them you only needed about 500 watts, in the
9 other one you needed 900 watts, which means to move
10 toward the HERS score of zero you have less credit in
11 Climate Zone 15 because you've used more of that 2 kW to
12 satisfy your high performance attics and wall, and so
13 the remainder is going to be less that's going to move
14 you toward ZNE.

15 MR. MC HUGH: I see. So you are calculating
16 something separate by climate zone for the PV output.

17 MR. SHIRAKH: Yeah, I think I emphasized that,
18 that the amount of credit is totally dependent on the
19 house size and the climate zone.

20 MR. MC HUGH: And at this point there's
21 nothing that's giving credit for, for instance, facing
22 your panels west versus east, it's a single PV value?

23 MR. SHIRAKH: The size of the credit is
24 calculated assuming an east facing panel, which means in
25 reality all it means is that -- well, first of all, it

1 makes verification easier because you don't have to send
2 someone out there, because we're assuming the worst
3 orientation, so you don't have to send George out there
4 to verify the orientation for you.

5 But what it means is that the amount of PV
6 that you need for those credit is going to be slightly
7 larger. And again, the difference between east, south
8 and west is not huge, but east is the most conservative,
9 so it means that the amount of credit you need is
10 slightly larger, which again, what it means is that if
11 you are interested in moving toward ZNE you'll have less
12 amount of PV left to move toward ZNE of zero.

13 MR. MC HUGH: So this will ultimately mean
14 that potentially you're actually going to be
15 overgenerating ZNE, you'll actually be somewhat ZNE
16 positive or whatever, you'll be somewhat energy
17 positive?

18 MR. SHIRAKH: No, it doesn't impact -- well,
19 yeah, it means slightly, yeah. Because again --

20 COMMISSIONER MC ALLISTER: This is only the
21 loads that are in this whole calculation, right?

22 MR. SHIRAKH: Right.

23 COMMISSIONER MC ALLISTER: This is only
24 regulated loads.

25 MR. MC HUGH: So I guess the part I'm confused

1 about is the HERS rating part.

2 So you get this leftover energy for the HERS
3 rating, especially if you're going to do the ZNE --

4 MR. SHIRAKH: Okay. Let's go into this example
5 here. Say if a 4 kW is installed but 700 watts needed to
6 trade away high performance attic. Let's say this is
7 Climate Zone 12. That leaves 3.3 that will be used to
8 lower your HERS score.

9 Now, you put that same house in Climate Zone
10 15, then this may go up to one kilowatt, which means
11 you'll have 3 kW would be available to lower your HERS
12 score.

13 So yeah, there's a difference of about 300
14 watts, which is basically one or two panels.

15 MR. MC HUGH: And then the remainder when you
16 try to hit ZNE, are you recalculating that differently?

17 MR. PENNINGTON: Let me respond to you, Jon.

18 MR. MC HUGH: Okay.

19 MR. PENNINGTON: So what Mazi has explained
20 here is kind of shorthand for what's going on, to assure
21 people that the overbuild of the PV system to get the
22 compliance credit doesn't disappear on your when you try
23 to lower your HERS rating, but a more accurate way to
24 think about it is that you would use the HERS rating
25 software to calculate a HERS rating on whatever energy

1 efficiency measures you have in the house, and then you
2 would add the PV system to get a second rating. That's
3 how the California HERS ratings work.

4 And actually that second rating would take
5 into account the actual orientation, the avoidance of
6 shading, everything that's in the PV calculator.

7 So Mazi's description is kind of simplified,
8 but you're going to get full credit for the PV system in
9 the HERS rating.

10 MR. MC HUGH: I see.

11 MR. SHIRAKH: Yeah, to emphasize what Bill
12 said, you put that 4 kW system and for moving toward the
13 ZNE you take the actual orientation of the house into
14 account.

15 MR. MC HUGH: I see.

16 MR. SHIRAKH: But it's not going to be -- for
17 the ZNE score it's the actual size and the actual
18 orientation. It's only for the calculation of the size
19 for the tradeoff is when we're assuming an east facing.

20 MR. MC HUGH: And for minimal code compliance
21 the maximum you can get is a total energy that would be
22 available from the HPA plus HPW.

23 MR. SHIRAKH: Right.

24 MR. MC HUGH: Okay. Thank you very much.

25 Appreciate it.

1 MR. SHIRAKH: Sure. Meg?

2 MS. WALTNER: Meg Waltner, NRDC. Just a few
3 questions. Could you go to the table on the last slide.
4 Could you just explain in a little more detail how those
5 scaling values were calculated?

6 MR. SHIRAKH: So this is the base case, this
7 2000 square foot and everything requires a 2 kW system.

8 Then as the house gets larger, going to 2100
9 to 2700 to 4700, then obviously you need a larger PV
10 system to trade away the high performance attics and
11 high performance walls, because as the house size gets
12 bigger you have a bigger attic, you got more walls, so
13 you need a bigger PV system. So basically this is the
14 recognition of that fact that as the house gets bigger
15 you need the larger PV system.

16 For in Climate Zone 12 for a 2000 square foot
17 house you need a 2 kW system, but if you go to 2700 you
18 need a system that's 2.23 kW system.

19 And I think Bruce has something to add to
20 that.

21 MS. WALTNER: Go ahead, Bruce.

22 MR. WILCOX: So the other way to think about
23 this, it seems to me, is that the credit is the smaller
24 of the high performance attic and walls TDV value or the
25 output of your PV system. So if you don't have a big

1 enough PV system you won't be able to generate the full
2 credit.

3 In other words, if you put the 2 kilowatt
4 system on the 4700 square foot house, you would get a
5 credit but it wouldn't be the full size of the high
6 performance attics and walls, you need another half a
7 kilowatt to get that much TDV credit for the compliance
8 calculation.

9 MS. WALTNER: Okay. And it says the way that
10 you generated these numbers by looking at the difference
11 in the TDV value from the high performance attic and
12 walls for a larger house and then just adding that on to
13 the 2 kW system?

14 MR. WILCOX: Yeah, more or less, yeah.

15 MR. SHIRAKH: Yeah, basically, yeah.

16 MS. WALTNER: Okay. So I it's not looking at
17 the total load of a larger house, it's just looking at
18 the difference --

19 MR. WILCOX: It's actually being calculated as
20 a factor times the TDV energy use of the standard design
21 for the house. It's the same way that the credit is
22 being done in the 2013 standards. You take the standard
23 design for the house and convert that to TDV, and then
24 we have a fixed percentage that for a typical house the
25 impact of the high performance attics and walls, we

1 apply that to the TDV for the standard design, and
2 that's the maximum credit you can get. And then the
3 other limiting factor is how big is the PV system.

4 MS. WALTNER: Are you going to publish
5 something through documenting your methodology in this
6 so we can look into it more and it would generally be
7 good to understand a little more what the process is
8 going to be (inaudible).

9 MR. SHIRAKH: It will be part of the ACM
10 reference manuals, that's where it will be.

11 MR. WILCOX: I was just going to say it's
12 going to be in the ACM reference manual.

13 MS. WALTNER: Okay. And that'll be a public
14 process where we'll be able to review and comment again?

15 MR. SHIRAKH: Yes.

16 MS. WALTNER: Okay. And then my last
17 clarification, I think everything's okay here, but you
18 made the comment that you can trade off basically
19 anything for the PV credit. I assume that just means
20 what's normally allowable to be traded off under the
21 performance -- for instance, not the mandatory res
22 lighting requirements?

23 MR. SHIRAKH: No. What I'm saying is this is
24 your -- like it's going to be treated like any other
25 compliance option where you can trade away prescriptive

1 measures in the house, not mandatory requirements.

2 MS. WALTNER: Okay. And could you use the
3 prescriptive path with this requirement? No, just the
4 performance path. Okay.

5 MR. SHIRAKH: No, this is only available
6 through performance, you got to use CBECC Res or Energy
7 Pro.

8 MS. WALTNER: Thank you.

9 MR. SHIRAKH: Bob.

10 MR. WILCOX: Bob, do you have a complaint?

11 MR. RAYMER: No, I don't have a complaint.
12 He's out of order.

13 COMMISSIONER MC ALLISTER: Actually, I think
14 we're sort of hearing -- and I've put staff through the
15 wringer in my own way on this stuff and I'm not a newbie
16 with solar, and I think this tradeoff idea, it's climate
17 zone and you have to think about what's going on there.
18 And if you look this, the uninitiated might look at this
19 and say, well, so 2 versus 2.23, not a big difference,
20 so what are we trying to accomplish here?

21 So I think the narrative under there is
22 important to understand and we're going to have to work
23 on our messaging here with respect to this tradeoff.

24 Sorry, go ahead Bob.

25 MR. RAYMER: I agree. Bob Raymer with

1 California Building Industry Association and a very
2 strong supporter of this option.

3 For those of you that weren't at either of the
4 energy forums, there's a bit of a history to this. CBI
5 has been seeking some level of credit for rooftop solar
6 for the last two updates of the standards. As you know,
7 there's a very minimal amount that's allowed right now
8 for HVAC budgets in a few climate zones, however, taking
9 the long view, the New Solar Home Partnership Program is
10 going to expire at the end of 2016. Our feeling is it's
11 also going to run out of money before it expires.

12 The fact is over the last two and a half years
13 industry usage of the incentive money through the New
14 Solar Home Partnership Program had skyrocketed. It has
15 enabled some of our largest companies to effectively put
16 solar on as a standard feature. Namely K.B. and Lenar,
17 all of their southern California projects was using
18 solar as a standard feature, and they were able to make
19 that design choice through the use of the New Solar Home
20 Partnership Program.

21 Now, that's the good news. The bad news is
22 we've got 3,000 member companies, not just a half dozen,
23 and so the fact here is we needed to find a way as the
24 New Solar Home Partnership Program transitions out of
25 style to provide some type of incentive, not necessarily

1 the passing back and forth of financial assistance, but
2 some type of way of allowing for compliance credit to
3 get the small and medium size builders very interested
4 in this.

5 And taking into account that with particular
6 reference to the advanced wall requirements, that's a
7 huge change in standard design. And while that's a bit
8 of a headache logistically for the builder and their
9 designers, there are quite a few jurisdictions in the
10 state where rooftop solar is more marketable than a
11 thicker wall.

12 And so with that what we anticipate is that
13 this will just be part of our overall design options
14 that you've got available access to. We're particularly
15 interested in getting a beta version of this into the
16 CBECC program as soon as possible.

17 One of the reasons for that, as you recall, we
18 attempted to do some large scale early adopter
19 compliance with the 2013 standards. We had some builders
20 ready as early as August of 2013 that were ready to do
21 that. We had some problems with the documentation and
22 the calculation methodologies and getting all the
23 effectively the bureaucracy up and running by that time.

24 To the extent that we've got access to the
25 beta version of this, we can start doing design analysis

1 now, and I suspect that you're going to find a lot of
2 jurisdictions just like in the past where they're in the
3 process of adopting the REACH codes right now. It would
4 be good to have access to this as a design tool so that
5 well in advance of January 2017 we could effectively
6 have those members who want to on mass production scale
7 use solar and high performance attics as a combination
8 to get above code, this could be very useful.

9 And so with that, we'll be looking forward to
10 the development of the ACM, but once again, we've very
11 strongly in support of this.

12 And to the extent that we can bring it into
13 multi-family, that would be welcome as well.

14 I can tell you that most low rise multi-family
15 that is not built on tuck-under parking will have a
16 parking lot. Primarily these parking lots are fitted
17 with trellises and a lot of that is easily applied with
18 solar, and so while you may not have a whole lot of room
19 on the rooftop of the apartment complex, there may be
20 some non-buildable area nearby in the adjacent lot where
21 you could get this on there, and as long as we don't
22 have issues with the utility company in that area, you
23 could easily get probably 20, 30 kilowatts located on
24 top of parking.

25 So with that, thank you very much and we're

1 strongly in support of this.

2 MR. SHIRAKH: Thank you, Bob.

3 MR. BROST: Matt Brost with Sun Power, also
4 here on behalf of Solar Energy Industries Association,
5 the representative couldn't make it today. I will be
6 brief in my comments and just say that we, as Sun Power,
7 strongly support the decision to make solar a compliance
8 credit, rooftop solar.

9 And I think it's timely too because, while it
10 doesn't pertain to California necessarily, the 2015
11 International Energy Conservation Code now provides a
12 performance path that includes solar, so this will allow
13 builders across the country really to leverage solar in
14 a much stronger way not just in California, so we see
15 some alignment there.

16 I also agree that NSHP is winding down and we
17 have got to find a way to bridge from a program that's
18 ending and ideally not stall out what has been
19 remarkable progress to the point where we're getting 30,
20 40 percent penetration in some markets in California.

21 And in fact, Commissioner, I heard you at the
22 resident conference recently and I was pleased to hear
23 that zero net energy 2020 is on path for 2019 standards
24 and without this important step in the codes I think
25 we're going to be well behind being able to achieve that

1 goal, so that's very important.

2 And so I think the devil's in the details and
3 we look forward as an industry association and working
4 with everyone here to make sure that we can support in a
5 technical way the implementation of the credit.

6 Thank you.

7 MR. SHIRAKH: Thank you, Matt. I hope you will
8 stick around, I have a couple of questions for you after
9 the workshop.

10 COMMISSIONER MC ALLISTER: Thanks for being
11 here, Matt. I wanted to just point out a couple of
12 things. Many of you know this, but this is covered
13 loads, and if you'll look at these PV system sizes,
14 these are relatively small PV systems. I mean, the
15 average retrofit PV system is larger than any of those
16 categories, any of those boxes, even the 4700 square
17 foot house.

18 So the non-covered loads, the bigger the
19 house, the bigger the property, whatever people choose
20 to get that's not covered, they're going to need more
21 energy to cover those loads. And we're not talking about
22 those here because they're not part of Title 24.

23 But at the same time, the other -- not all of
24 the solar future even on new construction is here,
25 because a lot of it is within Title 24, not under really

1 within this discussion, because we have metering reform
2 happening, we have rate reform happening, and the
3 customer drivers of solar are also going to be playing
4 out in those forums as well.

5 So this is a little bit of a distilled kind of
6 eclectic discussion because it's really a subset of the
7 overall solar discussion. These are relatively small
8 systems to covered loads and that's the crucible that
9 we're in today, but there is a larger conversation out
10 there that we need to be aware of in order to guide this
11 discussion. Because I agree with you, this is one thing
12 that's going to affect the market, but those other
13 things are also going to affect the market, and overall
14 we want that market to keep growing.

15 So we certainly don't want to get cross-wise
16 with those other conversations but we also have to check
17 off the boxes for Title 24 in our own way, the way we're
18 talking about it now and how the ACM works and all that.

19 So anyway, so just wanted to orient this in a
20 little bit broader context.

21 Go ahead, Mazi, thanks.

22 MR. SHIRAKH: Thank you, Commissioner.

23 George.

24 MR. NESBITT: George Nesbitt. So renewables to
25 me don't equal efficiency. I mean, renewables are great.

1 Just put another two and a half kilowatts on my parent's
2 house. So it seems that the credit essentially allows
3 you to build a non-code house because you have solar
4 offset, which I somewhat dislike. Essentially that is
5 what it's doing.

6 And then we keep talking about HERS scores.
7 When is CBECC going to do a HERS score? Because
8 currently if someone wants to do a HERS rating, they
9 have to use 2008 Energy Pro software, different
10 software, different run. You can't use it to do your
11 2013 or 2016 code compliance. Or as some builders are
12 doing, they're using RemRate or other national HERS
13 software. So if we're going to get to zero net energy we
14 have to have software that does code compliance and does
15 a HERS score.

16 MR. SHIRAKH: Any other questions on this PV
17 credit? Okay. So I guess we're going to move to the next
18 topic, which is reference appendices, and I think Payam
19 and Simon are going to present those topics.

20 MR. BOZORGCHAMI: So we're going to talk about
21 the reference appendices. As most of you folks know that
22 the reference appendices is divided into three sections;
23 The Reference Joint Appendix, which is for both
24 residential and nonresidential buildings. And then we
25 have the Residential Appendix and the Nonresidential

1 Appendix.

2 I'm going to be talking about Joint
3 Appendix 4. This is for values in JA4 are used for
4 residential and nonresidential prescriptive
5 calculations. These are tables, U-factor and R-value
6 tables that are used for the prescriptive performance
7 runs.

8 So we from time to time update these tables.
9 Right now we just updated the JA4.2.7, which is the
10 metal building roofs. This is a table that we borrow
11 from ASHRAE 90.1 2013. Previous it was the ASHRAE 90.1
12 2004, I believe it is.

13 At the same time we're updating some metal
14 truss U-factors for spans up to 48 inches and wider.

15 One thing just to make sure everyone's aware,
16 the JA4s can be updated at any time. We don't have to do
17 it every code cycle. We could do it with a signature and
18 not have to go through a full compliance option.

19 MR. LEE: My name is Simon Lee and I will be
20 presenting JA5 and JA10.

21 JA5 is an existing requirement since 2013 for
22 occupant controlled smart thermostats, and we are making
23 a number of changes to JA5 and these are all
24 clarification changes.

25 The first one, JA5.1, we clarified that for

1 the communication interface there's two types. It's
2 going to be the physical communication interface and the
3 logical communication interface.

4 And we also added the definition for default
5 restart settings and automatic rejoin under JA5.2.5.

6 And we also make a clarification that's for
7 the OCST -- that's short for the occupant controlled
8 smart thermostat. It shall be capable of demand
9 responsive control for the demand response period.

10 And then next we clarified for a minimum
11 OpenADR 2.0 or SEP 1.1 shall be the minimum standards
12 for the logical interface.

13 And for the physical communication interface
14 we clarified that it can be either Wi-Fi and/or Zigbee.
15 And we also allow additional wireless or wire physical
16 communication interface.

17 And next we also clarified that the physical
18 communication shall be bidirectional in terms of
19 exchange of information.

20 And then in JA5.3.2 we clarified that for the
21 expansion ports it shall allow installation of a
22 removable module to enable physical or logical
23 communication.

24 And then so that's all for JA5, and moving on
25 to JA10. JA10 is a new section. It's created to work

1 along with JA8, and we have presented the changes to JA8
2 this morning. So JA10 is the test method for measuring
3 flicker of lighting systems and also the reporting
4 requirements.

5 We have detailed the possible combinations of
6 dimmers and different types of light source. The light
7 source can be incandescent lamps or it can be non-
8 incandescent light source such as a LED light source.
9 And also other light source in the JA8.

10 And to make sure that the testing is
11 consistent, we spell out the test equipment
12 requirements. And also the flicker test conditions and
13 the test procedures.

14 One of the criteria that we are looking at is
15 the percent flicker, and this is a well-known formula
16 that we've shown on the PowerPoints for the percent
17 amplitude modulation.

18 And then once the test is done, we ask a copy
19 of the test report to be submitted to the Commission in
20 the format as shown in Table JA10.

21 And that concludes my presentation.

22 MR. SHIRAKH: So any questions on the updates
23 of the joint appendices for either Payam or Simon?
24 Anything online?

25 Okay, so we'll move to the next -- there's an

1 online question, sorry.

2 MALE VOICE: It looks like Dan O'Donnell has a
3 question, his hand is raised. I have to figure out how
4 to unmute him.

5 MR. SHIRAKH: Dan, you're unmuted if you want
6 to speak.

7 MALE VOICE: (Inaudible) so many proceedings
8 that we made a comment at the (inaudible) going to
9 happen because of (inaudible) through the BOE. The
10 (inaudible) would consider only the --

11 MR. STRAIT: We're getting a lot of crosstalk.
12 I think we know which call-in user this is. I'm going to
13 mute everyone.

14 Now let's see, call-in user 63, I think you're
15 the person that's had their hand raised under Dan
16 O'Donnell. No, call-in user 63 is someone that's typing
17 on a keyboard, that's all I'm getting through the audio.

18 I'm just going to unmute the call-in users,
19 although we're not unmuting everyone and we're not
20 getting too much crosstalk.

21 All right. Dan, if you're one of the call-in
22 users and you haven't associated your phone with your
23 login here, can you please speak now.

24 MR. O'DONNELL: Can you hear me?

25 MR. STRAIT: Yes, we can hear you.

1 MR. O'DONNELL: Great. This is Dan O'Donnell
2 with Honeywell. I have a few questions or comments
3 regarding JA5.

4 MR. STRAIT: Okay.

5 MR. O'DONNELL: I guess my first question is,
6 in the proposed 45-day language it appears that there's
7 further clarification on, as Simon outlined, the
8 physical interface and the logical interface. What's not
9 clear to me is if existing OCST products that are
10 currently certified under the 2013 standards are, for
11 lack of a better term, grandfathered going into the 2016
12 standard. They comply with everything that is outlined
13 in the proposed language but it's not necessarily clear
14 that those products would roll over into the new
15 standard. Can that be addressed?

16 MR. STRAIT: This is Peter Strait, supervisor
17 with the Building Standards Development Unit.

18 Oftentimes we've encountered this before in
19 lighting where we've had a rollover of code and we've
20 tried to maintain an existing list where it was shown
21 that all of those would meet the updated requirements as
22 well, but in some cases we've also needed to require a
23 recertification of existing products.

24 To the extent those products have already been
25 tested, we wouldn't be requiring new performance of

1 tests or redundant performance of tests, it would simply
2 be to be in contact with us and possibly answer some new
3 set of questions about that particular product.

4 So I don't think we've yet truly crossed that
5 bridge, but we will do what we can to make sure the
6 products that are already shown to be compliant and area
7 already in our current materials as complying with the
8 updated version of the standards to keep those around,
9 but do be aware we may have to go back and ask for
10 recertification of those.

11 MR. SHIRAKH: So Dan, one of the big changes
12 this time around is the requirement that the thermostat
13 must support either, I think it's Wi-Fi or Zigbee, and
14 so I think that is a requirement that must be met.

15 MR. O'DONNELL: Well, yes. And thanks, Mazi,
16 that's part of my next question or comment is that today
17 some of the products that are certified are Wi-Fi
18 compliant, however, they connect to Wi-Fi, to a wireless
19 router, by Ethernet and a gateway, and the current
20 language for 2013 and even the proposed language, the
21 current 45-day language, includes a footnote that
22 describes or allows for a network system of devices
23 which is capable of receiving and responding to DR
24 signals shall be considered equivalent to an OCST.

25 And so today we have those network system of

1 products and the 45-day language maintains that
2 footnote, so that would tell me that a networked or a
3 system of products would still be considered compliant
4 as long as it's able to receive and respond to a DR
5 signal via Wi-Fi, correct?

6 MR. SHIRAKH: Yes.

7 MR. O'DONNELL: Okay. We'd like to clarify
8 that, so when we provide comments we'd just like to ask
9 for clarification on that.

10 MR. SHIRAKH: Okay. Please send us your
11 written comments.

12 MR. O'DONNELL: So an Ethernet connection, so
13 where today the proposed language says a product must
14 meet 802.11, actually the product through a gateway
15 could meet 802.2 or 802/3, right, by an Ethernet
16 connection to a Wi-Fi router would accomplish the same
17 thing.

18 MR. LEE: I just want to mention one thing,
19 emphasize one thing. Like the Open ADL 2.0, that's the
20 minimum standards, and same similarly for the Wi-Fi
21 (inaudible), that's the minimum requirements.

22 And you can for the -- you mentioned Ethernet.
23 If you provide Ethernet you need to have at least the
24 Wi-Fi (inaudible). And in addition you can provide
25 Ethernet connection with it.

1 MR. O'DONNELL: So Ethernet is considered an
2 additional --

3 MR. LEE: That's right, yeah, additional.

4 MR. O'DONNELL: -- wired interface.

5 MR. LEE: That's correct.

6 MR. O'DONNELL: Okay. Okay. Thank you.

7 MR. LEE: You're welcome.

8 MR. SHIRAKH: Thank you, Dan. Any other
9 questions?

10 MR. O'DONNELL: Not from me. Thank you, Mazi.

11 MR. SHIRAKH: Thank you. Anything online?

12 MR. STRAIT: We do have another hand up from a
13 Richard Herring. Richard, you are on the air.

14 MR. HERRING: Hi, this is Rick Herring from
15 Philips. Simon referenced the table in JA8 that listed
16 the requirements for submittal. In this table it also
17 refers to the laboratory requirements and it implies
18 that only data from an accredited test lab will be
19 acceptable.

20 We're wondering if staff can comment on this
21 and clarify if this is really the intention, and if not,
22 whether the language in JA8.2 can be clarified to
23 indicate test labs submitting data can be certified from
24 third party certifiers such as UL or CSA.

25 MR. LEE: We have the same requirement as from

1 the 2013 standards, so we do not have a change.

2 MR. HERRING: Well, there is a change in Table
3 JA8.

4 MR. STRAIT: The requirement regarding the
5 certification of the laboratory is an existing 2013
6 requirement that the laboratory performing the test will
7 meet certain qualifications and possess certain merits,
8 for lack of a better term. That's not changed and it's
9 not proposed to be changed from 2013.

10 We are adding a reference to that requirement
11 in that table to make it clear that people need to
12 provide information about that in relation to their
13 products.

14 The table is just meant to perform a similar
15 function to a table in Title 20 that lays out exactly
16 what the data fields or pieces of data that we would
17 expect in a certification to include. They aren't
18 themselves new requirements in that they're not apart
19 from the requirements that are otherwise in JA8.

20 MR. HERRING: But then I would think that this
21 needs a little bit of clarification, because it seems to
22 indicate that only data from an accredited test lab is
23 allowed to be provided.

24 MR. STRAIT: I believe that's the case
25 currently that is under the 2013 code.

1 MR. HERRING: Okay. Well, then is it possible
2 to be certified, to have a test lab certified from third
3 party certifiers such as CSA or UL, which are certified
4 labs?

5 MR. STRAIT: I think this is may be something
6 we can discuss with staff. In addition, I don't think
7 there's a clear intent to exclude folks that meet that
8 requirement simply from having a satellite location or
9 some other. I know that UL, for example, does have a
10 remote where someone can become a lab that operates
11 under their umbrella but operates a facility that might
12 be offsite. And there's some other circumstances like
13 that, so this might be a detailed discussion we would
14 want to have apart from the setting right now.

15 MR. LEE: I'm trying to recall it from my
16 memory of the language of it. I don't remember the
17 reference to UL, but certainly if a lab meets the
18 requirements they can do the test.

19 MR. HERRING: Okay. Perhaps we should take
20 this off for later.

21 MR. SHIRAKH: That's what I would recommend is
22 talk to us in a couple days after this hearing.

23 MR. HERRING: All right, I'll send a separate
24 correspondence.

25 MR. SHIRAKH: Thank you. Any other comments

1 online? So we're going to move to the last topic of the
2 day, which is again the residential appendices and it'll
3 be presented by Payam and Mark.

4 MR. ALATORRE: Okay. We're going to discuss
5 the changes to residential reference appendices.

6 So starting with RA1, we retitled this section
7 from Special Case Residential Field Verification to
8 Alternative Residential Field Verification and
9 Diagnostic Testing Protocols. We felt that it was
10 applicable, well, we just felt that it was a better term
11 to use 'alternative' rather than 'special case'. That
12 had created a little bit of confusion to a few
13 stakeholders, and so we made that change.

14 Also, we included a reference to 10-109. That
15 was because currently the RA under what is special case
16 there's an avenue for alternative protocols to be
17 approved by the Commission but there was no clear
18 mention as far as process or how that was to be done.

19 If you look currently in our 2013 standards in
20 section 10-109 it does make reference to the reference
21 appendices, so we just kind of closed that loop and made
22 it a reference in both RA1 and 10-109 so people knew how
23 to apply for an alternative protocol and how the
24 Commission would proceed with that application.

25 We made changes to RA2.4.4 and that was to

1 require notification to homeowners that there was
2 pending refrigerant charge verification, and this is for
3 the case when weather conditions were not favorable and
4 the installing contractor chooses to do the weigh-in
5 method. HERS raters were having difficulty gaining
6 reentry into the home. A lot of times it's maybe months
7 after the install and so we felt that by notifying the
8 homeowners that it would facilitate that reentry.

9 Also, we added in RA3.2 a reference back to
10 RA1 in the case where there is an approved alternative
11 protocol, it would be in an addendum located in RA1 in a
12 subsection.

13 We also included the verification of the
14 liquid line filter driers and this was to align with the
15 requirements of 150.08. And we also relocated the
16 airflow protocols from currently that are found in
17 RA3.2.2.7 to a new section called RA3.4.

18 So the change here was for QII. It was a
19 clarification that gives direction for the placement and
20 the minimum R value for insulation above windows and
21 doors.

22 And lastly, we made a change here which
23 removed the point-of-use credit from being a HERS
24 verified credit. It was done to facilitate adoption and
25 also reduces the number of forms and the number of HERS

1 verified distribution systems.

2 That concludes my presentation.

3 MR. SHIRAKH: Any questions on changes to
4 reference appendices? I don't see any in the room.

5 Sorry. George. How presumptuous of me.

6 MR. NESBITT: I did sit out the last section.
7 George Nesbitt, HERS rater.

8 I think most of the changes, although, yeah, I
9 don't see any big deal. I mean, whether people will do
10 point of use non-HERS versus HERS, I doubt it. Nobody
11 does compact plumbing for the most part.

12 The QII header insulation, it was R2, now
13 you're saying it's R3.

14 MR. ALATORRE: Yeah.

15 MR. NESBITT: Okay. I just did my update
16 training for 2013 code a week before last, and of course
17 we were told insulated headers and then there was a
18 staff member of the Energy Commission in the audience
19 and then we were told that you don't have to insulate
20 the headers, so I'm confused on that.

21 MR. BOZORGCHAMI: Excuse me, George. Insulate
22 the headers for QII?

23 MR. NESBITT: For QII.

24 MR. BOZORGCHAMI: You do have to insulate the
25 headers for QII. Actually, there's a fact sheet that

1 went out about a month ago, two weeks ago, that explains
2 that.

3 MR. NESBITT: Okay. In the sampling section, I
4 believe it's always said that the builder will select
5 units that are sampled. As a HERS rater, I never allow
6 my builder to tell me what to do. As an independent
7 third party special inspector to the local jurisdiction,
8 if the builder is telling me what to inspect, what's the
9 purpose? Personally, I would remove that.

10 I also reserve the right to do 100 percent.
11 Some jobs I just do 100 percent because it makes sense.
12 And of course, when things fail you're just doing 100
13 percent anyway.

14 In 2013 we changed the depth leakage criteria
15 for multi-family to 12 percent. Honestly, I don't see a
16 lot of reason for that change, although the one issue I
17 have brought up as someone who does design and install
18 depth systems, that with lower capacity equipment but at
19 large enough house you have a fairly large duct system,
20 so it is actually harder to get a lower percentage of an
21 airflow when you have a low airflow system.

22 But in multi-family, we just did 80
23 apartments, tested last year and 100 percent pass rate 6
24 percent and less, so I don't see a problem in multi-
25 family in reaching a depth tightness.

1 Actually, one thing that's been missing from
2 the residential appendices is a section on solar hot
3 water. Whether it's a HERS thing or not. As far as a
4 protocol or any description in the code, I don't think
5 we have much there, although if you're taking solar hot
6 water credit, you're supposed to use the CECF chart. I
7 don't know if you updated that software and maybe it's
8 called something slightly different. Bruce didn't update
9 it. I've seen people use other software and not the CECF
10 chart, but nowhere we do have any sort of description of
11 solar hot water systems, components, anything like that.
12 Probably won't make it this round again.

13 The other issue I just want to bring up is
14 multi-family blower door. It is actually mentioned in
15 the residential appendices as a credit you can't take if
16 you're modeling by whole building, but it's a credit we
17 can't take. So what would it take to get credit for
18 multi-family blower door?

19 I just did 80 apartments on this project and I
20 did it apartment by apartment but approximately less
21 than 3 ACH50 through 13 buildings, 80 apartments. So
22 it's something we should encourage and have the ability,
23 so what would it take to get that credit back in?

24 MR. WILCOX: George, I think what's missing is
25 a reference standard for how to do the test that we can

1 adopt or use.

2 MR. NESBITT: Okay. I'll post it on the
3 Internet.

4 MR. SHIRAKH: Thank you, George.
5 Nehemiah.

6 MR. STONE: This is related to George's last
7 comment. There's been a lot of people who know an awful
8 lot about testing multi-family that have tried to work
9 out the protocols and there are a lot of issues with it,
10 and I suggest you don't put it back in until all those
11 issues are worked out and there's a consensus on doing
12 it.

13 In order to do it right you have to test the
14 apartments on both sides and the apartments above and
15 below, so in other words, eight other apartments at the
16 same time to know what's actually going on with the one
17 you're dealing with. You have no idea how of much of
18 what's leaking from one apartment is going outside and
19 how much is going into the next person's kitchen without
20 calibrating and knowing exactly what's going on with
21 those other apartments.

22 MR. SHIRAKH: Thanks, Nehemiah. Any other
23 questions in the room? Online?

24 MALE VOICE: Yeah, Mazi, we have a question
25 from Michael Jonea. Will all commercial thermostats have

1 to meet OSCT because of the change of Section 120.2.B.4?

2 MR. SHIRAKH: So we haven't really changed the
3 requirements for where these units have to be used.

4 Again, this is existing language in 2013 that in some
5 commercial spaces where unitary systems are used along
6 with traditional thermostat, the OCST was required, so
7 we haven't really changed that.

8 And same thing goes for residential. In 2013
9 we don't require OCSTs but it is provided as an
10 alternative to the solar ready zone or certain HVAC
11 tests that people want to avoid.

12 So we have not changed any of those
13 requirements but basically changed what's in Joint
14 Appendix 5, which is some of the functionalities of
15 these units, such as they have to basically be shipped
16 at least with a Wi-Fi or a Zigbee or both.

17 So again, the application of them in spaces
18 haven't changed, same as 2013, it's just some of their
19 functionality has changed. I hope that answers your
20 question.

21 MALE VOICE: A follow-up. Unitary single zone
22 was stuck now in 45-day language per 120.2.B.4. He also
23 says that this is commercial nonresidential so we can
24 defer to tomorrow if that's better.

25 MR. ALATORRE: Yeah, we're going to be

1 presenting the changes to the 120s tomorrow.

2 MALE VOICE: Okay, we'll do that.

3 MR. SHIRAKH: We'll do this all over again
4 tomorrow for nonresidential.

5 Any other questions? Nothing in the room. That
6 basically concludes our formal presentations. Now we're
7 in the public comment period. Does anyone in the room
8 have any comments they want to present at this time on
9 anything? Mike.

10 MR. HODGSON: Mazi, I'm looking for some
11 guidance here. We're in the implementation of the 2013
12 standards in the solar ready zone. We're finding some
13 homes where we can't even get 150 square feet on the
14 roof. And is that something that we need to address now
15 or in the residential manual for 2016?

16 It's something we have to address now in the
17 field, I understand that, but is that something you need
18 comments on in 45-day language or is that something that
19 we can defer to the residential manual to address?

20 MR. SHIRAKH: If you want to suggest that it
21 needs to change the allotted square footage, the 150 and
22 250, we need to do that in the 15-day language.

23 MR. HODGSON: Okay. All right.

24 COMMISSIONER MC ALLISTER: Mike, what are you
25 saying when you say you have a hard time finding 150

1 square feet, is that just because of all the
2 penetrations or what?

3 MR. HODGSON: It's actually a two-story home
4 typically on a small lot with a 35-foot lot and there's
5 just not enough space on the room to find 150 square
6 feet. Trying to be pretty creative on penetrations and
7 move them away or even looking at potential high
8 performance attic. There just isn't that much square
9 footage.

10 We haven't even addressed some of the new
11 product that's coming along, which is three story, and
12 we're getting up to 16 units per acre, and it's a
13 different product and we really haven't addressed that,
14 and so I think we need to think about an exception or
15 Plan B, and I'm trying to figure out --

16 COMMISSIONER MC ALLISTER: Is that three
17 floor, that's infill or what's the character of that
18 housing?

19 MR. HODGSON: It's high density. It's built
20 typically in a metropolitan location. Single family Bay
21 Area.

22 COMMISSIONER MC ALLISTER: Okay. Got you.

23 MR. SHIRAKH: Again, if it's changes to the
24 requirement, that has to be the 15-day language, we
25 can't do it in the compliance manuals.

1 MR. HODGSON: Yeah. And I think what it could
2 be is possibly just an additional methodology. If you
3 can't do this, you can't do that, you do this.

4 MR. SHIRAKH: Right.

5 MR. HODGSON: And I don't know what this is
6 yet but I'm just saying that we're running in to that in
7 the field. In fact, I just got a set of plans in the
8 office that someone's asking for some help and I'm going
9 to send it to Mazi. I was going to send it to Pat but
10 he's busy.

11 COMMISSIONER MC ALLISTER: No, no, don't send
12 it to Pat.

13 MR. HODGSON: But I would appreciate the
14 direction because if we need to make comments now I
15 think that's what we'll do.

16 MR. MC HUGH: Stick around, Mike, for a
17 second.

18 MR. HODGSON: Yeah.

19 MR. MC HUGH: So right now there already is an
20 exception to the solar ready, which is the basically the
21 OCST, the thermostat plus the plug load control. Does
22 that option not solve your problem with the 150 square
23 feet for those buildings?

24 MR. HODGSON: I think that allows us to go
25 from 250 to 150, correct?

1 MR. MC HUGH: No, no. If you do both of them,
2 that goes all the way to zero.

3 MR. SHIRAKH: If you do both of them.

4 MR. MC HUGH: If you do one, then it goes from
5 250 to 150.

6 MR. HODGSON: Okay.

7 MR. SHIRAKH: So what Jon McHugh is referring
8 to, there is an exception in existing 2013 which will
9 continue, if you do two things. That's the OCST --

10 MR. MC HUGH: And the plug load.

11 MR. SHIRAKH: -- and the plug load control,
12 then you'll get out of the solar ready zone altogether.

13 MR. HODGSON: Okay. Thanks.

14 MR. COTTRELL: Charles Cottrell with the North
15 American Insulation Manufacturers. Just a couple quick
16 questions on process.

17 The presentations that were given today, when
18 and how will those be available? Also, you mentioned the
19 PV details, the methodology and that information would be
20 in the ACM Manual?

21 MR. SHIRAKH: It's an ACM Reference Manual. On
22 the presentations, I'm going to ask Peter to comment on
23 when they're going to be available.

24 MR. STRAIT: If you notice, there are some
25 folks that are coming in with presentations, even like
26 this morning, so we're looking at after tomorrow's

1 workshop probably no later than the end of this week,
2 hopefully no later than the end of Wednesday.

3 MR. COTTRELL: Okay, terrific. Thanks.

4 MR. SHIRAKH: And on the PV credit, again,
5 Bill, did you want to make a comment on that? So that's
6 going to be part of what we call the ACM Reference Manual
7 and so it will not be adopted in May with the rest of the
8 Code, it's something we're going to be working on it
9 through the rest of the spring and summer, and it will be
10 approved by the Commission hopefully in December.

11 MR. COTTRELL: Okay, great. Our organization
12 looks forward to working with everybody on that.

13 MR. SHIRAKH: Okay.

14 MR. COTTRELL: Thank you.

15 MR. SHIRAKH: Thank you. Meg.

16 MS. WALTNER: A quick follow-up point on that
17 is that it would be useful to get more detail on the PV
18 credit in advance of the finalization of the Standard.

19 MR. SHIRAKH: I'm sorry, can you repeat that?
20 Bill wasn't --

21 MS. WALTNER: Okay. I was just saying that it
22 would be helpful if there could be some preliminary
23 analysis at least on the PV credit in advance of the
24 finalization of the standard. I understand it's a
25 different track, but given the interaction and on the
26 effects, it would be good to see that sooner.

27 COMMISSIONER MCALLISTER: And Mazi, just to ask
28 a question, so the table that you presented here with the

1 credit, that would be in Code language or not? Or would
2 that be in --

3 MR. SHIRAKH: That table was a representation
4 what would come out of a CBECC when you --

5 COMMISSIONER MCALLISTER: Yeah.

6 MR. SHIRAKH: So that table itself, Bruce, my
7 understanding is --

8 COMMISSIONER MCALLISTER: What part of that
9 would be sort of in the regulatory package versus the
10 compliance?

11 MR. WILCOX: Well, I think the table is
12 illustrating the results of the calculation that would be
13 in a formula.

14 COMMISSIONER MCALLISTER: Except -- but the
15 formula, that's my question, what part of this will be
16 the representation of the compliance pathway that would
17 be in the Code package.

18 MR. WILCOX: Well, that formula is proposed to
19 be in the ACM Reference Manual, not adopted as part of
20 the Code.

21 UNIDENTIFIED SPEAKER: But he's asking how is
22 it going to look, what's it going to look like?

23 MR. WILCOX: It's going to look like an
24 equation.

25 COMMISSIONER MCALLISTER: Well, I guess I'm
26 really asking, how would we then represent -- it would
27 really just be language, then, in the package without
28 much detail in it? Is that what you're saying?

1 MR. WILCOX: Right, yeah.

2 MR. NITTLER: Well, maybe one way to look at
3 this, we have drafted the proposed ACM language for this,
4 so I would think a good thing to do so people could
5 understand it better would be to release that. And then
6 you'd be able to see what the proposal is maybe a little
7 more fully.

8 COMMISSIONER MCALLISTER: I just want to be
9 able to have the conversation and, you know, and not have
10 people then later feel like, well, the train left the
11 station and we never had the conversation. So really just
12 however we need to facilitate that. I'm not arguing for
13 obsessive detail in the regulatory language, but just to
14 have the conversation.

15 MR. SHIRAKH: So kind of to recap, Ken has
16 proposed a methodology, he has proposed a language, we
17 just didn't include it in this package because we're not
18 talking about that language, but we'll be happy to
19 release it to anyone who wants to see it and comment on
20 it.

21 MR. INTAGLIATA: Shawn Intagliata, Unico. We
22 also manufacture ductless products and when we're talking
23 about minimum CFM per rated ton, is there a protocol that
24 we as a manufacturer should be adhering to, to educate
25 the HERS Rater on how to determine that the minimum CFM
26 produced by our ductless product is actually being
27 produced? Or is that an open-ended question? I don't
28 know.

1 MR. WILCOX: It could be open-ended, yeah.
2 There isn't a requirement for ductless systems' CFM in
3 the current Standards.

4 MR. INTAGLIATA: There isn't?

5 MR. WILCOX: There isn't.

6 MR. INTAGLIATA: So if we're producing 200 CFM
7 per rated ton, it's okay? I'm just saying...

8 MR. WILCOX: Well, it's not against the
9 Standards.

10 MR. INTAGLIATA: Okay. Thank you.

11 MR. SHIRAKH: That's not to say we won't have
12 anything in the future, but currently we don't have it.
13 Go ahead, sir.

14 MR. BARBE: Dan Barbe representing the Spray
15 Foam Coalition. There was a lot of work going into the
16 high performance attics prior to the 45-day language, and
17 we just want to offer our thanks to Bruce Wilcox and Ken
18 Nittler and staff, and Payam and Mazi on the work they
19 did in help ironing out some bugs in the software. So
20 it's greatly appreciated and we look forward working with
21 the Commission going forward and we did submit an
22 acceptance letter to the docket, too. Thank you.

23 MR. SHIRAKH: Thank you, Dan.

24 COMMISSIONER MCALLISTER: Thanks for being
25 here.

26 MR. NESBITT: George Nesbitt, HERS Rater.
27 Actually, to follow-up on Mr. McAllister's question on
28 the solar credit, I think how I kind of understood the

1 question is, where in the Standards or the Appendices, or
2 the ACM Approval Manual is there any mention in the Code
3 itself to the credit, even though the details of the
4 credit and the calculations are in the ACM Reference
5 Manual?

6 MR. SHIRAKH: Well, we don't make references to
7 the compliance credit in the Standards or, I mean, the
8 only place where I can think there may be a reference
9 would be the ACM Approval Manual, but not even there.

10 MR. NESBITT: I mean, certainly a lot of things
11 are either in the Standards mentioned, or they're part of
12 the residential Appendices, or --

13 MR. SHIRAKH: I realize you can develop or
14 propose compliance credits, even in between cycles, so I
15 mean that's an ongoing continuing process, that's why we
16 have the ACM Reference Manuals, so it would be outside of
17 the rulemaking, it would be easier to develop compliance
18 options and comment between cycles.

19 MR. NESBITT: But if it's a prescriptive
20 requirement, then it would be in the Standards or
21 something else?

22 MR. SHIRAKH: Prescriptive Requirements, yeah,
23 that's a different matter.

24 COMMISSIONER MCALLISTER: Yeah, that's exactly
25 right.

26 MR. NESBITT: Yeah. I want to touch on the
27 existing home alteration addition. It comes up a lot. If
28 you go read Chapter 9, 150.2, it references every section

1 of Chapter 7, 150.0, the Low Rise Mandatory Standards,
2 with the exception of the Solar Ready, as well as
3 typically it references the Chapter 150.1, which is
4 Chapter 8, what we refer to often as New Construction,
5 the Prescriptive and Performance Path. I think it's
6 probably too late for this cycle, but I think come next
7 cycle we need to look at lot harder at the existing in
8 the Codes and how we're doing things. Things are getting
9 a little complicated and I think we're going to end up
10 with more exceptions, so we tried to simplify in 2013,
11 and things have gotten pretty complicated.

12 Going back to the water heating issue under
13 current and past Codes, a water heater alteration would
14 have prescriptively had to meet Package A or what was
15 Package D, although I did go back and look. We looked and
16 reference to Package A, or Prescriptive Requirement, has
17 been deleted. The only problem I see there is it's still
18 referencing Chapter 110.1 and .3, which are the broad
19 sort of sections for water heating that applies to both
20 Residential and Nonresidential. So it's, yeah, the water
21 heater, the manufacturer needs to certify it, you know,
22 you have to have certain features or insulation levels,
23 whatnot, but those chapters contain no requirement for an
24 efficiency level. I mean, everything has to meet a
25 minimum federal efficiency, so I would say this is an
26 unintended consequence, deleting reference to Package A
27 basically means I can put in any gas water heater I want:
28 commercial, low efficiency, high efficiency, energy

1 factor, tankless, whatnot. And if I don't have gas, it
2 means I can put in electric resistance. So I don't think
3 that's what we're intending to do and really want to
4 happen. So the thing is we may have to have a different
5 requirement for alteration versus the package.

6 MR. SHIRAKH: Well, that was exactly our
7 intention, to have different requirements. So for
8 existing homes, we never meant to force people when
9 they're doing their water heater replacement to go to
10 tankless because that basically means they have to put in
11 an new gas line, the vent is going to be different --

12 MR. NESBITT: Right, I understand that.

13 MR. SHIRAKH: But what you're saying is that we
14 may have caused another problem --

15 MR. NESBITT: What I'm saying is, in 2013 and
16 prior, and as I've said, I've installed on at least,
17 well, on several jobs, commercial, high efficiency tank
18 water heaters where it was prescriptive compliance. It
19 should have been an energy factor water heater or we
20 should have had to show compliance under the performance
21 method. Now, I did those calculations and obviously I
22 made the house much better than it was. So we have a
23 situation where, even though we required an energy factor
24 water heater, people put in whatever the heck they want
25 and now we're saying you can put in whatever you want,
26 and I don't think that was purely the intent.

27 MR. SHIRAKH: So I'm going to ask Danny Tam to
28 look at that section --

1 MR. NESBITT: Yeah.

2 MR. SHIRAKH: -- with your comments in mind and
3 make sure -

4 MR. TAM: You run into the federal preemption
5 issue if you require something higher than what is the
6 federal minimum, that's why we leave that the way it is.
7 I mean, that's the main reason.

8 MR. NESBITT: Yeah. A couple other little
9 things on alterations. We exempt packaged air-
10 conditioners from refrigerant charge, yet refrigerant
11 charge is not only a combination of how much refrigerant
12 is in the system, but also air flow, so that package
13 system is probably charged based on 400 cfm per ton
14 because that's what manufacturers want. You throw it into
15 a system with 300 cfm per ton or less and the charge
16 isn't necessarily right.

17 The other thing that came up last week in Pat
18 Splitt's request for Emergency Rulemaking was for the
19 performance path under alterations it says you have to
20 alter at least two components, and I think in your
21 clarification you did say that two windows would be two
22 components, although two of the same thing is not the
23 same as doing windows and insulation; honestly, it should
24 really be one component. I don't think there should be a
25 restriction to two.

26 MR. SHIRAKH: Why would you use -- you use the
27 Performance Path to do tradeoffs, how could you do a
28 tradeoff with only one component?

1 MR. NESBITT: Because your existing condition
2 creates a budget and you alter even one component and, as
3 long as you haven't increased your energy use, that's
4 always -- and that's, I think, that's what it's always
5 been.

6 MR. SHIRAKH: I mean, the whole intent is to do
7 tradeoffs and you need at least two components and,
8 again, I think where Pat was going, he thought that meant
9 you have to have like in a wall and a window, but when
10 you read the definition of altered component, it's very
11 clear that anything that you touch is an altered
12 component.

13 MR. NESBITT: I mean, I don't want to get too
14 caught up in weeds, but if you're replacing windows and
15 you don't want to meet the package requirement, but
16 you're replacing all your windows, that's when you would
17 have to go to the Performance method. So if we let you
18 replace all your windows, why not just your furnace, or -
19 -

20 MR. STRAIT: Let me jump in front of this, just
21 logically, if you have one component and it's better than
22 what the Code requires, but you're not trading that
23 betterment off against something else, then you don't
24 need to measure it, and there's not a reason to do a
25 Performance approach. If you're installing something
26 worse than what's required, and you're not doing some
27 other thing to make up for that, then that's just not
28 allowed. So that's why there have to be two parts in

1 order to be able to do a tradeoff. Now, they can be two
2 of the same type of thing like one window versus another
3 window in the house, but if you just have one item, if
4 you're only replacing a furnace, there's a level it has
5 to be meet and if it just doesn't meet that level the
6 Code just excludes it, and if you're not doing a second
7 thing to bring it up --

8 MR. NESBITT: Well, but even when you're
9 building a new house, what you're doing with the
10 performance method is you're creating the hypothetical
11 Standard design, you're putting the package requirements,
12 the minimum requirements, you're saying it uses this much
13 energy, but you can do whatever you want as long as you
14 don't use more. So you can do only one thing that doesn't
15 meet the package requirements, or you can do nothing that
16 meets it as long as --

17 MR. SHIRAKH: Well, the idea here, George, if
18 you're just replacing one component, that Prescriptive
19 approach, you don't need Performance, you don't need
20 tradeoff. If you're going to Performance, you need to
21 have at least two components.

22 MR. NESBITT: Okay.

23 MR. ALATORRE: George, before you go on, I
24 wanted to answer the package refrigerant charge question
25 that you had, or comment?

26 MR. NESBITT: Yeah.

27 MR. ALATORRE: The Standards give an exception
28 for packaged system that are certified by the

1 manufacturer, but it does not exclude them from the fan
2 efficacy and the air flow requirements. They still have
3 to comply with that.

4 MR. NESBITT: Sure. But, yeah, but the charge
5 could be wrong, but oh well. Because I've refrigerant
6 charged plenty of packaged units and they're wrong.

7 The last thing is actually the HERS verifying
8 existing conditions. The language does specifically say
9 only the components that are being altered should be
10 verified; I think the reality is all the existing
11 components need to be verified because it has to do with
12 setting your budget, so it used to be you could take
13 vintage defaults, so if your house was built after 1978,
14 R zero walls were not a valid assumption. So now I want
15 to model my brand new house and I want to do an addition
16 to it, why not call it R zero walls because it gives me a
17 bigger budget and allows me to do what I want to do? Yes,
18 I'm going to call for HERS verification of some item
19 because I need it, but we have such a big problem in this
20 industry with energy consultants who can't measure
21 buildings, who deliberately manipulate in order to get a
22 result, and I think part of what's happening now is a lot
23 of departments are not wanting to enforce the Code
24 because they think things are messed up and, honestly, as
25 long as a consultant puts in a CF1R that says it passes,
26 that's okay, they don't care, even if it calls for HERS
27 measures and then, you know, it never happens? They don't
28 care. So it's just either we need to go back and put in

1 the vintage defaults, at least as a check, and say you
2 can't claim the existing condition is worse than that, or
3 we have to verify it all. And if we're going to verify
4 one thing, it's not that much more to verify everything.

5 MR. SHIRKAH: Well, again, the way that the
6 section is organized, you have two choices, whether or
7 not you do third-party verification, and if you don't you
8 get a different baseline, and when you do, you get
9 basically the existing conditions. But the thing is, if
10 we require people, let's say somebody like Pat is
11 interested in only getting credit for windows, and if you
12 require people to do third-party verification even for
13 the components for which they're not claiming a credit,
14 then we are adding an additional burden, an expense that
15 we're going to hear from them.

16 MR. NESBITT: Right. But the way that section
17 is read, and the way I read it, is only an altered
18 component. An altered component, if you HERS verify, so
19 if I have an R zero wall, and I want to alter it, going
20 to now make it R13, to get credit for the R zero I need a
21 HERS Rater to go out and say it's an R zero wall. Okay,
22 so otherwise I'm compared to --

23 MR. SHIRAKH: A vintage table.

24 MR. NESBITT: Probably, the package A.

25 MR. SHIRAKH: R13, yeah.

26 MR. NESBITT: Or a minimum, it varies a little
27 on the component. Whereas if I have a window, but I'm
28 going to replace the window, but I'm not going to replace

1 it with a window that meets the package requirement, now
2 I get compared to the package requirement which is a
3 greater requirement if I don't have it verified. But all
4 the other components that I'm not altering don't get
5 compared, I think, to whatever the unverified altered
6 condition is, it's just assumed whatever the Energy
7 Consultant put in the software. Am I correct, Bruce?

8 MR. WILCOX: Yeah.

9 MR. SHIRAKH: Well, again, if you don't verify
10 it, you get a credit that's not based on existing
11 condition, it's a higher level. If you do the third-party
12 credit, then you get the R zero that you mentioned, so
13 anyway, we can talk about it a little bit more, so I'm
14 not sure what the problem is here.

15 MR. WILCOX: So, I mean, it's a secondary
16 effect, but George is right, you can manipulate things
17 slightly that way.

18 MR. NITTLER: Yeah, actually - so for years we
19 had this vintage default table -- sorry, Ken Nittler with
20 Enercomp -- and having been the implementer of it before,
21 that was a very important safety valve. And so maybe what
22 George started to say, or maybe I didn't quite hear it,
23 but the deal is the person using the software can
24 artificially inflate the size of the standard design by
25 saying that, let's say they're only changing the windows,
26 so they put a really crappy wall in, a really crappy
27 ceiling in, the worst efficiencies in, and the standard
28 design budget is just huge, and so you make a little

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1 change to the windows and you can move the budget a lot
2 so it makes compliance easier. So I think the idea of
3 exploring the vintage table, if you have a feature and
4 you're not altering it, that locking it back down to
5 those values in the vintage table has some merit.

6 MR. SHIRAKH: Nehemiah.

7 MR. STONE: Completely different subject. In
8 general, I just want to ask that in moving forward we
9 think a whole lot more about how compliance hits the road
10 when it comes down to it. I got a little bit of laughter
11 when I recommended putting labels on the lights that says
12 "not compliant", but quite honestly, without that we're
13 not going to have very good compliance out in the field.
14 And that's just one example. Another example that I think
15 is probably more to the point: in the 15-Day language
16 for the 2008 Standards, there was a requirement that all
17 residential buildings would have communicating
18 thermostats. It got pulled out before the adoption, but
19 had it gone through that would have applied to all low
20 rise residential, which means multi-family, and there was
21 no manufacturer that had that equipment, and there was no
22 manufacturer working on making that equipment. And we
23 hadn't thought through the complete compliance issues on
24 that. And I'm relatively certain that there's a number of
25 them in this set of standards, too, that we need to kind
26 of think about, well, what is it that Building Inspectors
27 are actually going to inspect? You know, for a hot water
28 system, they're not going to get out there with a tape

1 measure and measure the length of the pipe, it's not
2 going to happen. So obviously we don't ask them to say
3 how many feet of pipe you have in these different
4 conditions. We need to find those same sorts of
5 approaches for everything in the Standard so that we
6 actually get compliance.

7 And I want to make one thing clear, I am not
8 arguing for making things simpler in a way that we back
9 way off on the Standards. What I'm arguing for is that we
10 spend a whole lot more of our intellectual capital
11 thinking about how this is actually going to get verified
12 in the field. Thank you.

13 MR. SHIRAKH: Thank you, Nehemiah. I must say
14 that I was really intermittently involved with the 2008
15 PCT and the reason it got dropped wasn't because of lack
16 of product availability, there were different reasons.
17 Anyway, any other questions or comments? Public comments?
18 Anything online? Commissioner McAllister?

19 COMMISSIONER MCALLISTER: Just this has been a
20 good day, I really appreciate everybody coming and
21 certainly Mazi and staff and Peter and Mark and, let's
22 see, and Bruce and Ken, as well, the whole team there,
23 Payam, Bill, let's see, who have I forgot? The whole
24 team, I'm just going to wrap it up, I'm going to leave
25 somebody out. Simon, let's see, Mark, there you go, and
26 Dan as well, yeah, Dan, thanks very much.

27 So you know, clearly this is a package I think
28 it's got folks thinking, I'm actually positively

1 impressed with everybody's engagement with it, and the
2 good discussion that we've had today, and you know, the
3 wheels start turning on, oh, what does this mean for me
4 in my practice and in real life when I go out there and
5 try to apply this? I think it's really important to start
6 thinking about -- I really appreciate Nehemiah's final
7 point there, figuring out how this works in the real
8 world is something that I certainly take to heart. And
9 the rubber hits the road out there and the Building
10 Department is trying to figure out how to invest their
11 time, and if we make it relatively straightforward for
12 them, then we'll get more activity, rather than less. So
13 I want to just encourage us to think about ways to do
14 that.

15 So tomorrow Nonres, many of you probably will
16 be back, so I look forward to seeing you and that set of
17 stakeholders, as well. For those of you not coming back,
18 comments due March 17th, very important.

19 MR. STRAIT: Simply to clarify --

20 COMMISSIONER MCALLISTER: Yeah, actually the
21 point is we'd really like to get them by the 17th. We
22 will take them after that, but the earlier they get in,
23 the more time we have to read and consider and work
24 through them. So we'll take them right up to the end of
25 the month, but the earlier is better from our
26 perspective, particularly if they were substantive and
27 might need some interaction, then earlier is definitely
28 better. So I think really wrapping up, that's all I have

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1 to say and I really appreciate all the good work and all
2 your attention. So thanks for being here and we'll see
3 you tomorrow.

4 MR. SHIRAKH: Thank you.

5 (Whereupon, the hearing was adjourned at 4:10 p.m.)

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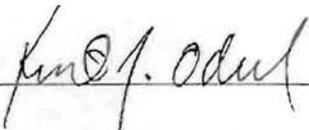
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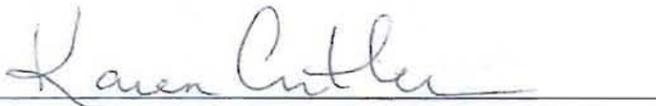
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