EFFICIENCY COMMITTEE WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	
2008 Building Energy	)	Docket No.
Efficiency Standards for	)	05-BSTD-2
Residential and	)	
Nonresidential Buildings	)	
_____	)	

BONDERSON BUILDING

HEARING ROOM 102A

901 P STREET

SACRAMENTO, CALIFORNIA

WEDNESDAY, JUNE 13, 2007

10:00 A.M.

Reported by:
Ramona Cota
Contract Number: 150-04-002

COMMISSIONERS PRESENT

Arthur Rosenfeld, Associate Member

ADVISORS PRESENT

Bill Pennington

STAFF AND CONTRACTORS PRESENT

John Arent, Architectural Energy Corporation

Martha Brook

Mark Cherniack, New Buildings Institute

Martyn C. Dodd, Energy Soft

Charles Eley, Architectural Energy Corporation

Gary Flamm

Chris Gekas

Bruce Maeda

Ken Nittler, Enercomp

Mazi Shirakh

Bruce Wilcox, Berkeley Solar Group

ALSO PRESENT

Steven L. Blanc, Pacific Gas and Electric Company

Michael G. Hodgson, ConSol,
representing the California Building Industry Association

Steve Mohasci, Institute of Heating & Air Conditioning Industries, Inc.

Bob Lucas, representing Carrier Corporation

ALSO PRESENT

Karim Amrane, PhD, Air-Conditioning and Refrigeration Institute

Gloria Pumpuni, GAMA - An Association of Appliance & Equipment Manufacturers

Michael E. Bachand, CalCERTS, Inc.

Rob Penrod, Beutler Corporation

Marc H. Hoeschele, Davis Energy Group

Don Stevens, Panasonic Home & Environment Company

Michael Day, Ice Energy

Helene Hardy Pierce, GAF Materials Corporation

Philip D. Dregger, Pacific Building Consultants, on behalf of ARMA

Jonathan McHugh, representing Pacific Gas and Electric Company

Reed B. Hitchcock, Roof Coatings Manufacturers Association and
Asphalt Roofing Manufacturers Association

David Gonzalez, Greenberg Traurig, as counsel to the Asphalt Roofing Manufacturers Association

William T. Callahan, Jr., PhD, Associated Roofing Contractors of the Bay Area Counties, Inc.

Martha (Marty) J. Dunham, Enterprise Roofing Service

Jay Salazar, City of Vacaville, and
California Building Officials

Hashem Akbari, PhD, Ernest Orlando Lawrence Berkeley National Laboratory

Gregory L. Crawford, Cool Metal Roofing Coalition

Gerry Greaves, Owens Corning Science & Technology Center

ALSO PRESENT

Mike Ennis, Single Ply Roofing Industry

John A. Goveia, Pacific Building Consultants, on behalf of ARMA

Richard J. Gillenwater, Carlisle SynTec, Incorporated

Scott Kriner, representing the Metal Construction Association and the Cool Metal Roofing Coalition

Andr, O. Desjarlais, Oak Ridge National Laboratory

Richard K. Olson, Tile Roofing Institute

Judy Holleran, Henry Company

Chuck Scislo, National Roofing Contractors Association

Matt Kolb, National Coatings Corporation

Ted Harris, California Strategies, LLC, representing the Cool Metal Roof Coalition

Mike Vogel, US Tile

I N D E X

P R O C E E D I N G S

10:08 a.m.

MR. FLAMM: Thank you everybody for coming to our staff workshop. We appreciate you taking the time out of your busy schedules, some of you traveling from long distances to participate. We appreciate your input.

My name is Gary Flamm, I am the lighting program lead. I am going to pinch hit for Mazi. Mazi has a sore throat and when he talks he starts coughing so I have been asked to moderate this meeting today so he doesn't cough all over the microphone. Mazi is right over here. I think you all know Mazi. And we're fortunate to have Commissioner Arthur Rosenfeld. Commissioner Rosenfeld, would you like to say a few words?

ASSOCIATE MEMBER ROSENFELD: Good morning. (Laughter.)

MR. FLAMM: Thank you. Okay. When anybody has something to say we ask that you to come up to the microphone every time. Cross talk will be lost by our court reporter. And every time you speak we ask you to identify who you are, even if it's back and forth between two people, so that our court reporter can keep an accurate

record of what is being said.

So today's workshop is the result of a major collaboration. There has been public interest energy research, a Commission program that has done a number of analyses and studies that has fed into this, this rule making. The PGC funded Codes and Standards, the CASE Initiatives by the electric utilities. We have a whole contingent of the representatives from the electric utilities are here. A public process with input from a number of stakeholders.

Leading this effort is the Energy Efficiency Committee. The Energy Efficiency Committees consists of Chairman Pfannenstiel, who I believe is in the meeting across the street, and Commissioner Rosenfeld. We're fortunate to have Commissioner Rosenfeld sitting in on this one.

The 2008 Standards, that's what this is being called, got underway in October of 2005. Staff has held a number of public workshops, October through February. This is the last set of public workshops in this rulemaking.

The first set of workshops that we held were the utilities and PIER and others bringing proposed measures to the table. The second set

of workshops, of which this is the last set, is where we have worked with the folks who have proposed the standards. We have incorporated the changes into language and we are now presenting that language to you for your input.

So the next step is going to -- Excuse me. So the next phase is -- I'm not even following this Mazi, I'm sorry. Mazi made this and I'm off cue with my talk here.

The next phase will be the formal rulemaking, in which we'll be incorporating comments from these last set of workshops and we will be publishing 45 day language sometime around November or October. And what that means is we will post the language in strikeout form on the web for public review and comment for 45 days prior to a business meeting, a hearing where we will hopefully adopt the standards at that time.

So the marked up versions, what we do is we take the 2005 standards. On the website is a marked up version where the language that is being proposed to be removed is stricken and new language is underlined.

So today's workshop we're going to go through, hopefully everybody has a copy of the

agenda that's in the back. We will go through a number of measures. And after each presentation that Charles Eley and others will be making there will be a short time for public comment.

Now if the public comment, if there is more public comment than we have time, we ask that you provide to the Energy Commission written comments. And you may provide written comments to the Commission even if you do make public comments today. And we ask that you get those comments to us in two weeks from Friday, which is going to be June 29. So we ask everybody to provide to us written comments by June 29.

All of the topic areas have already been presented. This is the last time we'll be presenting topic areas. We will not be entertaining any new additional topics for the 2008 standards.

So the adoption date is proposed to be January 2008. After the adoption date of 2008 for the standards we will go through a process of developing the ACM method, the manuals, the compliance forms, and it will take us a little over a year to do that. So it's projected at this time that the effective date will be around April

of 2009.

So I want to remind everybody to please sign in. Please pick up an agenda. If you haven't signed in make sure you do. It's really important for us to be able to contact those of you who have made comments.

Our court reporter over here in the corner may ask for your business card so that she can spell your name and spell the name of your company. So maybe after you speak if you could present to her one of your business cards.

And now before we start I'd like to introduce, go through an introduction. Charles, you want to introduce yourself?

MR. ELEY: Yes, I'm Charles Eley with Architectural Energy Corporation and the Energy Commission's prime support contractor for, for this project.

MR. FLAMM: It's a little clumsy here that Charles doesn't have a microphone in front of him. Charles is going to be a major presenter here. I've already introduced Mazi and Commissioner Rosenfeld. Bruce, does staff want to introduce themselves?

MR. MAEDA: Bruce Maeda, California

Energy Commission staff, primarily on nonresidential alternative calculation methods or computer software.

MR. FLAMM: Okay, any of the other staff want to come up and introduce themselves? Okay.

Do some of our consultants want to introduce themselves? Bruce.

MR. WILCOX: I'm Bruce Wilcox, I have been leading on the residential side of the revisions. Can't we do introductions without getting it on the record?

MR. FLAMM: No, you have to be on the record.

MR. NITTLER: And I'm Ken Nittler. I have been working with Bruce and Charles on the residential issues.

MR. FLAMM: Okay, are there any questions up to this point. You have to come up here on the record, Steve, please.

MR. BLANC: Do these work? (Dropped microphone) Yes they do. (Laughter.)

MR. FLAMM: Yes they do.

MR. SHIRAKH: They did.

MR. FLAMM: Can you pick that up? Okay, then you don't have to come up here. We have a

special microphone for our utility friends.

MR. BLANC: Wasn't that clever. Steve Blanc, PG&E. Do you guys have dates yet for the beginning and ending of 45 day language and for the meeting at the end of that?

MR. FLAMM: We anticipate that 45 days prior to the December meeting, at least by 45 days before that is when the 45 day language will be posted. So that will be sometime in November. We would have to back that up. I'm sure it's a pretty clear date.

Any other questions?

Okay, so our first presenter is going to be Bruce Wilcox and I'm going to turn the microphone over to Bruce at this time.

MR. WILCOX: Thank you, Gary.

Okay, so I'm going to talk this morning about revisions to the residential standard.

MR. FLAMM: Tilt the mic up a little bit.

MR. WILCOX: There we go. Is it okay now? Can you hear?

PRESIDING COMMISSIONER ROSENFELD: Put it up a little higher. You're taller than most.

MR. WILCOX: How is that? Okay, good.

If Art can hear it then everyone is okay. I'm okay anyway.

So I am going to talk this morning about revisions to the residential standards, major revisions to the residential standards and get into related changes to the ACM calculations related to those changes in the standards.

I am going to make a further presentation this afternoon on one of the major residential topics having to do with cool roofs so we're going to put off all the cool roof, roofing discussions until then. And then there are other things, other changes being made to the ACM manuals and the calculation methods that will be discussed at the Friday workshop. Things that are not as closely related to these major changes we're talking about. So that's the organization here.

I'm going to present four topics here having to do with refrigerant charge issues for air conditioners, fan watt draw and air flow for central air conditioner fans, indoor air quality ventilation, and the New Solar Homes Partnership.

These are, you know, basically pretty unrelated things so the way I'd like to proceed is

I'll present the information I have on each one of those topics and then we'll stop for questions at the end of the topic. And we'll talk about, people are going to ask questions having to do with what I presented on that or we can discuss that and then we'll move on to the next one. So rather than having questions right in the middle, unless it's overwhelming, I'd like to proceed to the end of each topic and we'll have questions on that topic.

I'd like to say that that the stuff I'm going to present here this morning represents a lot of good work, as Gary said, over a pretty long period of time by a large team of people. You've already met Ken Nittler but there's several other people who have been working on the residential consultant team working on this. Architectural Energy Corporation has a good team that's been working on this and staff has had major inputs on all of the stuff we're going to be presenting here.

And then finally what we are presenting here has been affected, I think, and improved greatly by comments from you guys. And we have tried to respond to comments. I won't pretend

that we're prepared to make you all happy exactly but I think the proposals here are much better than they were when we presented them last time, which was almost a year ago now for most of these things.

As Mazi said or as Gary said, everything that I'm presenting has already been presented previously in workshops so I am not going to try and go through all of the details. I am going to try and summarize what these proposals are for those of you who have not been involved previously so you have an idea of what we're talking about. And then we're going to focus on changes that have been made since the previous things that you guys have seen and some of the ACM-related issues, performance calculation-related issues for those things.

Okay, so let's jump into refrigerant charge. The current standards have a requirement that split system air conditioners have, it's a prescriptive requirement. In the California language prescriptive means that you don't have to do it but it sets the level of the performance for the overall standard.

And one of the really essential features

of the California code is that in residential a vast majority of all of the new building permits are accomplished under the performance standards where there is an energy budget that is established by the prescriptive standard applied to your proposed house and then you comply by showing that whatever, however you want to build your house works at least as well as that prescriptive standard version of that house.

So it's very flexible, offers the builders a lot of chances to do things differently or to make their own custom version of what they think the most cost-effective measures are. It really makes what we do here a little bit different than what's done most other places.

So this requirement in the standards is that you do a refrigerant charge test on each system. That's a prescriptive requirement. And if you don't want to do it then you can accept a slightly lower efficiency assumption in your performance calculation and trade that off against a better water heater and so forth.

So we have had a lot of comment -- And this is in the 2005 standards that's now on the street. There's been a lot of comments that there

are problems. We'll there's an exception in the 2005 standard that says you don't have to do a refrigerant charge if your system has a TXV, a thermostatic expansion valve installed. Because the thinking was that the TXV actually mitigated lots of charge issues and made things work better and it was a reasonable trade-off.

But things have evolved since the 2005 standards were developed in a couple of ways. One of the things, one thing is that a large fraction of new air conditioners come with TXVs already installed because that's one of the ways you get higher SEER ratings and so forth. So we're kind of double counting here, we're giving people credit for something that's already in their SEER rating and that seemed to be not a wonderful trade off.

The second issue has been there's been a lot of comment from people who were doing field work that TXVs that are installed in the field often don't work. They're not installed correctly, they're not the right TXVs, whatever. There are lots of problems and issues with that.

So we talked about this at workshops in the last couple of years and the resolution going

forward, the proposal here is that we eliminate that TXV credit so that the prescriptive standard would say that all systems have to have a charge verified. And in addition that if you have a TXV that the charge verification would be done in a way that would show whether the TXV was working or not. Because that turns out to be, we think a byproduct of the charge test.

So this is the proposal on this. Now the new twist we're adding here to the proposal is that one of the ways that you verify charge or one of the ways to satisfy this requirement is by installing a charge indicator light. This is a device, and the performance spec for the device is that it sits there on the air conditioning system and it has a display indicator that's near the thermostat and invisible to the homeowner. If the air conditioning system starts displaying charge problems then the red light goes on and people are told that they should call for their service technician.

The idea is that this is basically doing the same function as what the refrigerant charge test that we currently have where the guy goes out in the field and hooks up his gauges to the air

conditioner and checks the charge.

That with some smart microprocessor technology and some sensors that you can actually build this into the machine and essentially provide not just a one-time check but an ongoing check over time. Which from my own personal point of view is a much better situation because things change over time and if the refrigerant leaks out then this will inform the homeowner of that case. And if one of these things is installed on the system then that replaces the necessity of doing the charge test.

So that's the proposal. And we can go back here. That's basically in summary what we are proposing to change about the air conditioner charge and TXV situation. So we could stop right here. I'm sure no one will have any comments or questions about that so we can go right on. But if there are comments or questions please come up to the podium and talk into the microphone.

MR. FLAMM: Those who are sitting around the table, there are these really nifty looking flat devices. Those are microphones that are going to the court reporter. So if you're sitting around the table you don't have to come up here,

just speak very loudly and identify yourself every time. Those who are sitting in the perimeter, if anybody has any questions or comments you want to come up right now, please.

ADVISOR PENNINGTON: You could sit next to Jon McHugh there if Jon will -- Jon, be nice.

MR. HODGSON: Hi Jon.

MR. McHUGH: I don't bite.

MR. WILCOX: In case you might want to make another comment later.

MR. HODGSON: I won't. Mike Hodgson, ConSol, representing CBIA. We've had numerous conversations with staff and consultants regarding the interaction of some of the credits for designing an HVAC system. And I just want to make a comment on the record to say that we encourage better design of mechanical systems. And with the elimination of the TXV credit the maximum cooling capacity and some of the other credits that are intermingled reference a TXV and now they're going to reference a refrigerant charge.

And we'd like to discuss that with staff to make sure that those are workable solutions in the field. Because what we don't want is the HERS rating industry to start penetrating on a regular

basis different types of mechanical systems and potentially being in either a litigious situation or a voiding of warranty situation.

And we know staff is aware of that, we're working with staff. We just want to make sure that it is out on the table and we appreciate your cooperation in attempting to find a resolution.

ADVISOR PENNINGTON: Thanks, Mike.

MR. MOHASCI: Steve Mohasci, making comments on behalf of IHACI. The comments I would like to make are primarily referenced toward the existing market. Because there has been a lot of research done on the new construction market because initially all these prescriptive measures apply there.

But then because of the AB 549 standards that we're now trying to address the improvement efficiency in existing homes these same measures now get targeted to the existing market. Case in point, this year 2005 standards had duct testing. That is slowly getting being integrated into the market and now the challenge we have is historically these systems have not had adequate air flow. They have had sufficient air flow to

make the customer happy so the contractor has gotten by with the TXV as the alternative.

Now in the existing market if the TXV as an alternative is eliminated the contractor is now going to be forced to address the air flow of that system. So I am a little concerned that the research on the new construction side indicates that it's very cost-effective but I am not quite sure whether the cost effectiveness has been actually looked at on how and what the costs are going to be on the existing side.

MR. SHIRAKH: Gary.

MR. WILCOX: I think I can answer that, Mazi. Actually in response to your comments, I put that first bullet up there and I didn't actually say the words. But the proposal here is to eliminate the TXV credit in new construction, not in alterations. So we agree that we don't have the alteration situation as well understood and documented. For this round the TXV credit will remain for alterations, is the current proposal.

MR. SHIRAKH: I think there's a little twist to that. The way we have in Section 152, we've written the language, you have two options,

it's either refrigerant charge or the light display indicator. Those would be your options. TXV is gone.

But you don't have to do the air flow or the fan watt draw. So in 152 we connected that to the subparagraph that only talks about the refrigerant charge and the charge indicator light. So those would be the requirement. So you don't have to do the air flow.

ADVISOR PENNINGTON: So one level more detail. In order to do the refrigerant charge there is a threshold level of air flow that is necessary to have the refrigerant charge testing be valid. So our premise, and maybe we need your feedback on this and to work with you, our premise is that that level of air flow is achievable that would enable refrigerant charge to be done on existing systems.

MR. MOHASCI: Right. I noticed that the threshold for the refrigerant charge had been dropped to 300 CFM. Part of my comments are kind of based on some research I think that Robert Mowers did that basically showed that the current range of existings probably was in the range of about 270 to 325. So a fair percentage of them

are going to meet that 300 threshold but there's also a percentage that may have a problem.

And I think given the current problem we're having with introducing duct testing, we add this into the mix with too much force I think we're really going to have a problem getting, getting compliance. I'm waiting for some more of the final to come out but I see you're heading in the direction to kind of ease it a little.

MR. SHIRAKH: I'm sorry, I missed a lot. So you want the TXV to be an option, is that what you're saying?

MR. MOHASCI: The new comments that came out on the CID, the early I read on that it looked like that the verification of that did require a refrigerant charge. but now you're going to relax the air flow on that so that CID might be a good alternative. Thank you.

MR. SHIRAKH: Okay.

MR. FLAMM: Just a point of order. I want to ask our court reporter. There was a lot of cross-talk there. Were you able to follow all the staff? Okay, thank you

MR. WILCOX: Okay, seeing no other hands raised I want to move on to the next topic here.

Okay. So the next topic has to do with fan watt draw and air flow. And this is heavily centered in those spaces that nobody ever lives in in your houses. Up there in the attic where typically it gets very uncomfortable in the summertime.

What I am going to talk about is a summary of the revised proposal. And the proposal here is for a prescriptive standard for fan watt draw and air flow. Again as I said earlier, what a prescriptive standard does in the California code is establish the performance level that's required. And very few houses would ever have to meet that prescriptive standard prescriptively, because people don't comply prescriptively in California.

So what this is doing, attempting to do, is give people an incentive to do good air handler duct systems that are efficient and deliver enough air so the air conditioner can be efficient. I am going to take a little bit about the furnace fan data that we have used to develop this. I'm going to talk about a comparison with some field data we collected in new California homes for this project and I'll present a newly revised and expanded life cycle cost analysis for this proposal.

So the proposed prescriptive standard is that in climate zones 10 to 15, which are the hot, Central Valley climate zones, including Riverside and Redding, Sacramento, Bakersfield, Fresno and then out in the southwest desert climate zone 14 and climate zone 15, which is Palm Springs. So these are the hottest areas where the air conditioning is the biggest deal and the peak demand of residential air conditioners are a large part of the state's electric supply problem.

The proposed requirement says that furnace fans shall simultaneously demonstrate, in every zonal control mode, a flow greater than 350 CFM per ton of nominal cooling capacity and a watt draw of .58 watts per CFM or less. The structure here is basically the approach that we presented a year ago and two years ago but what's changed is we have simplified the structure. Last time we had a different standard for small, small furnace, for small air conditioners and a different one for large air conditioners.

Based on comments from the industry and further analysis we decided to raise the watts per CFM number from, it was as low as .5 watts per CFM up to .58 watts per CFM, and simplify it by having

only one standard for all the fans.

We're also proposing that permanent static pressure probes be installed in each system. A pair of these that would allow someone to measure the static pressure on the return and the supply side both of a split-system air conditioner using a furnace for the fan.

This is a recent modification of the proposal which responds to comments from unnamed parties about the difficulties of trying to measure static pressure and measure air flow if you think it is not a good idea to drill holes in a duct system of new houses. Because all the good measurement techniques, and particularly the static pressure techniques, require that you actually have a pressure probe in the duct system.

We think this is a low cost item and it will actually make it possible for contractors to see whether they have actually done a good job on the duct system. And for both them and the HERS industry to be able to verify the air flow and fan watt draw stuff easily.

So this proposed standard is a post-construction test. This is not a design standard. You comply with this by the contractor tests each

house as he finishes them and signs off that they actually meet the air flow and fan watts that were specified. And then the HERS rater verifies that that was done correctly, usually on a sampling basis.

Again, this is not a mandatory standard. You don't have to do it. A builder can just completely ignore this and go forward and put in, you know, a much better water heater and not have to actually change their current practice. So just to make sure that nobody thinks this is going to, you know, that you won't be able to sell a furnace in the state or whatever. Those issues are not here, this is evolutionary. In fact I think it's a pretty baby step in terms of the performance requirements.

The advantages here is this offers great flexibility for builders. As you'll see in a minute the issues in making the system work well are how the duct system is designed in installed. The actual static pressure in the duct system is a big part of the problem here and a builder can comply with this by improving the duct system.

He also has the choice of buying a better furnace. There are furnaces that have

naturally lower watts per CFM for their fans at the same static pressure because of the design of the internals of the box, because they use a better, more efficient loader. They have a better design of their fan. There's a whole system involved here that is interacting with the duct system. So the builder can decide they want to, you know, buy a better furnace and meet it that way or they can, they can absolutely solve the whole problem by just building the duct system at a low enough static pressure.

We have structured this requirement so that I think nearly any of the current marketed furnaces will be able to comply if the duct system running at the design condition has a static pressure of .5 inches of water gauge or less. And if you read the manufacturers literature they rate their furnaces for air flow at .5 inches of water, usually, and recommend that that be what the installation condition is. So if you do that that will, you'll comply with the standard.

This is a standard that is going after real performance that is actually measured in the field, it is not a paper situation. It deals with this awkward and troublesome situation that we

have right now with multi-zone systems where we actually give credits under certain circumstances to people who put in a multi-zone control system on an air conditioner, in spite of the fact that all the data we've seen indicates that most of those systems won't deliver adequate air flow when they're operating in zonal modes.

So there's a simple way to solve that problem that requires putting, requires putting in a larger duct system so you can get the full flow when you're running on one zone or your can put in a multi-speed air conditioner so if you drop the capacity down when you're only running in one zone there's ways to deal with this that we're going after here with this requirement.

And finally this offers a path for a greater demand and kilowatt hour savings for incentive programs and above code programs. Because although we've established, as I said, a pretty baby step requirement here it's not very hard to meet, in my opinion. It also offers the opportunity for doing a much better than minimal job and actually saving significantly more electricity and on-peak demand.

In developing this proposal we relied on

a database of manufacturers' furnace data that was put together by DOE and Lawrence Berkeley National Lab. It's published data from all the manufacturers who had all the data available. There are 141 unique, permanent split capacitor motor furnace models which are the low-end builder models for which there was blower and power information available. And we used the watts per CFM for cooling at the high speed setting as our information we're looking at.

So what I plotted here is all 141 of those unique furnaces with their fans. On the left axis we have the watts per CFM. So you take whatever CFM that the furnace is delivering and you divide the watts by that CFM and that's the watts per CFM that we're talking about here.

These are just sorted in order of watts per CFM number for the furnaces and you can see there's a big range, all the way at about .35 watts per CFM all the way up to close to .6. These are all actually, by the way, these are all at .5 inches exterior static pressure, the ideal number that we're talking about.

The median furnace is about .45 watts so, you know, half the furnaces are already better

than that and half are worse. And we're proposing to set the criteria here at .58, which is, as I said earlier, designed so that almost any furnace that is currently being sold can meet this criteria if the duct system is reasonable.

So how does this compare with what's practiced out in the field now? We did a field study and looked at close to 50 different new home systems that are relevant to this measure and measured all of these values in the field. The static pressures and the watts per CFM in all the different modes and so forth.

And if you take those with the watts per CFM calculated and you sort them in order and plot them out here you'll see that the median of those is at about .50 watts per CFM. Most of these would comply with this performance requirement if the were providing enough air flow. They're not all providing enough air flow. All these things interact with each other.

So our proposal is, you know, in terms of watts per CFM is not very different than current practice in the field the way things get installed.

Here is the air flow picture. We're

proposing that the minimum requirement is 350 CFM per ton, per nominal ton. That's the horizontal line with the box here and that would be our standard design performance point. That's about the median of what's out there. You know, half the systems are already that good and half of them are worse. And our default for the ACM calculations will be 300.

So if you don't want to do the test, if you don't want to comply with this standard and do the test, then your ACM calculations will be done at 300 CFM per ton and a higher watts per CFM that represents kind of a worst-case.

So here is the one that is kind of telling, right. This is also from that same field study. This is the external static pressure on the furnace when operating in cooling mode. So that's over here on the left hand side, inches of water gauge. The manufacturers say we ought to have .5 inches of static as the design point, that's what people ought to do. But there are only two out of our 60 systems in California that actually were .5 inches of water or less.

So basically the standard approach in California is to run duct systems at very high

static pressures and make up for it by more fan watts and less air flow. So what we're, you know, attempting to do here is move, you either move this system or move the watts per CFM system and try to get the situation to be more efficient.

MR. SHIRAKH: So how do you get the static pressure down? Larger ducts?

MR. WILCOX: I'm going to get there.

We're proposing here to require as part of this prescriptive measure that permanent static pressure be installed. What that will do is allow the contractor to easily and accurately measure that static pressure value and determine whether the duct system is a problem or not.

And also the accurate methods of measuring air flow require that you measure static pressure in the supply plenum. So this will make it possible for people to do those measurements easily and in a repeatable way without having to drill holes in the system.

The manufacturers have commented over and over again that we ought to base our standard just on static pressure and that static pressure was the biggest variable. We think that this is an essential step to trying to get at the issue of

high static in duct systems. People have to be able to measure it and understand what it is then maybe we can do something about it.

The way this proposal is envisioned at this point is it doesn't matter who installs the static pressure probes. It could be -- My favorite idea is that the furnace manufacturers will leap all over this and start installing them in all their furnaces so that you could just put the furnace in and it'll have these two nice little taps and they'll be labeled return and supply. They can do it very cheaply and make sure it's done right in the factory and all that.

If that doesn't happen or you want to install a furnace that doesn't have those things then the HVAC installer can put these in as part of the installation. You know, build them into the coil box. There's a lot of steps here where this can be done and it's not an expensive item that we think.

Okay, so let's talk abut where this static pressure is. We actually measured the static pressure in all the different components of the system for these field houses that we looked at and the median of our survey, at least this one

shot through it, had a total external static of .75 inches, which is 50 percent higher than the .5 inches we're looking for.

And this is where it was. On average actually the median was that .18 inches was in the supply side, the supply ducts. A little over a quarter of an inch was in the cooling coil. The return ducts is about .15 inches, the filter is about .15 inches, and then the total is .75.

You can, you know, you can reduce any of these and have an impact. And there's a lot of different ways to do it. We did a design for a typical system that was done in the field. Rich Atwood, who did the residential field survey did this design based on his knowledge of what was there and what was practical.

So his proposal was that, you know, .18 wasn't so bad for the supply duct, you'd leave that alone. If you'd get a cooling coil with less pressure drop and drop the pressure there the big change is in the return ducts where you'd put in a big enough return register and a big enough duct to drop the pressure significantly.

This seems to us to be one of the areas where the big problem is and where it's pretty

cheap to make the change. Maybe a lot of the houses will end up with two return registers because they were moving enough air that you can't get it through one and doing a better filter. So that gets the .5.

So we've done a life cycle cost analysis of what it costs to do that and here it is. The cost according to the estimate we have, including overhead and profit and so forth comes out at $123 for a three-and-a-half ton typical system.

You know, you can argue about these costs, you can argue about whether this is the right way to do it or not. That's all arguable and that's one of the reasons we have a performance standard. But I think the idea here is to try and get an idea about whether is this $1,000 or is this $100. And it's somewhere between $100 and $200 seems to be in the ballpark.

So how does that compare to the savings? Since all these things interact it's not necessarily very easy to figure out what the savings are but we used an approach here that I haven't presented before. Which is, we said okay, suppose you had a system and you put a furnace on it. And you get our typical situation for the

current situation, which is you've got .8 inches of external static. And you take the median furnace, the .45 watts per CFM at a half an inch and you apply that. If you take that furnace and run it at the same efficiency at .8 inches of water column then that takes 30 percent in the air to make that happen.

So based on -- It's just a real simple thing. What is the impact of higher static everything else being the same? And of course this is complicated because everything else being the same means that it's actually a different furnace because furnaces, you know, don't have a constant efficiency when you change the air flow. But in general this works very well.

Then you take that trough our standard life cycle cost analysis and TV numbers and so forth. If you can drop the wattage from .45 watts per CFM to .63 watts per CFM in the 1761 house standard prototype we use for standards development that's worth, you know, in the climate zones we're talking about from $785 up to $2335 of present value. This is compared to our estimate of $123 for the first cost.

None of these numbers are exactly

precise but we're talking an order of magnitude here in the difference so I think we're pretty safe on that.

Another way of looking at the value of this measure: If you take that same comparison of .63 watts at .8 inches, what we're doing right now, and .45, what you can do with a typical furnace at a low static pressure. On a five ton system, 1750 CFM, that's 1100 watts on the high static pressure, 787 watts on the low static pressure. And the difference, the savings there is 315 watts, which is on-peak. You know, basically air conditioners run in California on-peak and they're a large part of the reason for the peak. So that's 315 watts of peak demand.

And we're going to talk about the New Solar Homes Partnership in a few minutes here. That's where we're subsidizing people to put in PV systems to reduce peak demand in houses. If we want to supply that 315 watts with a PV system it's going to cost the state about $2500. So it's worth a lot of money to make these changes and I think that's what we're trying to do here.

The standard design, we're going to say that the standard design is 350 CFM per ton. The

default if you don't do the, you don't meet the standard is 300. The watts per CFM is .58 or the default is .8, which is the high value in the field survey.

Okay, so that's the end of the presentation. We're running kind of behind here so if we have a few questions. Go ahead, Bob.

MR. LUCAS: Thank you, Bruce. Bob Lucas representing Carrier Corporation. I have an initial question for you. You mentioned furnaces don't have constant efficiency when you change the air flow. We're still trying to determine whether these factors apply to the fan at cooling mode or in air distribution mode as well.

MR. WILCOX: The answer is I was going to talk about that when we get to the indoor air quality, the next topic, but they do. The proposal is that the requirements apply to any system that is used as an air distribution system.

So it applies for cooling systems in those five climate zones and then for what we think is a relatively small number of systems that are doing that currently, using the fans in an air distribution mode where this is a situation where you set it up with controls so the furnace cycles

on 20 minutes out of every hour and circulates the air around in your house. So you maintain good air distribution and indoor air quality so none of the rooms get stuck with stale air.

MR. LUCAS: Thank you.

ADVISOR PENNINGTON: Excuse me, I am not sure you are using the same terminology there. I'm thinking Bob was talking about something different than using the system as a ventilator.

MR. LUCAS: This is why I'm raising the question, Bill. Obviously the efficiencies of these units change dependant upon the air flow. If air distribution mode means constant fan then we need to do some more work. And I think that that's what that mean, right? You just have the fan on?

MR. WILCOX: Well, maybe we need to do some more talking about the definitions here. What we're -- If your indoor quality system, one of the components of that is a central air distribution system, then this would apply. If the homeowner just wants to switch on the fan switch and it's not part of any designed indoor air quality system then I think it probably doesn't apply. So there's maybe a fine line there.

MR. LUCAS: Okay. Carrier is trying to give you competent, real-time feedback as this develops and all of the feedback we're giving you to date has to deal with operation of these systems in the cooling mode.

We suspect that the watts per CFM would be higher as you decrease the air flow. So if this standard were to apply to a lower air flow mode of operation then we need to take a look at the numbers again because it would take a considerable additional review to come up with some sense as to what those numbers might look like in that mode. But we do think that they would be higher than they would be in the loaded mode.

The second point that I would like to make is we have also done some work with the air flow measuring device that was suggested to be used in the field. And although this is still preliminary information, what the engineers in the lab have determined is at least for the devices that they're checking they are finding a consistent under-measurement of air flow by about ten percent. It looks as if that underestimation increases as the air flow decreases. So if we get

it to a fan-only mode then that situation could exacerbate.

And the reason it's important is that if the field measurement device has a ten percent deviation from the actual measurements then an item that would test out at .58 or an appliance would test out at .58 watts per CFM as it comes out of the factory would be field tested at a ten percent higher value at 0.64, which would take it from meeting the standard to not meeting the standard.

And since this could result in the red-tagging of the device since these are measurements that are being taken as the building envelope has already been completed we think these are some fairly significant points that still need some discussion.

So we'd like to reiterate our initial comments to you that we'd like to see you focus more on the duct system static pressure. We think that that is a very fruitful avenue for you to proceed and to proceed with caution as the proposals relate to the ability to use individual appliances.

So on that point what I'd suggest is

this, that particular standard deserves some further inquiry. Thank you.

MR. WILCOX: Thank you, Bob. I think we need to pursue the issue with the measurement technique and I would be happy to do that, Bob. If you could connect me up with the right guys we'll try and figure out what's going on there.

MR. LUCAS: We regard this as a continuing discussion so we'd be happy to do that.

MR. WILCOX: Okay. Go ahead.

DR. AMRANE: Good morning, Karim Amrane with the Air-Conditioning and Refrigeration Institute. Just to go off on what Bob just said, it would be good for us to have a look at the raw data, the data that was used to derive those numbers. And I have made a request to staff to get copies of the report and surveys but as of today I haven't received it.

This data should be made available to the public so we can look at the accuracy of the testing, you know. The ten percent I think is a good point here. So I think it's very important and we'd like to encourage the Commission to make those reports available to us.

I guess I'm confused as to whether this

proposal, this merger will apply to only new construction or to both new construction and replacement.

MR. WILCOX: New construction.

DR. AMRANE: Only new construction, okay. That answers my question, that's good.

Now also I am confused as to whether this will apply to heat pumps as well as A/C and furnaces. It will apply to heat pumps?

MR. WILCOX: Well, unless there is some reason why it shouldn't.

DR. AMRANE: Well again, I mean, the analysis focused mainly on central A/C and furnaces. All the data, all the analysis, all the measurement was on that, now we're extending this to heat pumps as well. So I'm wondering why.

MR. WILCOX: I'm sure this will come as a shock to you but there aren't very many heat pumps going in new houses in California. (Laughter).

DR. AMRANE: I wasn't aware of that. But anyway, that's besides the point. I mean, if we are trying to back up the merger with the data and the analysis, the analysis was done only on one type of system and now we're extending it to

heat pumps. And I was just asking the question as to why?

MR. SHIRAKH: Are they different?

DR. AMRANE: Of course they are different. I mean, the pressure drops --

MR. SHIRAKH: They are air handlers --

DR. AMRANE: Yeah, but pressure drops are different. So I guess, I mean, without looking at them I was kind of surprised that we are extending it to heat pumps as well.

MR. WILCOX: Well I think there were two heat pumps in our survey.

DR. AMRANE: Oh, there were two? Okay.

MR. WILCOX: I think there were two. And because there were only two we didn't try to draw any conclusions. But I think both of the heat pumps were the best machines that we had. So I had been assuming it wasn't an issue because the heat pumps are usually not as -- you know, they're different, they don't have a furnace.

DR. AMRANE: Right.

MS. PUMPUNI: Good morning, Gloria Pumpuni, GAMA. Just a few comments in general. We support establishing air flow levels and also the efforts to reduce the duct system and filter

static pressure. However, not to sound like I'm whining, but we didn't have access to the proposed language of this presentation in time. Members will be providing more substantive comments in the two-week period or by June 29.

I have a question also about the analysis. Would it be possible to get a copy of the detailed analysis that you performed so our members will have a chance to review your numbers and the type of work that was done? That would really help in the comments we provide. Thank you.

MR. WILCOX: I think the data from the field survey work is needed and we'll get it out to you guys later.

MR. BACHAND: Good morning, I'm Mike Bachand from CalCERTS. Good morning, Commissioner, Mr. Pennington and staff. I just wanted a couple of clarifications, if I could.

On the 350 CFM per ton in the nominal cooling capacity. Having taught a lot of HERS raters how to do air flow tests and things the first question that comes up, nominal cooling capacity of what? Condenser, coil? In fact, we had an excellent example today of a three-and-a-

half ton system with a five ton coil.

So I would hope that we could get clarification pretty much in black and white in the standards on the nominal cooling capacity. What we're looking at on that one.

MR. WILCOX: It's the outdoor unit.

MR. BACHAND: Outdoor unit, okay. So could we have clarification of that in the standards? It hasn't been clear before.

MR. WILCOX: Yes, I agree.

MR. BACHAND: Another thing, if we don't have a cooling system then we need the same information for a furnace. And that has been pretty well done in the ACM. But again, that information when you don't have a cooling system, you have to have another thing to do 350 CFM of something.

MR. WILCOX: Well this requirement doesn't really apply to systems that don't have cooling. I think -- I mean, I don't know if it's written exactly to exempt them or not but it should because the economics are completely different if all you're doing is heating.

MR. BACHAND: Okay. So we're not talking about air flow on furnace-only systems?

MR. WILCOX: No.

MR. BACHAND: So that should be made clear also probably.

MR. WILCOX: And you won't find very many in those five climate zones I would say.

MR. BACHAND: I guess not. I got one of the heat pumps though in my house. (Laughter)

Another question is the 350 CFM per ton, that's not going to carry over to the duct test or it is going to carry over to the duct test? So our six percent leakage values are actually going to become tighter? That's a question mark.

MR. WILCOX: That's an interesting interaction. I don't --

MR. BACHAND: That will need -- We'll need to know how to clarify that when we go out to teach the HERS raters and the contractors what's going on. Thank you for your time.

MR. PENROD: Rob Penrod, Beutler Corporation. My question relates to residential economizers. Did you factor in cooling savings that can be brought there? Are they going to be held to these same standards, especially in the return air static side of things? Because there's obviously a benefit from the free cooling provided

there.

MR. WILCOX: Yeah.

MR. PENROD: And the ability to provide that return air system at the static you're asking for is challenging.

MR. WILCOX: We haven't actually looked at that so maybe we should talk about what that means.

MR. PENROD: Okay.

MR. WILCOX: Okay, I want to go on and do the next topic. So this is the third topic, which is a proposed, new, mandatory requirement for indoor air quality ventilation. I'm going to talk about the summary of what those requirements are and I was going to talk a little bit about air distribution systems as part of that.

So the proposal here is that -- I guess my slide doesn't start out with this on it. But the proposal is that in the mandatory section of the standards there be a requirement that each new house comply with the requirements of ASHRAE standard 62.2-2007, which I have a copy of here. It's entitled Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings.

And there is one modification to the

general provisions here, which is that the ASHRAE standard allows window opening as a ventilation system if approved by the local authority having jurisdiction and our requirement says that window openings are not allowed as a method for meeting Standard 62.2.

So basically this is a proposal for mandatory ventilation including whole-house, mechanical ventilation for each new house. The whole-house mechanical ventilation is -- There's an equation form of that which is here. There it is. Oops. (The pointer stopped working.) This is much too complicated for an engineer to operate, Bruce, I don't know. (Laughter). I did something to get it to --

ASSOCIATE MEMBER ROSENFELD: The batteries pooped out.

MR. MAEDA: It'll only get you when you point to your eye, right?

MR. WILCOX: Right. Now it's doing funny little shapes on the screen. I don't know how to get away from that.

MR. MAEDA: You turned it.

MR. WILCOX: Oh, maybe I turned it. That's what happened, okay. Sorry. All right.

Anyway, the rule here is the one CFM per 100 square feet plus 7.5 CFM times the number of bedrooms plus one. So it's a combination, the mechanical rate is a combination of the size of the house and the occupancy based on the number of bedrooms.

I personally like the ventilation rate table that's in the standard. It's a nice, simple, straightforward way to do this. And this shows the ventilation required, the whole-house ventilation in CFM for floor areas by 1500 square feet at a time on the left side and bedrooms across the top. And, you know, the Commission can make one of these and put it in the documents, the manuals and so forth. You know, have a different format and so forth and still apply this.

But for a 2,000 square foot house with three bedrooms what we're talking about is 60 CFM of ventilation air. With four or five bedrooms it goes up to 75 CFM. Generally what most people in the ventilation business would consider to be modest if not inadequate levels of outdoor air ventilation.

We're proposing some requirements on fan power that are not part of ASHRAE Standard 62.2,

which only deals really with the indoor air quality and safety aspects of the standard. We're proposing that if you don't use a performance approach, in other words you want to comply prescriptively with this mandatory requirement, then the total fan power that you are using to move that 60 CFM shouldn't be more than 1.2 watts per CFM. So for 60 CFM you get 70 watts, basically.

And if the performance approach is used then we're not going to -- The language here is a little complicated to understand but the idea is that you don't get a credit by putting in a smaller ventilation system. We're talking about indoor air quality ventilation here as being something that is really intending to produce better environmental quality and less health risks for occupants. So we don't want people to save ten watts by putting in a system that isn't going to work very well.

Part of the reason for this watts being set at a pretty high level is that some people in the indoor air quality field think that a good ventilation system ought to have a supply duct to each bedroom, to each room in the house, and the

return ducts. And the whole system ought to work so that there's, you know, the air is supplied to each space and so forth. So we have actually set this watts per CFM number at a level that should allow that.

So the basic idea and what's required by Standard 62.2 is simple, high-quality exhaust fans. In fact the exhaust fans in your bathrooms are typically adequate to do this if you put in good exhaust fans and engineer the installation. But if you want to do a better system than that then, you know, that's fine too and we're not going to penalize you for going to distribution and so forth. That's one of the interesting issues.

You have to supply controls so that occupants can control these things. You have to have exhaust ventilation of at least 50 CFM intermittent in each bathroom or 20 CFM continuously in each bathroom. Your choice about whether it's an intermittent system that is user controlled or goes on with an occupancy sensor or whatever.

This is one of the major steps to try and improve indoor air quality by eliminating

problems. And one of the major problems in houses with indoor air quality is moisture. If you exhaust bathrooms when people are taking showers you get rid of a large part of the moisture problems related to mold and so forth.

Also the 62.2 standard requires exhaust ventilation to the outside from each kitchen of at least 100 CFM. And there's some details about whether you do it with a hood or you do it with just an exhaust fan in the ceiling. But again, one of the major indoor pollutant sources is cooking and moisture from the kitchen. So if you can exhaust those before they get into the house that's a major advantage.

There's some requirements in 62.2 for the sound ratings on air moving equipment. You have to meet a, there's an industry rating standard for sound and for air flow and you have to have equipment that's got a one sone standard for continuous use. So if you have a continuous exhaust fan system it has to be rated at one sone or less. Or three sones for the intermittent fans if you're going to use them like for kitchen exhausts.

Also the air flow that you need, you

have to have equipment that's actually rated to deliver that either by measuring it in the field. You can show that you have actually done the job by measuring it but typically you can use a prescriptive table that just says, you know, if you're going to do so many CFM you need to have a four-inch duct instead of a three-inch duct if you're going to go 30 feet. Those tables and so forth are built into the 62.2 standard.

And 62.2 also requires a slightly better filter on your central air conditioning system. This is intended to keep bad things from building up on the coil and becoming a source of indoor air quality problems.

There's some rules on naturally aspirated combustion equipment when inside in a house and you have too big an exhaust fan flow. This is an issue for special cases where you have giant exhaust range hoods and things like that potentially. It's, I think, set up in a way that's pretty reasonable to do.

Clothes dryers must be vented to outdoors. One of the only changes in the 2007 version of the 62.2 is that if you have a condensing clothes dryer it does not have to be

vented to outdoors but the other ones do. And there are some other detailed requirements about ventilation locations and all that other stuff.

Air distribution systems. The attempt here is to define. An air distribution system is a case where you have a central air conditioning system fan, the ones we were talking about, the fans in the air flow part of the situation.

If you want to use that as your ventilation system or as part of the system to distribute ventilation air typically then you're going to be running that system many hours a year. It's going to be running way -- you know. The typical air distribution system runs 20 minutes out of every hour. So rather than a few hundred hours for air conditioning we're talking thousands of hours of operation. So it's using a lot more electricity.

So what we said was that if it is reasonable to apply the same efficiency criteria that we apply to the air conditioning mode in the ventilation mode if you're going to use those systems. And as Bob raised, maybe there are some issues there that we don't, we haven't considered all of the interactions and so forth. And there

is a proposed way that this works in the performance standard so that you could actually trade off and use better fans or trade off against other measures and so forth.

Okay, so that's the end of the indoor air quality ventilation topic. I am actually running over on time here but I think we should take as many comments as people feel they need to say at this point.

MR. MAEDA: Bruce Maeda, CEC staff. For exhaust fans what is the definition of kitchen? Is it really a range hood or is it a kitchen? Where do you have to have an exhaust fan?

MR. WILCOX: There is a definition and I think it's okay. There has been a lot of arguing about the case where the kitchen is actually in the living room and is it, you know. But basically --

MR. MAEDA: What if you have a studio apartment?

MR. WILCOX: Well it's the room that has the cooking equipment in it. And if it happens to be a very large room then you better have a range hood or then you have to -- you know, you can't -- If you're going to try and exhaust the general

room and it's a very large room then you have to have a big exhaust.

MR. MAEDA: And I presume it applies to multifamily as well?

MR. WILCOX: Yes.

MR. MAEDA: It's a dwelling unit rather than just a, rather than a house.

MR. WILCOX: That's right.

MR. MAEDA: And is a studio apartment a zero bedroom?

MR. WILCOX: It's number of bedrooms plus one. So if a studio is zero then it comes out one.

MR. HOESCHELE: Marc Hoeschele, Davis Energy Group. Bruce, I just wanted to clarify how the standard design is handled if, is there a different budget if you're using a central air handler than a bathroom fan?

MR. WILCOX: Yes.

MR. HOESCHELE: And is there any, there is a credit, potentially, for a variable speed?

MR. WILCOX: Yes.

MR. HOESCHELE: Okay, thank you.

MR. WILCOX: The intention, to clarify this, is that, you know, the standard design if

you have a central air distribution system would be one running at .58 watts per CFM and on a schedule, a standard schedule. And if you had a more efficient central air distribution system then you could get a credit, an energy credit against that.

If you don't have a central air distribution system then it is not an issue because you don't, you don't end up with that in your standard design.

MR. HODGSON: Mike Hodgson representing CBIA. We have the similar questions that we had probably 15 months ago when this was introduced in ASHRAE 62.2. One of the major issues and what we look for is cost-effectiveness of new standards. Since this is a requirement that really increases energy use and increases cost we're concerned about where is the cost-effectiveness requirement for 62.2?

The assumption, since there will be probably an increase in energy use, is this really is based on health. So we have asked for those health studies and we don't see them posted on the web site. We presume that they would exist and we would like to have reference to those so that we

can understand the health risks associated with indoor low ventilation in homes.

Also we have asked the Energy Commission probably about 15 months ago a similar question. That if there is a regulation on homes on health and what authority do they have to actually impose this regulation on the building industry, since it is not an energy issue, it is a health issue. But those are similar questions we asked probably a year and a half ago and we have looked forward to that discussion.

I have a couple of other questions I'd like to ask more technically. And that is, one of the issues you brought up previously, Bruce, was to try to design a low static pressure on the return side. And what we'd like, some explanation assistance on how we can put a MERV 6 filter with a very, in a .05 static on the return side. Those are some things that are difficult to do and we would like to understand how we can do that so that we can design good systems.

Because the cost-effectiveness argument you made 15 minutes ago seems to be very strong. So we'd like to work with you on that but we don't quite get it. Because we do put in MERV 6 filters

and I believe it's a .15 static bump by putting in the typical MERV filter that the homeowner can buy at the store for a few dollars per filter.

The other question I have is I am unclear on the energy savings. Currently in the standards if we have low ventilation, excuse me, low air infiltration in a home you can get credit for that down to a certain SLA. And then after that time the modeling software assumes that there is a penalty because you turn on a ventilation system. So how is that going to work?

If this proposal succeeds how would that work in the 2008 standards? Would it assume that both on the standard home there always is a ventilation system so that is built into the energy analysis? So as you get more and more, lower and lower infiltration you'll get more and more credit? Or is there still going to be that slope where it goes down, hits some level and then you'll be penalized for going too strong? Too low, excuse me.

MR. WILCOX: Let me answer the last -- Are you done?

MR. HODGSON: Sure.

MR. WILCOX: The last question first. I

didn't get into the details of that. We could talk about it on Friday, probably.

We presented as part of this proposal a change in the rules so that current ventilation modeling stuff would all go away and you wouldn't, there would be basically no interaction between house air tightness and the ventilation rate stuff. So it provides a much, I think an increased ability to take credit for tightening the house, particularly down below the point the three SLA level that you're limited to now.

MR. HODGSON: Okay.

MR. WILCOX: We also tightened the default down some so the credits are not as big as you might imagine but they are still substantial.

You know, in terms of the health angle. There's a major study that is underway that the Air Resources Board is doing on indoor air quality in California houses. Unfortunately the results are not yet available. The Air Resources Board has strict rules about not releasing stuff before it's made it through their peer review process. So I think there is a good chance we'll have information within -- soon but it is not available today.

ADVISOR PENNINGTON: Related to your authority question, Mike, sorry if we didn't understand that you wanted, you know, some direct response from us on that. The Energy Commission does have explicit authority in statute to address indoor air quality when we're looking at energy efficiency changes. In fact on recent discussion related to commercial buildings there was an agreement among state agencies that the Energy Commission has the authority to address ventilation.

MR. HODGSON: Bill, if you could help me out then. When we talk to our membership and describe these changes that are good for California we just need to be able to respond to our membership on their questions. And one of the questions is, this is not the Energy Commission's responsibility. We would love to have the documentation to say, yes it is, here's chapter, verse and an agreement among state agencies that this is the reason why. We're not doubting it, we just need the documentation, okay.

ADVISOR PENNINGTON: Okay.

MR. HODGSON: The issue on health risk. We really need to have the study, not the

potential study, to talk to the membership to say that this is the reason why these things are happening. Okay.

MR. PENROD: Rob Penrod, Beutler Corporation. Going back to whether it's air conditioner or air handler size as far as the CFM. If I understand it right you're penalizing a designer if their right-sizing a system, say a four-ton unit is the right size air conditioner for that house, but in order to get a proper air distribution you need a five-ton furnace, 2,000 CFM, because of the size of the home.

That seems to be getting penalized here even though you're really trying to save energy for the house in terms of the size and the equipment. Otherwise you could just put a five-ton air conditioner in there to accomplish that, which isn't what I think you want us to do. Do you understand what I'm saying?

MR. WILCOX: Yes, I understand what you're saying and I don't think it's the case. What you're proposing is a case where you want to supply more than 350 CFM per ton, right?

MR. PENROD: Correct.

MR. WILCOX: So what we have said is

that, the criteria is at least 350 CFM per ton, so you meet that. And then we said that it's actually the watts per CFM.

MR. PENROD: Okay, then I misunderstood you. So it's the CFM of what it is actually providing.

MR. WILCOX: Right.

MR. PENROD: Okay.

MR. WILCOX: So if you have more, if you go out and you measure the CFM and you measure the watts.

MR. PENROD: I thought it was the nominal CFM based on the ton.

MR. WILCOX: No.

MR. PENROD: I thought that's what you said to Mike.

MR. WILCOX: The minimum is based on the nominal CFM per ton.

MR. PENROD: I've got you.

MR. WILCOX: Okay.

MR. PENROD: Thanks.

MR. WILCOX: No, we tried to anticipate that problem.

MR. STEVENS: Don Stevens, Panasonic. I am a member of the ASHRAE 62.2 committee. I am

the incoming vice chair of that, been involved since the organization shifted away from a combined single ventilation standard to one for res and one for non-res, which is like 1995. I wanted to say that, and again I'm not speaking on behalf of the committee or for them specifically but rather for myself and my long involvement with this. I am very glad to see California looking at adopting 62.2 into your standard.

I am from the state of Washington. I am one of the primary authors of the Washington ventilation code, which we wrote in 1989, which we have enforced with whole-house continuous ventilation kind of requirements with sound ratings on things, with range hoods required, things like that.

And I wanted to basically say, yeah, this stuff is very possible. Yes, there's some cost. Ventilation does have some cost to it. But not doing ventilation has cost as well. There are a lot of variety of fans out there, a lot of varieties of ways to do ventilation. 62.2 allows supply ventilation, exhaust ventilation, balanced ventilation.

You can do it with a fan that draws nine

watts to give you your 60 CFM. You can do it with an air handler that draws 300 watts to give you your 60 CFM. Any number of ways to do it. It's up to you how you want to do it. But it's very doable, very possible to do that.

One thing I do want to mention that wasn't brought up in the discussion on using the central air handler as your ventilation device. Typically that type of system is using the return air plenum, negative pressure to pull in outdoor air. In this case let' say we needed that 60 CFM from the chart that Bruce showed. In order to do that there has to be a known amount of negative pressure available.

When you reduce the air flow in the air handler, let's say you cut the CFM in half, you cut the pressure to a quarter. So you don't have the pressure there to bring in the outdoor air when you're running at a lower speed with the air handler.

So one of the things to keep in mind is as you look at how to approach this is that there are penalties to the different strategies that are used. There are tradeoffs that you have to do. And Bruce can explain all those to you ad nauseam.

But I just want to basically say, keep in mind that there are a lot of ways to skin this cat. Thanks.

MR. MAEDA: I want to speak briefly for a second, Bruce Maeda, California Energy Commission.

There is an interaction between the infiltration limitation and ventilation. That's at the lower limit when you reach .15 CFM.

MR. WILCOX: .5 SLA.

MR. MAEDA: .5 SLA and you have to have balanced ventilation at that point. That usually entails an additional fan or something.

MR. DAY: Good morning. Michael Day speaking as an individual today, not as a part of any company. One thing that I brought up when we first looked at this about a year and a half ago was that if we're going to continuous ventilation, which is obviously a good idea from the health standpoint, there are some builders, there are some mechanical contractors that would look at putting in a heat recovery or energy recovery ventilator to save kilowatt hours over the course of the year, save a lot of BTUs tempering that outside air that was coming in.

In looking at introducing this to the standards, Bruce, are we looking at giving a credit for the application of an optional, sensible or latent heat-exchanger?

MR. WILCOX: Yes. I think one of the details here is that if -- as I said, we set the fan watts per CFM high enough so you could do a ducted system. It's probably not high enough to allow a heat recovery ventilator because of the pressure drop in heat exchangers. But we're pretty sure that if you have such a device and you do the performance calculation that you'll recover enough energy to make up the difference and come out ahead, probably.

MR. DAY: So there will be a way that you can model that?

MR. WILCOX: Yes. A simple recovery efficiency model.

MR. DAY: Okay.

MR. WILCOX: Okay.

MR. DAY: And then the second point was, looking at 62.2, a lot of houses, especially in the custom range, do go to fairly good sized range hoods. And there is a discussion about interlocks between the, between ventilation devices and the

exhaust hoods.

Again, if you've got a ten-burner Wolf stove and a 2,000 CFM range hood it starts to become, it starts to become a real issue. And I would encourage great clarity on that between however it's written and the building community to make sure that people know what's coming before it hits and give you any comments on the way that you specifically phrase it.

MR. WILCOX: Thank you. I think real issue there, it happens in cases where you have a natural gas appliance inside the pressure envelope. And that's where the big issue becomes that you don't want to backdraft by having a large exhaust negatively pressurize the house and run the flues backwards. Other than that Standard 62.s I don't think complains about large exhaust fans if you want to do them.

Maybe at some time we'll get after the energy side of the large exhaust fans but at this point I don't think there is any evidence that it is nearly as big an issue.

Okay, I'd like to proceed on. We have one more topic here and this has to do with the New Solar Homes Partnership. The New Solar Homes

Partnership is a California Energy Commission device that is working with builders to get PV systems installed in new homes like these in a subdivision in, I think this is in Rocklin.

This is one of the things that a lot of us have been working on for the last year, the Energy Commission has been developing this program. There is a larger state program, the California Solar Initiative. The New Solar Homes Partnership is the part of the California Solar Initiative that applies to new residential low-rise construction. The PUC runs everything else except that part so this is the Energy Commission's program.

The major thing for our discussion today is that this program gives you a subsidy for putting a photovoltaic system in a new house if you comply with all the rules. It's a pretty significant amount of money. The requirement is that to get into this program you have to have enough energy efficiency measures to exceed the requirements of Title 24. So the Commission is trying to promote the idea of efficient houses with renewables as well.

The Commission has developed a

simulation program to calculate the performance of the PV systems. There's a field verification procedure for installation and performance. A big emphasis on the site shading and orientation and installation issues for the PV systems to try and make sure they work right.

You know, this is the kind of systems we're talking about. They're grid-connected systems with an inverter. They run through the utility meter and homeowners get to run their meters backwards when the PV system is running.

So one of the important things here is the energy efficiency side of the New Solar Homes Program. There are two levels defined in the New Solar Homes Program Guidebook, which is an Energy Commission document that provides the rules. It's posted on the website. Type Go Solar California and you get there.

The first level is 15 percent savings beyond Title 24 based on the total budget. So you do the performance calculations, 15 percent better. So it's kind of quasi the ENERGY STAR level house. And that is minimum to get into this program.

Then the Commission established this

second level and it's much more aggressive, 35 percent of total budget and 40 percent on the space cooling budget savings compared to Title 24 requirements. It's moving towards zero energy new homes. It's kind of like developed based on current Building America home practices.

And the Commission is working with the CPUC to try, and I think they are now in place, some program support where the utilities are providing incentives for people who comply with this level of performance. Also high efficacy lighting and ENERGY STAR appliances are a part of the proposal. The Commission is defining a very high performance house here that saves on-peak energy, it saves energy and has a -- it's kind of, you know, a step beyond the minimum standard we're usually dealing with.

I am not going to go into the details. The Commission has their own simulation program that was developed. Those of us who worked on it like I have think it's actually very good. The incentives are actually based on the predicted PV performance. The calculations are done in TDV terms. It is very consistent with what we're doing in the building standards for building

standards calculations.

There is a field inspection required for the PV systems in this New Solar Homes Partnership. Visual inspections, shading evaluation. The HERS rater goes out and actually observes the output of the PV system operating with the sun shining on it to make sure that it's producing the electricity it is supposed to and so forth. A strong emphasis -- Those of us who lived through the 1980s solar tax credit programs like to focus on this performance side of things a lot.

And so here is the reason we're talking about it today. There is an exception that is in the proposed Section 10-103 in the proposed standards that says that if builders meet the requirements of the New Solar Homes program as specified in the Guidebook the building department can decide they don't need to do a plan check or inspection.

So it's kind of a, you know, a little -- I think this is all kind of in development. What this actually would mean in the future, but what this does is establishes a basis for what could be seen as an incentive for builders to buy into this high level of performance because it gets them in

a different place with regard to permitting and building inspections and so forth. And hopefully that would be an incentive for people to participate.

I think Bill Pennington may want to say something about this. He knows a lot more about it than I do so go ahead, Bill.

ADVISOR PENNINGTON: I don't know about the knowing a lot more than you part. But one of the things that is going on here is that we're actively coordinating the program with the utility new construction programs and we are actively encouraging participants who are seeking solar incentives from the Energy Commission to seek energy efficiency incentives through the utility new construction programs. And we're actively working with utilities to provide substantial incentives for Tier II as well as kind of the base level incentives for Tier I.

We are also expecting that for some reason if participants in our program in terms of applicants for the solar incentives don't participate in the utility new construction programs that the Energy Commission expect a similar level of scrutiny of the installation of

measures for those homes as would happen with the utility new construction program.

So basically what's happening at the utility level, as you may be aware, there is a plan check function that is conducted quite well, in my opinion, by the utilities that ensures that energy efficiency measures are readily present on the plans and there is consistency with the calculations that are done.

There is also a close coordination between the utility programs and the HERS providers and they introduce the information on measures into the HERS registry so that there can be very good field verification.

So essentially we have a very good model that we have with the utility new construction programs for getting a very competent demonstration that the measures are actually being achieved in the buildings. So that gives us confidence that we can rely on that same kind of structure for all participants in the program and that it really is not necessary for the building departments to be doing plan checking of those measures and doing inspection of those measures.

So that's a clarification of why we

would go to this what might be perceived as outrageous relaxation of enforcement of these requirements. Probably the contrary is true. We think we have a very strong verification process built into the program.

That doesn't apply to mandatory measures so we need the mandatory measures to be checked. So that's the reason for leaving the mandatory measures with the building departments.

MR. WILCOX: Okay, so that concludes the subjects I was scheduled to cover this morning. I don't know if there are any further questions about the New Solar Homes program. Otherwise if not I am done and Charles can take over. Okay, thank you.

MR. FLAMM: Before Charles takes over we're a little behind in the schedule. I'd like to recommend that we do the lighting acceptance requirements and then push the fault detection, the next agenda item, after lunch. Does that present any constraints for anybody here if we do that?

Okay, so it's a quarter until 12. So Charles Eley will take over and he will talk about the nonresidential lighting acceptance

requirements, then we'll break for lunch. Okay.

MR. ELEY: Thank you, Gary. I don't think this will take too long because I think most of this has been introduced in the past. These acceptance requirements reside in a document called NA7 or Nonresidential Appendix 7. It's one of the, it is one of the reference appendices that we are creating with this round as we reorganize the documents.

The NA7 has all of the nonresidential acceptance requirements but the ones we're going to talk about today are just the ones having to do with lighting. The HVAC acceptance requirements were presented I believe at the February workshop.

The first set that I'll talk about are the requirements for automatic daylighting controls. The first part of it is construction inspection where basically you verify that the equipment exists in the building and that it meets the specifications of the project and of the standard.

Then there is a, the next part of this talks about a sampling procedure that you can use. You don't have to actually do a functional test on every single control, you can sample certain

units. Because buildings could have hundreds of these. So you do a sample, a sampling procedure that is similar in a way to the sampling procedure that's used with HERS ratings.

And then after that there is a detailed specification of the functional tests that you have to go through and this is a step by step procedure. There's two of those, one for continuous dimming controls, which would almost always involve a dimming ballast and a photocell. And these can either be open-loop or close-loop system.

And then there is another set of procedures that are specified in the document for stepped control systems. Stepped control systems are still automatic controls, there's a photocell, but instead of dimming the lights usually you have luminaires with multiple lamps and lamps are turned off one by one as daylighting levels increase.

Then the second area deals with occupancy sensor controls, indoor occupancy sensor controls. And again this is organized the same way as the automatic daylighting controls. There's a set of procedures for construction

inspection, primarily to verify that the equipment is there and that it meets the CEC and project requirements. Again there is sampling permitted for occupancy sensors because again you can have hundreds of these or thousands of these in a large building.

Then there's a step by step procedure that is specified in the document on how you, how you verify the exact control and verify the functional operation of these, of this equipment.

And then there's a set of procedures for manual daylighting controls and automatic time switches. So all of this is laid out. I think most of the stakeholders that have been involved in this process are already pretty familiar with it so that's why I'm not going through a lot of, a lot of details here.

Then the next section deals with outdoor lighting controls and there's two categories here. There's motion sensor controls and there's automatic shutoff. For motion sensor controls there's a construction inspection that's required and then there's a step by step set of procedures for doing the functional tests.

And the same thing for shutoff controls

except for shutoff controls there's three optional sets of functional tests depending on the type of shutoff control it is. It could involve functional testing of a photocell type control or an astronomical time clock type control.

The astronomical time clock is one that keeps track of the time of year. You put in the latitude of your location and it will, it will make automatic adjustments to the, to the times that you set so that the lights come on at dusk. No matter if you're at the summer solstice or the winter solstice.

And then the last category is for time clock functional testing. This is just a normal time clock without the astronomical adjustment.

And I think that's it. This is for tomorrow, for Friday. Any questions or comments? I knew that wouldn't take long.

MR. FLAMM: Well I wonder if I was premature in dismissing the next element. Would you all prefer waiting to do the --

MR. SHIRAKH: I would suggest going to the next item. It's not going to take very long.

MR. ELEY: The next item is not going to take long either.

MR. FLAMM: Okay, if you could be flexible with me. I apologize for getting your stomachs ready for lunch. If you could wait just a little while.

MR. ELEY: All right.

MR. SHIRAKH: The afternoon is going to be very busy.

MR. ELEY: Yes, there's a lot of stuff this afternoon. Okay.

The next category, these are really credits that are being offered in the nonresidential software manual. They are not really standards so I guess we could have covered these Friday but they're on the agenda today so we're kind of making the exception here.

What we're talking about here are fault detection diagnostic equipment. And what happens in the software manual is that the software basically assumes imperfect operation of the equipment, which is not a bad assumption I guess.

But if you have the fault detection diagnostic equipment installed as a part of the unit that meets the specifications that are required then the performance of the equipment can be, is assumed to be better. So essentially it

degrades the equipment efficiency, the EER, by ten percent if the FDD is not present and only five percent if the FDD is present.

This was presented in detail at a previous workshop. Was it a year ago? It was a year ago when you presented this, Martyn. This was a project that Martyn Dodd did the primary research on, the report is cited there at the bottom in case you want to look at it in more detail.

But what we have done now is simply put it into the nonresidential ACM manual so that it exists as a compliance option. And of course a compliance option is something that you can use to comply with a standard but it is not, it is not a prescriptive requirement and certainly not a mandatory measure.

There is a similar credit that is offered for fault detection diagnostic sensors and equipment that is installed in air handler units and in VAV boxes. This is, this credit is basically tied in to, is in addition to energy management systems that would normally be installed in larger, more complex buildings that would tend to have this type of equipment.

And again the credit is offered is by tweaking some of the inputs to the models for the VAV boxes and the air handling units. There is an input in DOE-2 called maximum outside air fraction, which is set to less than one to reflect imperfect economizer operation in the event that the fault detection diagnostic equipment is not installed. And then the minimum VAV box is then increased to ten percent over the design minimum in the event that the FDD is not installed.

So those two things kind of create a penalty for the cases where the fault detection diagnostics is not, is not a part of the system. And again these were, these were -- I think this was part of the same report that was, that was presented a year ago February. If there's detailed questions about this I'm going to probably ask Martyn to answer them though.

MS. BROOK: I just have one question. Is there any verification requirements if they take these credits?

MR. ELEY: You mean acceptance requirements? Yes.

MR. MAEDA: Yes.

MR. ELEY: Those were covered at the

last, at the last workshop, Martha, but there are acceptance requirements attached to these.

MR. MAEDA: Actually we hadn't proposed them yet but they are in the current version of NA7. Martyn, I think I asked you for some additional information, a write-up on that for -- we changed, the outside air fraction was changed somewhat to be a more realistic credit. I asked you for simulations and a write-up on the simulations. You need to post that to the web also.

MR. DODD: I'm Martyn Dodd, Energy Soft. I had e-mailed you the backup data on the runs and that was supported by the FDSI stuff. Which I think Mark was going to come up and just say a little bit about. But no problem, I can -- Do you want to post it on the web or just?

MR. MAEDA: Okay, I'll get it over there one way or the other.

MR. DAY: Michael Day with Ice Energy. Our equipment comes basically already pre-loaded because of our software and our monitoring package with fault detection equipment. In addition to that there is equipment such as ours which can actually change its mode of operation by changing

the operation of valves to overcome deficiencies, for example, with refrigerant charge.

The question I would have is, with the next generation of equipment that can not only detect a fault but actually respond to it so that efficiency remains the same, would there be the opportunity to get more than just the five percent back that's being proposed under the FDD guideline here?

MR. ELEY: I think I can speak for the Commission on this. If we were to do that, that would be a new, a new compliance option that would have to be considered separately from this one. All that is being proposed now is what you see.

ADVISOR PENNINGTON: Those are pretty fast and easy, no problem. (Laughter)

MR. MAEDA: A couple of years.

ADVISOR PENNINGTON: I'm sorry, I didn't mean to --

MR. DAY: Okay, so let me -- Michael Day with Ice Energy again. So the response to that would be that it is not being considered now but it may be considered? Or talk to you off-line or something along those lines?

MR. ELEY: It won't be considered for

the 2008 standards.

MR. SHIRAKH: As part of 2008. But you can always come in as a compliance option. And you know the process.

MR. DAY: Okay, thank you.

MR. CHERNIACK: Thanks, Charles. Mark Cherniack, New Buildings Institute. I have been working on a CEC PIER diagnostics program for a couple of years now. To speak specifically to Bruce's question, all 16 California climate zones have been modeled for the rooftop unit piece of this and I think you should have those by now. So specifically speaking to that.

Tomorrow UC Davis, there will be a fault detection and diagnostics round table. I would say almost the first of its kind in quite some time to be held. There was a focus on California. We have people coming nationally as well as from Canada to talk about how we might accelerate the adoption of fault detection and diagnostics and the related system optimization that flows from these capabilities in both built-up systems as well as rooftop units.

Hopefully we'll have some additional advice for the Commission, perhaps some

refinements to the two proposals here within the next couple of weeks, obviously. This is a very major historic step forward for diagnostics and to support the ongoing efficiency of HVAC systems.

MR. ELEY: Thank you.

MR. FLAMM: Well not only did Charles get done on time, he got done early. So I want to ask Mazi, we have scheduled after lunch to be back at 1:15. Do you want to maintain that 1:15 or do you want folks to be back at one o'clock?

MR. SHIRAKH: I know there are a lot of roofing people who are interested in the afternoon topics, they are not here.

MR. FLAMM: Right. So we might keep the 1:15 just in case somebody is planning --

MR. SHIRAKH: I think we need to keep the 1:15.

MR. FLAMM: Right. So you all get an extra 15 minutes for lunch today. So enjoy your lunch, see you all back at 1:15. Thank you.

(Whereupon, the lunch recess was taken.)

--oOo--

AFTERNOON SESSION

MR. FLAMM: Welcome, everybody to the afternoon session. Those of you who were not here this morning, I ask that you make sure that even those that were here this morning, make sure that you sign the sign-in sheet to show that you were here and how we can contact you.

We are going to continue with the agenda. We're right on time with the agenda that was posted and is at the door right now. Charles Eley will be making a presentation. The way this is going to proceed is Charles will make a presentation on a certain topic and then we'll give some time for comments. And we're going to try very hard to stay on schedule.

So if we tend to float off schedule we're going to ask you to provide written comments to us if we can't get through to everybody's comments. So whether you get to speak or whether you do not get to speak you're welcome to provide written comments to us. We ask that you get them to us by June the 29. So we're going to try to get everybody. If we're floating off schedule too much then we're going to have to move on.

So with that, are you ready, Charles?

MR. ELEY: Yes.

MR. FLAMM: So Charles Eley is going to take over now.

MR. ELEY: Okay. I guess I'm going to cover two topics and we'll stop and take comments in-between. The first one is the, is the building envelope insulation requirements and the overall building envelope tradeoff method.

The insulation requirements have been, have been updated. The tables that have been updated include 143-A, B and C. That's for nonresidential, 24 hour occupancies and C, I think, is schools, relocatable classrooms.

So these requirements I believe have been presented in the past. This section of the standard you can, you can download from the Energy Commission website, it has been up there for a few days to review and also comments are open through June 29. Is that what you said, Gary?

MR. FLAMM: Yes.

MR. ELEY: June 29. So basically the stringency of most classes of construction and for most climate zones have not changed that significantly. But there were, there were a few cases where the stringency did increase. The

recommendations or the updated numbers are based on a life cycle cost analysis where we calculated the time dependant value of the energy savings. And then the net present value of those savings was calculated and compared to the incremental cost of insulating each wall or roof or floor.

So there was a detailed -- I think the latest measure evaluation report was March 20 of '07. Where is John?

MR. ARENT: Right here.

MR. ELEY: There you are. good.

MR. ARENT: Yes, that's right.

MR. ELEY: Also related to this is these prescriptive requirements also set the standard for the standard design, which is the basis for performance calculations. So table N2-1 of the nonresidential software manual, I guess we're still calling it the ACM Manual, has a -- lists the various constructions from Joint Appendix 4, which go into the standard design building and set that level.

So I am not planning on going through each of the, each of the numbers. There's a lot of them obviously and then they're published. I'll just summarize it there for now.

Another change that is being made is to the Building Envelope Tradeoff Procedure. This is in Section 143(b) of the standard. And what you'll find when you go to Section 143(b) is it is fairly brief, it's a single paragraph. Instead it references a reference appendix, which is NA8. And NA8 is the appendix that lays out the building envelope tradeoff procedure.

The new building envelope tradeoff procedure has several improvements over the, over the one that is in the 2005 standard. Perhaps the biggest difference is that there is one figure of merit, which is TDV energy for the building envelope and it combines both heating and cooling.

Previously you could make tradeoffs on the cooling side and you could make tradeoffs on the heating side but both had to comply. Now you can actually slightly increase heating or reduce cooling or vice versa so that, so that as long as your total TDV energy is less than, less than the standard design you're okay.

The building envelope tradeoff procedure uses the prescriptive standards to set the standard design. Then the proposed design is whatever building you want to build and it

accounts for orientation of walls and windows. And then there's I think four classes of walls. There's metal building walls, metal framed walls, two kinds of mass walls, light mass and heavy mass, and then there's other. And other is wood-framed and everything that doesn't fall into one of those previous classifications.

For roof constructions there's metal building roofs and just other right? Just two, two classes of roofs.

MR. ARENT: Right.

MR. ELEY: And for floors we have mass floors and other floors. This tradeoff procedure offers credit for window overhangs and shading services. So if you want to use or if you need to use clear glass in a window you might be able to do that if you have, if you have adequate shading by an overhang, a fixed overhang. So the overhangs are credited through something called a projection factor, which is a ratio of the projection of the overhang to the distance between the bottom of the overhang and the window sill.

And then the tradeoff procedure also takes into account both the reflectance and emittance of the, of the roof surface. So that's

an element for tradeoff as well. So in new buildings you could, if you had a, if you had a roofing product that had a, that had an aged reflectance higher than .55 you could get credit for that. If you had a, if you wanted to use a roofing product that had an aged reflectance of lower than .55 then you would lose TDV energy but you could make up for it through overhangs or better windows or more insulation or some combination of those things.

So it's a fairly rigorous and I think solid tradeoff procedure and it is documented in Appendix NA8. All of the equations, all of the coefficients, everything that you need to implement the procedure is documented in Appendix NA8. We have also developed a spreadsheet that we created for testing the procedure. I don't think we've posted that to the website yet but we, I think we can make that available to whoever would like.

There's kind of two versions of the spreadsheet. There's one version for, which would be for new buildings. For that one you enter everything about your building, walls, roofs, floors, windows, the whole works.

And then there is a second version of the spreadsheet which is sort of tailored to the needs of the roofing industry where you're typically not going to be mucking around with the windows. You're only going to be replacing the roof and maybe adding some insulation above the roof deck as part of the application of the new membrane.

So there's kind of two versions of the spreadsheet. I think you'll find that they're fairly, fairly easy and simple to do.

The equations in NA8 look kind of complicated but they're really not. There's a lot of different coefficients for 16 different climate zones and for all the different classes of construction. But when you code it up and put into a spreadsheet it is actually a fairly, a fairly simple procedure.

Let's see. A couple of other things that have gone into the standard. The prescriptive skylight U-factor and SHGC requirements. And this again is in 143(a). These were, these have been modified to be consistent with the default fenestration assumptions that are specified in Tables 116-A and -B, or Section 116

of the standard.

Previously we had, we had skylight performance characteristics that were less stringent than the defaults in the table. So by simply using the defaults in the table you actually got credit for putting in a skylight. Which didn't make sense so those have been adjusted.

Let's see. There's a couple of other things here and then we'll take some comments. One other thing that we looked at. This is in Section 149 of the, of the standard which deals with alterations. When you, when you replace a roof and you take it down to the, down to the substrate, if there is no, if there is no insulation in the roof or less than R-19 insulation -- and those are probably the same thing because California standards have required R-19 insulation since about 1978. So if there is any insulation at all there it is probably going to be at least R-19.

What we did is we looked at that situation and said okay, if there is no insulation in the roof is it cost-effective to add some? And the answer was, yes. So the insulation that you

add would be either R-8 or R-14 depending on climate zone. So that's roughly one to two inches of insulation.

If there is any insulation in the roof -- the way the code is written, if there is R-19 or greater insulation in the roof then this requirement is not triggered. Because in those cases it is not cost-effective to add additional insulation. It was only cost-effective when there was nothing there.

So this is a modification to Section 149. It is based on the same life cycle cost analysis that was used for the changes to Section 143. The difference here is that when we looked at the insulation upgrade opportunities here we only looked at the possibilities of adding insulation above the deck.

You know, in existing buildings it is not reasonable to assume that you can pop the ceiling tiles and climb up there between the duct work and the plumbing and everything and actually install the insulation. So the only, the only options we looked at were putting a rigid board above the deck, not trying to insulate below the deck. Of course if you do have access below the

deck and you want to do it that way you could meet the requirement that way. But the prescriptive requirement in Section 149 is based on the cost-effectiveness of putting the insulation above the deck.

MS. HARDY PIERCE: Charles?

MR. ELEY: Yes.

MS. HARDY PIERCE: May I ask a question?

MR. ELEY: Sure.

MS. HARDY PIERCE: One of your --

MR. SHIRAKH: You need to come up to the podium, please.

MR. FLAMM: I'm sorry, I should have informed everybody. Every time you want to make comments, for those who weren't here this morning, we ask that you come up to the podium and identify yourself. And if there is cross-talk please identify yourself each time. Because this is being transcribed, all the notes, and we want the reporter to know who is speaking. So any time you make comments please come up to the podium, identify yourself and make your comments.

MS. HARDY PIERCE: Thank you. Helene Hardy Pierce, GAF Materials Corporation. My question as I listen to you speak, you're talking

about when you tear down to the deck. But what if you are reroofing and you have an R-15 already in place? You're saying that this would say you have an R-14 so you end up with a total of an R-29? For example.

MR. ELEY: Well the way, the way the requirement is written, or at least the way it is intended is that if you have, if you already had R-15 continuous insulation that would, that would produce a U-factor lower than having R-19 below the deck, which is the, which is the threshold that we're looking at. So you wouldn't have to do anything else in that case. If you happen to have R-11 under the deck then the upgrade requirement would get triggered, yes.

MR. DREGGER: Thank you. My name is Philip Dregger, Pacific Building Consultants, here on the behalf of ARMA. Just some clarification regarding this specific thing. So we're not talking about adding insulation to make it at least an R-14. If you're below R-19 you have to come up, you have to add 14 or add 8. Okay, that's cool.

Now this is in alterations and I believe it's -- and just for clarification. It's for

replacement, repairs or recoating. I believe that is how it's phrased. So I guess -- And are you intending it to be the scenario where there is an existing roof that is going to be recoated, say with a reflective coating, and it has an existing R-11 below the deck. That project would now require adding R-14 above the deck. That's how I read it.

MR. ELEY: The insulation requirement is triggered by the same things that trigger the cool roof requirement. I think if you're -- Unless you're removing the roofing down to the substrate the cool roof requirement is not triggered and neither would this.

MR. DREGGER: I believe alterations include recoating.

MR. ELEY: Let's check that.

MR. DREGGER: Okay.

MR. ELEY: I think the intent, though, was -- What we learned last time is you can, often you can put a layer of roofing on top of the old one without taking it up but if you try to put a third one you have to take it up because of the codes. When you strip it down to the substrate that's when this would get triggered.

MR. DREGGER: Okay, again I'm just trying, trying to understand. So if you wanted to do an overlay it has to be cool I assume. So you trigger the cool roofing right away. It sounded like --

MR. ELEY: What do you mean, what's an overlay?

MR. DREGGER: You leave the existing roof system there and you put a new roof system on top of it. And that's

MR. ELEY: I don't think that triggers it.

MR. DREGGER: There's previous interpretations that it would, okay. And so I'm just -- And then with that scenario then you said that there was going to be, the cost-effectiveness analysis provided, which is the same as 143. Now we're at some different things. But is that available? I haven't seen it on any of the documents posted so far.

MR. ELEY: Yes. It is not, I don't think it has been posted yet but we will certainly make it available.

MR. DREGGER: Okay. So --

MR. SHIRAKH: It does mention recoating

in 149. I think we need to take those comments.

MR. ELEY: We need to, we need to make that clear. I think if you are just recoating the roof it's probably not practical to do this. When it is practical to do this is when you're stripping the old roof off, going down to the substrate and there is no insulation at all there already. That's when you would add the new boards before you put down the new membrane.

MR. SHIRAKH: It wasn't intended for recoating but the way it's written it could be interpreted --

MR. DREGGER: It could be.

MR. ELEY: So we need to clarify that.

MR. DREGGER: Right. And I'll maybe ask it again when we talk about 143. But therefore the cost of the R-14 would have to be included in the cost-effectiveness.

MR. ELEY: And it was.

MR. DREGGER: Okay.

MR. ELEY: There's one more slide here and then I guess we can take questions.

At a previous workshop we presented a report where we looked at ASHRAE 90.1 for requirements that should be added to Title 24.

There were several things that we found.

One was a requirement for loading dock weather seals. So these are, these are devices that create an air seal between the back of the truck and the opening in the warehouse. This would, this would become a requirement in climate zones 1 and 16 only, colder areas of the state. This would just reduce infiltration into the warehouse due to the doors being left open while the trucks are parked there being loaded or unloaded.

Then there is another requirement which was an ASHRAE for vestibules or revolving doors. And this requirement is not applicable for low-rise buildings but for buildings with four stories or more it is applicable. In those cases you can get some significant thermal stack effects in the building and a lot of infiltration can be induced in at the ground level.

Then we have added some U-factor criteria for opaque doors which did not exist previously. So that has been put in there. The minimum U-factor for -- the maximum U-factor for opaque doors in most climate zones is .7 for a typical swinging door. This is just exterior

doors of course. And for roll-up doors it's 1.45. But for climate zones 1 and 16, the colder areas of the state, the U-factor for swinging doors is the same but for roll-up doors it drops to .5 for that too. So you would have to have insulated roll-up doors in climate zones 1 and 16.

And then the, and then the last requirement was a restriction on the use of loose-fill insulation. What happens if you use loose-fill insulation in a sloping ceiling application it can all, it can all kind of drift to the bottom of the ceiling so there is a restriction about this. You can't really use the loose-fill form of information if the slope of the ceiling -- We're not talking about the roof now. I know there's a lot of roofers in the room. We're talking about the ceiling now. If that ceiling slopes more than three in twelve you have to use some insulation other than blow-in.

So those are, those are the requirements. I think we can take comments and questions now, Gary.

MR. SHIRAKH: There is a comment.

MR. FLAMM: Jon, I just acknowledged Jon McHugh.

MR. McHUGH: Jon McHugh with -- can you hear me?

SPEAKERS IN THE AUDIENCE: No.

MR. McHUGH: Okay, I'll speak up. Jon McHugh representing PG&E. I just wanted to make note of other measures that are in this section 143, which is 143(c), which is the requirements for skylights in large open spaces with floor areas that are 8,000 square feet. This is a reduction from 25,000 square feet. Just making sure that everyone is aware of that.

MR. ELEY: Yes, I think that may -- I guess I overlooked that one, thanks for bringing it up.

MR. McHUGH: Okay. And the other issue associated with that is that in the past the minimum skylight area was based on the lighting power density and for simplicity of enforcement. It has been recommended that it be just one, one value. So that if the lighting power density changes people aren't having to change the amount of skylights.

Then in 149 when skylights are added to an existing building and the lighting system isn't re-circuited single level photo-controls are

allowable so that the cost of re-circuiting is not required. So you could turn off -- You know, if you skylit the entire space you could just turn all the lights on and off. Thanks.

MR. HITCHCOCK: Reed Hitchcock with a comment on behalf of the Roof Coatings Manufacturers Association. Just to follow up on the comments made earlier.

I would request formally a clarification of recoating as an alteration requiring an upgrade of insulation and would suggest that perhaps an exemption or other clarifying language would be appropriate. Thank you.

MR. SHIRAKH: Again, it wasn't meant to be like that but you are correct in your interpretation. We'll clear that up.

MR. HITCHCOCK: Thank you.

MR. ELEY: That was certainly not the intent, to trigger this for re-covers.

MR. FLAMM: If anybody else wants to make comment on this topic you can migrate over here now. Except those around the table, you do have speakers. But if everybody could migrate over here so we know how many people need to speak.

DR. CALLAHAN: Bill Callahan, Associated Roofing Contractors. I had a couple of questions about the same issue, on adding the rigid insulation besides the clarification. You're saying that if you've got R-14, for example, underneath the roof deck you could add -5, meet the -19 and not have to put the -14 above. I believe you said that. That's not the way it reads now. It would certainly have to be clarified. You've got R-14 underneath the roof deck. You add -5 to make it R-19. Then you could do what you want above the roof deck?

MR. ELEY: Well you still have to have a cool roof. This is not --

DR. CALLAHAN: Or make a trade -- Well that's another part of my question.

MR. ELEY: Okay. This is not an alternative to the cool roof. This is an additional requirement.

DR. CALLAHAN: No, I'm talking about meeting this condition, which right now says if the existing roof installation is less than R-19. And it is not clear whether that applies below the deck, above the deck or as a combination.

MR. ELEY: Right.

DR. CALLAHAN: And whether you're allowed to increase the amount below the deck to bring it up to R-19 and then not have to do the rigid insulation above the deck? And if that's an option it needs to be clarified because it is not clear right now.

Secondly, in those areas where you do need to do -14 above the deck and you are going to use a non-cool roof and do a tradeoff, is now R-14 above the deck the minimum R value to which any additional insulation tradeoff value is added?

MR. ELEY: That is correct, yes.

DR. CALLAHAN: For example, right now in climate zone 2 with an R value of 18 if you use a default value of .10, a non-compliant roof, you have to add 10.3 R to be compliant. Under this regulation you would need to go to 24.3. Is that correct?

MR. ELEY: Well I can't confirm your calculations but in principle that would --

DR. CALLAHAN: In principle. Okay. So you're adding -14 to the minimum value so you're adding at least three inches of insulation before we even start substituting.

Now in this analysis did anyone take

into account the cost of re-altering the roof in order to take three or five or seven inches of insulation? The movement of equipment, the relocation of drains, other factors that would be involved. It seems to me that when you do this you are pushing a cool roof. You are pushing options away from contractors and forcing them de facto to use a product rated by CRRC.

In the same vein you talk about minimum insulation of R-14. I think some consideration should be given to average insulation values if only to allow some possibility for a contractor who wants to add insulation to be able to slope that insulation to existing drains and other rooftop structures instead of having to move them all. Or do things that they can't actually do, the building wasn't intended to do. That's my comment for that, thank you.

MR. ELEY: Okay.

MS. DUNHAM: I'm Marty Dunham with Enterprise Roofing Service out of Concord, California. I am concerned that the prescriptive approach is being buried in the attachments. I think that fundamentally the roofing contractors are the ones that have to get in there and

interpret and enforce and carry out these regulations in many instances, particularly retrofit conditions where we are removing an existing roof.

I am also concerned that the prescriptive approach is becoming more stringent. I am more for having the cool roof and saving the environment, et cetera. But I think that it is critical that costs not be passed on to building owners and other citizens that are unnecessary.

A couple of the points that Bill Callahan who spoke prior to me touched on I think are very important. Adding insulation to an existing roof. If you have a facility with 25 air conditioners and they are a nominal eight inches above the roof and you add three inches of insulation, now the equipment needs to be raised in order to have a good watertight assembly. So you're forcing, possibly forcing the facility to spend a lot of money on disconnection/reconnection of utilities and equipment. And that is something that has to be considered very carefully.

I am not sure why on the 143(b) that the prescriptive table was moved out or the language for the prescriptive approach was divorced a

little bit.

MR. ELEY: Well 143(b) is not the prescriptive requirements. They are in 143(a).

MS. DUNHAM: Okay.

MR. ELEY: 143(b) is the tradeoff procedure.

MS. DUNHAM: Okay. Well either way a tradeoff is, in layman's terms, a prescriptive approach. Something other than tearing off, putting on an R-19 and putting on a cool roof. So in my opinion that's just a matter of semantics. But regardless, in 143(a) then, Table N2.1, if it could somehow be included and be more transparent to those of us who have to carry it out.

The other thing that has jumped out at me when I have looked at some of the responses and reviews is that there are many special interest groups involved. I as a roofing contractor am certified for 25 different roofing assemblies. I can put on a single ply, I can put on a built-up. I can do tile, I can do anything. And I can meet the requirements in many, many different ways.

I think that lobbying should be set aside and that as many options as possible should be available so that the property owners aren't

forced to spend a lot of money needlessly. And the more options the better. Someone might prefer a certain type of roof over another and that shouldn't be mandated. So the more tradeoffs, the more prescriptive approaches that are available while we can still comply and minimize the urban heat island effect the better.

So that is essentially my comment and I'd appreciate that being kept in mind throughout the process. Thank you.

MR. FLAMM: Okay, any more comments on this topic? If not --

MR. ARENT: One more.

MR. FLAMM: One more. Okay, thank you.

MR. SALAZAR: Jay Salazar, City of Vacaville, California Building Officials.

Just one thing to consider about raising roof mounted equipment and putting on rigid insulation. Every city has zoning requirements that typically limits the height of roof-mounted equipment to the height of the parapet or line of sight. So you may be setting up the roofers here providing them an almost prescriptive type package where they are going to end up fighting with the local planning division or department over the

height of equipment.

So I would just recommend that staff take another look at that issue and make sure that -- they may want to contact a few jurisdictions and a few zoning departments regarding this height of roof-mounted equipment issue and adding rigid insulation. Thank you.

MR. HODGSON: Mike Hodgson, CBIA. I'm not talking about roofing. A quick question for Charles and Mazi in that there were comments put in November and also again in May to the record on the steel-framed insulation tables and cost assumptions.

MR. ELEY: Yes.

MR. HODGSON: And I was wondering if there was a response to any of those concerns or the proposal, the alternate proposal that was offered.

MR. ELEY: Well we haven't made formal response but the cost of the steel framing in the spacing is not really relevant because none of the, none of the measures that are the basis of the recommendations require that we change the steel framing or, you know, go to a thicker stud or change the spacing or anything.

Basically what we found with steel framing was it was, it was cost-effective to add a rigid panel outside, continuous insulation. And you can do that, you know, with any, with any frame. So basically the cost of thicker framing versus thinner framing is just not relevant to the analysis that we did.

MR. SHIRAKH: So Charles, I think ConSol forwarded the report that Mike is talking about, it's two or three pages. I think we need to --

MR. ELEY: We'll just prepare a response.

MR. SHIRAKH: A response to that.

MR. ELEY: Okay, we'll do that.

MR. HODGSON: That would be great. And Charles, just for background, the interest there is multifamily, it's really not residential. It's the four to seven story structure. A lot of that may not be able to be wrapped because of some of the issues with structural panels and so i would appreciate a dialogue with that so that we could make sure that we're on the same discussion point.

MR. ELEY: Okay.

MR. HODGSON: And there are some contact names for you there within the text of the letter.

MR. ELEY: Okay.

MR. HODGSON: Okay, thank you very much.

MR. ELEY: Okay. Basically moving on to the --

MR. SHIRAKH: Excuse me. There's chairs available up here if anybody wants to go sit up there instead of standing.

MR. ELEY: Those are usually reserved for the Commissioners.

Okay. Basically to summarize the cool roof requirements. And these were, the analyses of these measures were in Hashem's report. I believe May '06 was the, was that the correct date?

DR. AKBARI: May 18, 2006.

MR. ELEY: Okay. We left out the 18th. May 18, 2006. Essentially in the previous standards we have specified an initial reflectance of .7 and an emittance of .75 for low slope roofing applications. But when you, but when those numbers go into the building envelope tradeoff procedure or when they go into the compliance calculations we don't actually model to .7, we model to .55 because there is an assumption that as the roofing membrane weathers it will, it

will lose some of its reflectance.

So the requirement has been modified now so that basically there is an aged, the requirement is specified in terms of the aged reflectance of .75. And if you have, if you have a product with Cool Roof Rating Council aged numbers you can then use that to comply with the .55 requirement.

If you have a product that has, where the aged numbers aren't yet available because it takes at least three years to generate the aged numbers, you can still use the initial reflectance. There is an equation in the standard that will determine the aged reflectance based on, based on the initial reflectance. Basically if your initial reflectance is .7 you end up with an aged reflectance of .55. It's the equation that's in there.

So this is, this is the requirement for climate zones 2 through 15. There is also an alternative to having a reflectance of .55 and an emittance of .75 you can comply by having a solar reflectance index or SRI of 55. And the SRI doesn't have a decimal in front of it, it is just a number between zero and 100.

So there's not a lot of changes for the low-slope, nonresidential applications. It is mainly just an adjustment of the aged versus the initial and the substitution of the SRI for a different kind of tradeoff that was, that was in the '05 standards.

For high-rise residential low-sloped roofs the same requirement applies but only for climate zones 10 through 15, not for, not for the other climate zones.

And then for steep-sloped roofs the minimum aged reflectance is .25 with a .75 emittance or you can meet this with aged SRI of 25. So that's basically the summary of the cool roof requirements.

So essentially the requirements are being proposed to be added for residential, for high-rise residential low-slope and also for steep-slope residential and nonresidential.

MR. FLAMM: Bruce is going to make a presentation. But I think before we ask questions --

MR. ELEY: You're going to cover res, both? Why not.

MR. WILCOX: As I said this morning, the

work that we are presenting here actually represents a lot of work by a pretty big crew of people. Staff, consultants and a lot of comments and work by industry people who have been very helpful in getting the stuff to be as good as it is.

Okay. So I'm going to talk about residential, low-rise residential cool roof. You all know about climate zones but the requirements are specific to specific climate zones. And the climate zone map can be found in all the documents. We're talking a lot about climate zone 11 and 13 and 15, which are the Redding and Fresno and Palm Springs and the southern desert areas, just to get you, just to get you oriented.

So the current proposal for low-rise, steep-slope, new construction prescriptive requirement is basically what Charles just said, .25 aged reflectance, .75 aged emittance in climate zones 11, 13 and 15. The ones I just pointed out there which are the hottest desert climates. SRI of 25 meets that.

For alterations there is a sort of a different set. Partly because the life cycle cost of the alterations cases is higher since the other

efficiency measures are not as good. The requirement says .2 reflectance aged, .75 emittance, and it is in more climate zones, 10, 11, 12, 13, 14 and 15.

And then in alterations, since we're assuming that the alterations are often done as a separate item and there aren't a lot of options for tradeoffs and no real basis for performance calculations we're giving a variety of prescriptive equivalencies that can be used. So if you just want to trade, if you just want to change out a roof you can do other things. Like if you show that there's no ducts in the attic or that you install R-30 insulation, et cetera, that that can be an equivalent situation to installing the prescribed cool roof.

And for low it's similar or the same requirement as in non-res. And we're saying that it applies in new construction and in alterations both in climate zones 13 and 15. And again, if you have don't have ducts in the attic space under the roof, or in some cases if you insulate the roof deck, that can be an equivalent process.

There has been a proposal for a low slope ballasted roof exception for these

requirements. We did analysis and have concluded that in fact it is an equivalent. This is a plot that I am going to show several that look like this where you have the TDV value, which is the annual energy metric that we used for evaluating seasonal or annual combined heating/cooling energy use. That's plotted here. Higher numbers are more energy used. And across the bottom here we have roofing layer mass and pounds per square foot. And the lines are the reflectance of the roofing, the aged reflectance. So .08, this is the blackest roof, .20, .25 and so forth.

Our proposed standard here is a .55 aged reflectance. If the cases below that line comply and if they're above that line they don't. The added -- If all these lines were below the criteria by the time you got over here to 10 or 15 or 20 or even 25 pounds per square foot then it would make sense to have that exception. But in fact they are not. And this is in climate zone 13, which is sort of the average, not the worst climate zone. So we are not proposing to include that exemption.

For steep slope new construction the life cycle cost analysis is like this. The first

cost premium is .25, 25 cents per square foot. I'm sorry, the first cost premium of a .25 aged reflectance shingle is 35 cents per square foot. That is what this is based on. And if you use that and you compare it to the cost, the life cycle cost savings per square foot of roof, we have a positive savings number in those three climate zones that we're proposing for the standards. This is done on a 1761 square foot prototype standard analysis situation.

On the steep slope alterations case we're doing it for a .2 aged reflectance with 31 cents a square foot. In this case the life cycle cost savings are much bigger because we're assuming that a house built in 1986, '81 -- '83 is the house that's being used here. It has much lower levels of insulation and duct insulation and duct ceiling and all of the things that interact with the attic. So the savings are bigger in the older houses.

For new, low slope construction in low-rise residential the first cost premium for .55 aged we said is 50 cents. And we achieve those savings in climate zones 13 and 15 but not in 10, 11 or 14. So that's the basis for the proposal

that we require them in 13 and 15.

So one of the significant things that we're proposing as a change here -- This is not a change in the proposal, this has been central to the proposal, it has been presented several times over the last couple of years, is we have developed a new simulation module for calculating the interactive effects of all of the efficiency measures in an attic roof system. The proposal is that that be integrated into the compliance software so that builders can do the performance analysis and make the tradeoffs between all these measures as part of their standard compliance approach, just like they do now with wall insulation and air conditioner EER and so forth.

So these are the major components of this attic model. You have the -- We're showing a half of a section here. You have the attic, the roof deck, the ceiling, and down here is the conditioned space in the house. And the model includes solar radiation, which is the biggest driver, convection and radiation back off the outside of the roof, which is also a major heat flow. We're simulating ventilation through the attic, conduction and infiltration through the

ceiling, and the interaction of the duct system in the attic with all the attic environment.

So this is actually a major change in residential performance calculations, to actually be able to do an integrated calculation that has all of these factors that interact with each other. And you can get the effect of changing the roof reflectance on the duct efficiency as part of that calculation.

Partly I'm talking about this because in California a very large fraction of all the houses use these performance simulation calculations to comply for new construction. So most of the, of the essence of the building code and where it's impact is is in the calculations in these performance models.

So these are the components and inputs for the roof deck part of that attic model. You have the reflectance and emittance on the outside of the roof, the roofing mass and conductance. There can be an insulation layer underneath the roofing and then you have your roof deck, the structural part.

We also allow for having an insulation layer below the roof deck. There are some systems

that work that way. We include the effect of framing. The framing path through the roof is explicitly modeled separately from the path through the insulation. And the emittance of the inside surface, whether it's insulation or the bottom of the roof deck, is a big factor and that's where the radiant barrier goes if there is one.

So one of the, one of the things I wanted to focus on here were things that have changed since the previous times we have presented and discussed this proposal with industry. And this is one of the, one of the things that we've recently decided to do is change the way we're treating tile systems. And this actually is a result of some comments we got, mostly and originally from Hashem Akbari about how tile roofs worked and what the critical factors were.

But if you look at these three kinds of roofs here we have our shingle roof in which you have the roof deck and then you have the roofing. And it's basically installed flat on the roof and there is no, there is no air space there to speak of and the shingles are flexible so they fit down tight. It's all basically nearly one temperature.

It's almost like it's a homogenous thing. It's not homogenous but it's very uniform in temperature.

The second system here I'm showing is a section through a tile roof that's installed over battens. And this is one of the common systems that is used in California with concrete tile. And you have these tiles which are always put down with overlapping -- actually the roof should be pitched this way. I made them horizontal here just so we could line them up next to each other but they do drain in normal application, as all you roofers would know.

And one of the important issues here is this air space that is underneath the tile. The tile can get really hot and in order for the heat from the tile to get down into the roof deck and through into the attic it has to jump across this air space. And since it's heat flow down it is mostly a radiant exchange issue and the air space is a significant resistance.

This is the case that is in question here, which is the case where you nail the tile directly to the roof, no battens involved. Our previous proposal was based on the assumption that

this system was basically the same as that system. If you nail the tiles straight flat on the roof that it's, there isn't a significant resistance, it performs like a shingle system.

And Hashem -- We had a meeting a month ago and Hashem made a very strong case that in fact this direct nailed tile system was actually very close in performance to the tile on batten system. Much closer to that system than it was to the shingle system.

So I've thought about that a lot and we've talked about it and talked to various people in the industry and concluded that that seems to be in fact the correct thing to do. So the change that we're making here is that we're proposing to treat both of these systems essentially the same.

There may be a slight difference here, there may be, you know, ventilation effects that are not, that are in addition to this. But from the point of view of how this system performs in the sense of heat transferred down between the tiles and the roof deck we are now saying that we're going to say that all the tile systems have the same, essentially the same resistance in this space. And that changes things a little bit in

terms of what we're going to propose.

So in terms of these performance calculations the critical items are what we call the standard design, which is when you have a house that you're going to propose for compliance in the standards you calculate, the energy performance of that house, including all of the things that are going on with it.

And you do a second calculation of what we call a standard design version of that house. The standard design version of the house has, all the features in that are set according to the prescriptive standard using what we call the standard design values. So these are the standard design values that are going to be in the performance path for new construction, steep slope, low-rise residential.

So for asphalt shingles it's straightforward. We have a prescriptive standard for those of .25 reflectance and we're going to assume that it's .90 emittance, which is the typical value for asphalt shingles. And then if you have -- And that's in climate zone 11, 13 and 15 where the prescriptive standard, there is a prescriptive standard. So that defines what this

is.

All the other zones there is no prescriptive standard. We are not proposing that there would be on there. But if you are going to do performance analysis you're still going to have to take account for the performance of the roof and the attic. So the proposal here is if your proposed roofing system is lightweight, less than five pounds a square foot. We are going to assume it's asphalt shingles at the default asphalt shingle values, eight percent reflectance and .9 emittance. And if it's a heavy roof, basically if it's a tile roof, we're going to assume it's concrete tile at 15 percent reflectance and .9 emittance.

So the alterations case is similar. In fact it's basically the same except that the values, there's an error there. That should be .2 rather than .25. But it's a straightforward application of the rules there.

And in the low slope for 13 and 15 roofing weight is going to be a lightweight built up roof, .55/.9. In all the other zones it will be a reflectance of .1, which is the default case. So what this means is that if you're in one of

those other zones like climate zone 12 right here and you do a performance calculation you come out exactly dead even if you default your roof to the normal roof. Because there is no, there is no requirement here. Whatever a normal roof is, is exactly what the requirement is. It's neutral.

If you want to put in a cool roof in climate zone 12 then you can put in your .55/.90 in the performance simulation and compare it to this .10 reflectance roof and get a positive credit. That's the way the performance tradeoff stuff works.

Again, this is the standard design, lightweight roof. The factors are all laid out here. One of the issues here is that when a radiant barrier is required in the prescriptive standard then your standard design has a radiant barrier and the emissivity of the bottom of the roof deck is .05, otherwise it's .9. So that's one of the interactive issues.

And here is our tile standard design roof. It's got a reflectance of .15, it's got ten pounds a square foot concrete tile. And we're going to assume the air space resistance is .85 regardless of whether it's direct nailed or on

battens. That's the change I mentioned. And depending on whether or not it's in a climate zone that has a radiant barrier requirement it gets a radiant barrier.

So, you know, we're talking about tiles at .15 reflectance. That's a value that is not very difficult to meet. This is a roof, a house I've done a bunch of work on. It's a builder house in Elk Grove and it has a nice, dark gray roof and everything was measured at a reflectance of .18. So these are, you know, sort of very possible, very standard kinds of tiles to meet these requirements at this point.

Okay, so let's look at one of these graphs again. The attempt here is to look at what the tradeoff is between the existence of that layer between the roofing and the roof deck and the reflectance. This is in climate zone 13. We're proposing that the standard design value for this lightweight shingle roof is a .25 reflectance and that establishes the budget essentially. So any of these roofs with a TDV less than whatever that is, 86 and three-quarters or something like that, would comply and get a positive credit in the performance standard.

And that basically is anything with a reflectance of, well anything. You can see how the reflectance pays out. And then if you do any of the, if you were to do an insulated roof deck system. It's the same climate zone, same situation except now we're talking concrete tile. You end up with basically we're giving you the .85 R value for the air space so tile of any reflectance would actually work in climate zone 13.

If you move the same thing to climate zone 12 where there is no requirements then we set the shingle value at .08, and that's the standard design value for lightweight roofs. Everything else can get credits if you want to do either, particularly high reflectance roofs.

And then if we go to the steep slope tile we're saying now that in climate zones like 12 where we don't have a prescriptive standard the standard design is a .15 -- I'm sorry, the default is .1 reflectance tile. All the tile systems work with the reflectance of .1 or better and get positive credit.

So one of the things that's going on here, particularly on the performance side, is

that this is a big change in how roofs and attics are treated in the performance standards. At this point the whole thing is just the U-factor. You have the Joint Appendix in the ACM Manual that lists assemblies and standard U-factors for all kind of roof, attic, roof deck combinations with their ceilings and that is the basis for the compliance. And they're look-up tables and they're all combined all the way from the conditioned space through the roof deck.

So, you know, the problems with this approach from the cool roof point of view is that reflectance and emittance are not part of the equation at all. Interactive effects are not calculated, et cetera. So the change here is to try and upgrade the calculation to include that stuff.

And we're actually in this new attic model each surface is dynamically modeled. The roof deck separate from the ceiling and the structure is separate from the roof deck between the structural members. So in order to do that we need to have layer by layer thermal properties for the roof deck, the ceiling and the attic structural mass. We are also accounting for air

flows between the house and the attic for attic ventilation. It's a much more detailed and interactive model.

And the input structure for the performance program is a lot different. It's a combination of inputs that are free variables like the reflectance of the roofing, which is you put in the certified age reflectance. But for construction layers, like in this case we have roofing mass choices, the proposal here is that they are a specific set of defined cases and you select from those.

So all you need to know is that you're going to use concrete tile. And you pick the concrete tile case and the software will set up all the properties including these obscure factors like the volumetric heat capacity and the conductivity of the materials and so forth. And the software basically automatically assembles and populates the attic model for you.

There's also the changes in the duct system input slightly. Mostly it's not changing. They are now simulated as part of the attic and part of the attic energy balance. So when the ducts lose heat in the wintertime to the attic

that heats the attic and part of that heat is recovered and reduces the heating load in the building. All of those interactive effects I think are done at a pretty good first level.

Okay, so that's the story with the residential cool roof stuff.

DR. AKBARI: Can you go to slide number 13 or number 14. I have a question, please.

MR. WILCOX: Okay, 13, is that what you said?

DR. AKBARI: Thirteen, yeah. I think it's 13. Yes. Go one more. That's the one.

MR. WILCOX: Okay.

DR. AKBARI: Hashem Akbari, citizen of California. The comment that I am making about this particular slide is the following. I understand as a person who knows a little bit of heat transfer that the thermal performance of the tile system is better in moderating the ambient air than shingles, as an example. But I also understand that to the variety of measurements that we have done and the data available there are an ample number of products out there with a solar reflectance for the tiles of .25 or higher.

Selecting a standard which is less than

that is --

MR. FLAMM: Hashem, some folks can't hear you. Can you come up to the podium.

MR. WILCOX: Why don't you come up to the podium, please.

DR. AKBARI: Sure. I would repeat from beginning. The comment is the following. That there are quite few products, tile products out there with a solar reflectance of .25 and higher. If I dare to guess I would say perhaps over 30 or 40, perhaps 50 percent of the California market share in the tile.

By selecting solar reflectance that is much, much lower than what 30 or 40 percent of the market already is doing we are really rather than encouraging the state of the California and the pioneering manufacturers in their marketing of their good quality products, we are discouraging them from those marketing.

Basically any tile right now we are recommending is a cool tile. And I as a California citizen, I have difficulty understanding that. And I would like to strongly urge that that .15 to be increased for the tile in all other climate zones to .25. Thank you.

MR. SHIRAKH: Now Hashem, you understand that the .15 is for climate zones that do not have a cool roof requirement? That's just a --

DR. AKBARI: I understand that, I understand that. But it still seems there is no incremental cost for these cool products with the solar reflectance of .25. Cool tiles would be cost-effective at the solar reflectance of .25 everywhere in California. That is the comment that I make. The products are out there, they are already being sold. So that's the comment.

MR. FLAMM: Before I get everybody to come up and comment. The gentleman over there behind Bruce, you had the load letter with some graphs. I'm going to call upon you first.

And then I'd like to get a show of hands. How many people want to speak on this topic?

Okay. How many people want to go home tonight? (Laughter)

What I'd like to suggest is that as we -- and Bruce, you want to say something, right? Okay. What I'd like to suggest is that we start on this start of the room and have one or two people waiting in the wings all the time so we can

keep moving this and then work around the room and make sure everybody gets a chance to speak. Okay?

MR. CRAWFORD: Good afternoon. Is this mic really working very well?

SEVERAL PEOPLE IN THE AUDIENCE: Yes.

MR. CRAWFORD: Okay, then we already know that it's good afternoon. I'm Greg Crawford with the Cool Metal Roofing Coalition. I'm the Executive Director. I have ten minutes of remarks and we have already submitted the written remarks to staff.

The Cool Metal Roofing Coalition is a group of manufacturers and retailers that produce and sell products with cool pigment technologies and unique designs that help California reduce energy consumption. We view our energy efficient technologies, reflective pigments and cool metal roofs, and a beneficial airspace with Above Sheathing Ventilation as being part of the solution to reduce peak energy demand, mitigate urban heat island effect, and to help California meet greenhouse gas reduction targets. And the technologies offered by the Cool Metal Roofing Coalition provide these benefits while maintaining the roofing colors and consumer choices that are

desired throughout California.

Our coalition has actively engaged in the process to update the Title 24 building energy efficiency standards and we look forward to continuing to work with the CEC staff and Commissioners to be part of the solution in California. On July 10, 2006 we submitted a detailed Measure Information Template with our recommendations for prescriptive standards for cool metal roofs, and on March 7, 2007 we provided our recommendations to incorporate the benefits of Above Sheathing Ventilation.

We would like to take this opportunity to thank the Energy Commission and CEC staff for all of their efforts to work with affected stakeholders to collectively find cost-effective strategies to reduce energy demand. In particular we appreciate that the proposed standards incorporate the suggested .25 TSR, which US EPA ENERGY STAR program states can save up to 40 percent in cooling energy. We appreciate new language that recognized the substantial energy savings of at least a three-quarter inch airspace being added to the roof deck. We also appreciate the use of updated cost numbers that accurately

reflect current market costs.

We would like to continue to work with staff and Commissioners to address two outstanding issues; One is the need to exclude additional climate zones that are not cost-effective for low-slope nonresidential applications; and secondly, the application of ASV, Above Sheathing Ventilation, to new construction.

You may refer to the graph that's on the screen as far as the cool roof prescriptive requirements for low-slope nonresidential. We are in agreement with the cost-effective study that was performed as noted below.

This analysis that assumed a 50 cent per square foot cost premium for cool roofing, and you can see that as the red bar going horizontally across the screen. This analysis assumed the 50 cent per square foot cost premium for cool roofing indicated that zones 1, 3, 5 and 16 should be excluded because cool roofing is not cost-effective in those zones. Furthermore, zones 4 and 11 are not cost-effective unless the equipment savings unless the equipment savings are included.

Our position is that zones 1, 3, 4, 5, 11 and 16 should all be excluded form the cool

roof requirement. The rationale presented at the May 17 meeting by CEC that zones 3 and 5 should not be excluded because cool roofs are required in these zones in the 2005 Title 234, and that there was to be a tradeoff given in these zones with regard to the prescriptive insulation requirement, is not justified by the CEC analysis, as illustrated above and as you see on the screen.

The position that these zones should be included because they are in the 2005 is not consistent with the recent CEC analyses with the most up-to-date cost numbers as illustrated. In fact, if one looks at the analysis done for the 2005 Title 24 and uses the same cost premium of 50 cents per square foot, even more zones, 2 and 12, would have been excluded, as illustrated below.

We also do not agree with the policy decision to include equipment costs in the analysis. This is not consistent with the assumptions made for all other roofing types and does not seem like an equitable standard. (It would be a particularly unreasonable assumption for alterations where more efficient equipment will not be likely considered by building owners when making decisions on a new roof covering.

With regard to the proposed tradeoff in zones 3 and 5 with insulation requirements, we are reviewing the recent report on this and are not in a position to evaluate it at this time. But it would be more consistent and reasonable to see the cool roof and insulation prescriptive requirements stand on their own merits rather than being artificially included -- rather than artificially including zones in this manner.

We strongly recommend that the additional climate zones 3, 4, 5 and 11 be excluded from the 2008 cool roof requirements for low-slope nonresidential.

Regarding the second area, Above Sheathing Ventilation. The Cool Metal Roofing Coalition strongly supports the proposed language in the template submitted by the Metal Construction Association in March 2007. We feel that the cooling benefit from the Above Sheathing Ventilation has been scientifically demonstrated and that the CEC has not fully included the six-year PIER/Industry research project results.

The CEC's proposed cool roof equivalence for alterations, R=.85 or greater above roof deck thermal resistance over a vented attic, represents

the thermal resistance offered by a three-quarter inch air space. The submitted study by ORNL demonstrated that the natural convective air flow occurs in the air space created from roofing products that are offset mounted. This passive cooling mechanism is supported by the laws of thermodynamics. The research shows that ASV is a viable prescriptive equivalence for cool roofing.

As mentioned above, we appreciate the language that recognizes the energy efficiency benefits of a three-quarter inch space above the roof deck for reroofing alterations applications. And we strongly recommend that the ASV also be applicable to new construction as well as alterations, as proposed in the March 2007 Measure Information Template for ASV. We support the wording as presently included in the proposed 2008 standards and look forward to presenting additional substantiating research results on this topic.

Thank you again for taking the time to incorporate stakeholder input and to work together to reduce California's energy consumption and associated climate change emissions while also allowing the use of roof colors desired throughout

California.

We hope that the California Energy Commission will continue to work with all of us. Our only outstanding issues are the need to work together to address the exclusion of climate zones 3, 4, 5 and 11, and if possible provide additional feedback on this today.

And we would also greatly appreciate your thoughts and direction on helping to realize the energy savings and greenhouse gas reductions for applying Above Sheathing Ventilation for new construction.

So to recap -- Or I need to mention one other thing. We have provided -- These won't be part of our oral comments today but we provided a short addendum with some editorial suggestions for the Title 24.

In recap, we would like to thank again the CEC staff for working with affected stakeholders. Thank you.

ADVISOR PENNINGTON: Greg.

MR. CRAWFORD: Yes.

ADVISOR PENNINGTON: At one point I think you misstated the rationale that the Commission has for not changing the requirement

for climate zones 3 and 5.

You kind of indicated that you hadn't had a chance to look at the additional analysis that we were considering that was part of our rationale. So you kind of acknowledge that we had an additional rationale but you didn't --

MR. CRAWFORD: We haven't been able to look at that as yet.

ADVISOR PENNINGTON: You didn't say that when you were summarizing our rationale.

So just to be clear, what we looked at in the analysis for climate zones 3 and 5 was if we did not have a cool roof requirement in those climate zones then in looking at what would be cost-effective for insulation, the insulation requirements would go up considerably versus them having a cool roof requirement.

And the energy consequence of having the insulation requirement go up considerably would be very close to the same energy consequences as if you left the cool requirement there.

And so since California is, a big part of California anyway is a performance standard, the performance standard essentially wouldn't change if you made that switch. You know, you

base it on insulation instead of basing it on cool roofs. So from that vantage point we're concerned about there really being value in making that change.

And a second consideration is that we're anticipating that the economic advantage of having air conditioning savings that we will see in future updates of the standards is going to go up dramatically as a result of climate change and the results of electricity prices going up. And so what we anticipate is that in the future there would be no question that cool roofs were cost-effective in those climate zones.

So we think it would be disruptive to go from a requirement in 2005 that has a cool roof requirement to a requirement in 2008 that did not but had a higher insulation value that was energy equivalent, and then in 2011 go back to a requirement for cool roofs in climate zone 3 and 5. We think it is much less disruptive and a better message to keep the current requirement for cool roofs in those climate zones. So that's the explanation.

MR. CRAWFORD: I understand. And we have reviewed this internally and wanted again to

look at the insulation requirements and get to understand this a little bit better. But we wanted to bring this up as a strong concern as yet about those two climate zones.

Marty or Scott, did you have any additional comments to offer?

MR. SHIRAKH: I just want to reiterate one thing that Bill said. That 98 percent of non-res in California is performance. And whether you have insulation in those climate zones or cool roof it doesn't really matter, I mean, it's equivalent. So, you know, if somebody wants to put in insulation rather than cool roofs it's the same thing.

MR. CRAWFORD: Okay, okay, very good. Thank you, Bill. Any other comments or questions of me?

DR. AKBARI: May I be on the record in here that -- Hashem Akbari from Lawrence Berkeley National Lab.

Within the last two months I have received tons of information and a lot of letters that have been sent to the Commission seriously questioning the validity of the cost number that is being provided by ARMA for many applications

these letters suggest that the cool roofs without even considering the energy benefits of it, just because it's a different roofing system. For many roofing applications on a net annualized cost it would be cheaper than the roof that has the lowest cost.

So I strongly urge the Commission to bring down the cost of the cool roof from what it is being considered right now to less than 20 cents per square foot. That way cool roofs would be cost-effective in the entire California. And that is being supported by people who are actually installing cool roofs.

MR. GREAVES: I'm Gerry Greaves, I'm with Owens Corning and I have three I think brief points of clarification. And the first one is in Section 151(b)(1)(G)(1), which is the alternatives to the cool roof and the steep slope residential. And there are three alternatives listed, A, B and C. And the only point that I wanted to clarify is, I'm assuming that it's either/or any of those three, not requiring all three.

MR. SHIRAKH: Right, and the lady brought up that point. I'm sorry, I forgot your name.

MS. HARDY PIERCE: It's Helene.

MR. SHIRAKH: Helene.

MR. GREAVES: So we're okay?

MR. SHIRAKH: Yes. We'll fix that.

MR. GREAVES: The other question I had in that area, in some discussions in the past we talked about homes that do not have air conditioning being included in either an alternative or an exemption in that section. I notice that is not in the thing and I just wanted to understand the thinking on that.

MR. SHIRAKH: These are very hot climate zones where these are required so it is very unusual for a house not to have air conditioning in a new home.

MR. GREAVES: Well these are, these are reroofs.

MR. SHIRAKH: Reroofs, okay, let me, I have to think about that.

MR. GREAVES: Okay.

MR. WILCOX: Are we talking residential here?

MR. GREAVES: Residential, steep slope, alterations.

MR. WILCOX: I think it says if there's

no ducts in the attic you're exempt, right?

MR. GREAVES: Right, there's no ducts in the attic. That's one of the --

MR. ELEY: Then if there's no ducts --

MR. SHIRAKH: So if you don't have air conditioning you don't have ducts.

MR. GREAVES: But if you just don't have any air conditioning.

MR. ELEY: Well if you don't have ducts in the attic you probably don't have air conditioning.

MR. WILCOX: That's sort of assumed to be equivalent, in California anyway.

MR. GREAVES: Okay. I just thought maybe it would be worth thinking about clarifying that and explicitly stating it.

MR. WILCOX: I don't have any problem with that.

MR. SHIRAKH: The problem is it can be gamed. I mean, if there is ducts in the attic they can add an air conditioner there at any time. The next owner is going to move in and they're going to, they're going to add an A/C unit and you lose that opportunity. If there is no duct system then it's going to be much costly.

MR. GREAVES: And the last one I think is a typographical error. It's back in Section 118(i)(2), the equation for calculating the aged reflectance.

MR. SHIRAKH: Right.

MR. GREAVES: And there's a one-minus at the beginning of that, which I think is a typo. That's all I had.

MR. SHIRAKH: Okay, thank you.

MR. HITCHCOCK: Hello again, Reed Hitchcock representing the Asphalt Roofing Manufacturers Association. First I did want to recognize once again the efforts of the CEC staff after what Greg said, particularly Pyam, Mazi, Bill Pennington, Bruce Wilcox and Charles as consultants.

It is apparent that industry is being heard when we compare what we are seeing today versus what we saw about a year ago in this process and we appreciate that. We would like to thank the staff for their cooperative nature in this process.

There is one concern I'd like to raise, however, and that is as part of this 2008 revision process ARMA has submitted a number of documents

to which we have had no official response from CEC. And just to lay those out there was a July 10 letter on cost-effectiveness, a July 10 -- and this is 2006. A July 10, 2006 on proposed increases in insulation. A July 10, 2006 letter on life cycle costs.

April 10, 2007, a measure information template on prescriptive tradeoff alternative of insulation for roof reflectance. April 10, 2007, measure information template on the inclusion of solar reflectance index as an alternative to reflectance and thermal emittance requirements.

And most recently May 25, 2007, a letter from ARMA's council, Jim Mattesich, which outlined a number of specific questions and proposed revisions to the information presented at the CEC stakeholders workshop on May 17. That letter proposed a regulation that we believe addresses the mission and concern of the CEC as well as meeting the needs of the people of California.

My question is whether this letter and our proposal have been considered and whether the CEC was planning to respond formally to that letter?

ADVISOR PENNINGTON: We normally don't

respond formally to every letter we get into the docket. We consider all that in developing a proposal and then vet that proposal. So that's our practice.

MR. HITCHCOCK: Okay. You know, one of the things I heard earlier, I think Greg raised it or I forget who raised an issue earlier about concern over no response to a measure information template and there was discussion of responding to that. I guess there is a feeling that a lot of the stuff goes into thin air with no response.

And in that particular letter, when we were at the stakeholders meeting we certainly indicated that we would try and turn around our comments as fast as possible, with the understanding that you all would try and get back to us as soon as possible on that, given the very short time period in-between.

So I just had a little bit of concern about that. But I do want to reiterate that we appreciate the opportunity to engage and be a part of the process as a meaningful partner in the development of these regulations. And certainly any dialogue that can continue on some of those concerns that have been raised we would

appreciate.

MR. SHIRAKH: I saw that letter about a week ago when you sent it to us.

MR. HITCHCOCK: That one, it was sent on the 25th.

MR. SHIRAKH: Did you have any specific reaction?

MR. HITCHCOCK: I mean, I can get up here and read the letter if you want me to. I didn't think you'd want to do that.

MR. SHIRAKH: So that letter is basically it?

MR. HITCHCOCK: Yeah, I mean, there's a lot of comments in that letter that address -- Very little has changed between the stakeholder workshop and this meeting, if anything, that we addressed in the letter. So I think that the points made in the letter remain. And if, you know, if you'd like to discuss that further I'm happy to do that.

MR. SHIRAKH: We can read it.

MR. HITCHCOCK: Okay, thank you.

MR. GONZALEZ: Thank you. David Gonzalez with Greenberg Traurig. I am here today serving as counsel to ARMA, the Asphalt Roofing

Manufacturers Association. I'd first like to thank the Commissioner for the opportunity to do some public comments here today on these important regulations that we're going to be working on for awhile.

But I wanted to ask a quick question for clarification. It is my understanding that the current proposed cool roof regulations that are being proposed that are on the website right now, that that's a draft. And that there's going to be opportunity for us to work with you in the development of that language and there is going to be further dialogue for any appropriate amendments that might take place. Is that the correct understanding?

MR. SHIRAKH: It is a draft, it hasn't been adopted by the Commission, and we have been working with industry for a couple of years now.

MR. GONZALEZ: Okay.

MR. SHIRAKH: That will continue until it's adopted.

MR. GONZALEZ: It is encouraging to hear and we look forward to working with you on this proposed language that you have right now. But I would like to note some of the frustrations that

we have had thus far. I understand that up until now it has been an informal process. We have been doing workshops and there isn't all the APA requirements. But we have had some frustrations in working with you and providing information and getting some responses to that.

Just as an example for today. Those significant amendments that were done to the cool roof standards that were just posted on the website literally today. So in terms of workshops like this it is very difficult for our association to provide you feedback in a forum like this and to engage in a dialogue.

I understand that there is going to be more opportunity but you can understand our concern when the day of the workshop we see significant changes to the proposed regulations.

MR. SHIRAKH: The standard language was posted on Friday of last.

MR. GONZALEZ: It is my understanding that it was just posted today on the website.

MR. SHIRAKH: No, it's been -- It was posted on Friday of last week. And we sent an e-mail too.

MR. GONZALEZ: I'm sorry, the supporting

documents were --

MR. SHIRAKH: The residential ACM, that was posted today. But the main requirements are in the standards.

MR. GONZALEZ: You're right, my mistake.

MR. SHIRAKH: And that was posted on Friday and we sent an e-mail to everyone.

MR. GONZALEZ: It was my mistake, the supporting documents were just posted today. And we hadn't had a chance to review those and we'd like to discuss that with you.

Secondly, as was noted earlier, we submitted multiple correspondence and have not received much input back as to that. You know, we don't want to be viewed as a no-no to you, we really want to be proactively engaged as partners with the Commission and staff on these issues. We're not here to be obstructionists but we are really here as a resource of information. We want to be partners with you on this but we want to be proactive and relevant partners. And to the extent that we can engage with you in a dialogue to work these things out we'd rather have this be a partnership and engage in a meaningful dialogue with you.

All that being said, I have to note that we still have some serious concerns about the current draft. And before getting into the specifics of that I would turn it over, if it is okay with the Commission, to Philip Dregger and John Goveia with Pacific Building Consultants to bring some of those concerns out. They are not all of our concerns but we just wanted to highlight some of the things that we have been discussing internally regarding those standards. Thank you.

MR. DREGGER: Phil Dregger, Pacific Building Consultants here on behalf of ARMA. Actually I wanted to pick up a little bit with you, Charles, and the nonresidential low-sloped -- Let me -- We ended with some questions regarding the alterations and the adding the R-14.

I asked about some life cycle cost information then and I kind of thought we were going to get to it. But I didn't see any assumptions on life cycle cost savings or life cycle costs associated with that change. And let me just -- Like in 2005 you could reroof and not add insulation. In 2008 it is proposed to reroof but add R-14.

MR. ELEY: If there is no insulation.

MR. DREGGER: Well, if it's less than 19. Which in my experience, most buildings have less than -- Well, a large number have less than -19. So I guess, do we -- So I'm interested in finding out what the life cycle cost savings and costs were. And then obviously the backup information just so we could, you know, comment on the reasonableness of it, that sort of thing. That's my first question. Do you have anything offhand to give me a handle as to what was assumed?

MR. ELEY: We could forward that information. It's not on the website now. You did this study two weeks ago, John?

MR. ARENT: We used the same cost assumptions as far as the --

MR. ELEY: Introduce yourself.

MR. ARENT: This is John Arent, I'm with Architectural Energy.

We used the same continuous insulations costs that we did in the analysis for new construction. So the difference, here we were comparing a baseline of having R-19 insulation to start with as your reference case. So if you

already had R-19 insulation or greater we asked the question, is it cost-effective to add more insulation above the deck and answer for that was no. But in the case of not having insulation it was cost-effective to add insulation above the deck. So the --

MR. DREGGER: So you --

MR. ARENT: I'm sorry, just to finish up. That analysis, those tables haven't been formally I don't think posted and they should be. But the cost assumptions were the same as those used in the analysis for new construction.

MR. DREGGER: Okay. I guess what I am trying to get -- Because we have been talking about energy savings. You know, say 30 cents to a dollar. You know, numbers like that.

MR. ARENT: Right.

MR. DREGGER: And I guess -- Because I was very curious. When you look at a reroof without insulation, a reroof adding R-14, that's going to be a significant cost difference. I mean like a buck 50, two bucks. I mean, it's a big difference adding insulation. So I'm just wondering what cost assumptions are you assuming there. And there's contractors here that can, you

know, speak to this.

But if you look at a system immediately over the deck versus one with two and a half inches of isocyanurate insulation or something like that, it is more than a dollar. Am I safe?

MS. DUNHAM (FROM THE AUDIENCE): Oh yeah. Two bucks --

MR. SHIRAKH: I'm sorry, you need to come up to the podium.

MR. DREGGER: In fact, Marty, do you want to address this issue at all?

MS. DUNHAM: Sure.

MR. DREGGER: Okay. And then I actually had just some other follow-up regarding, again, some of the similar questions. But just give a chance to -- Again, I'm a consultant and I think I have experience in the area but this is someone who works daily putting roofs on.

MS. DUNHAM: Speaking to adding the R factor.

MR. FLAMM: Can you identify yourself.

MS. DUNHAM: I'm Martha Dunham from Enterprise Roofing Service.

First of all I would hazard an educated guess based on 30 years of experience in this

industry that of existing structures in the state of California that there are greater than 50 percent that have less than an R-19. So you're talking millions upon millions of square feet of roofing where all of a sudden there potentially may be a mandate for the owners of these buildings to expend a tremendous amount of money.

The material alone for adding the approximately three inches of R-18.5 polyisocyanurate insulation is probably around 95 cents a square foot. So with tax and markup over a buck a foot just for the insulation.

Now on a built-up roof you have to put down, and many single plies as well, you can't adhere directly to polyisocyanurate for various reasons, off-gassing, delamination of the fiberglass spacer, et cetera, or to obtain the fire rating. Then you have to go with either a layer of a dry wall type dense glass or fire retardant board or fabric or perlite. Another layer of insulation on top of that.

So you've got twice the labor. You've got to put down one layer of insulation and then a second in many instances. So you're talking about, you know, a tremendous amount of money.

And given the millions and millions of square feet of roofing and the equipment that's mounted upon it all of a sudden you're not just raising the equipment, you're disconnecting and reconnecting the gas lines, you're disconnecting and raising electrical lines, condensation lines, curbs for equipment, sleepers, exhaust fans. It's a phenomenal cost.

And we don't do residential roofing but I am the owner of a, the proud owner of a 1950 home in Pleasant Hill and my particular neighborhood has approximately 260 houses that either look just like mine or are cleverly disguised as a mirror image to look very similar to mine.

And I would say although I've owned it for 25 years I retrofitted A/C into it approximately eight years ago, that 90 percent of the residents in my neighborhood have no duct work in the attic and don't have the financial means to add it. So I think we're getting on very dangerous ground in terms of mandating expenditures.

And also I know there has been a tremendous amount of criticism on some of the

studies that have been done about costs. And I have to say we have put roofs on for 98 cents a square foot and we have put them on for 27 cents a square -- I mean $27 a square foot. So, I mean, you know, I think some of the studies that were done. You know, you could be 100 stories in the air, you could be a wide open football field. You could be a little --

I think that the study that was done by Pacific Consulting Group made a tremendous effort to try and define a baseline for a roof without a lot of frills. I think that that's kind of what you have to do. But many of the people criticizing the validity of figures -- and I did participate in developing, spent many, many hours costing out various scenarios. Many of the critics, you have to consider the source.

I have no vested interest. I am certified for single ply, reflective, coatings, built up roofing, all of that so I have no vested -- shingles, comp, you know tile, the whole nine yards. So I have no vested interested either way.

But when a manufacturer of a particular product, be it single ply or built up or whatever, is all of a sudden stating that I can sit in my

office and say that a roof should cost, you know, $2.50 a square foot versus, you know, $2.75 or whatever, you know, it's a gross over-simplification of many of the conditions that you're going to run into, particularly in a retrofit situation.

And I want to emphasize that the retrofit market in California is huge. It's nice to talk about all this, all these design factors that come into play but in terms of roofing and re-roofing, the economy, you know, takes a dive, as long as it keeps raining all the roofs are going to be wearing out every year and they're going to have to be torn off and replaced. And the retrofit market is a huge part of our business.

You know, we're just trying to be part of the solution but also don't want some mandates to occur where money is being spent needlessly and the options of the people that we're providing pricing to are minimized. So I hope that helps.

MR. DREGGER: Thank you. Again, I'm moving on. So that information hasn't been posted but, Charles, it will be posted shortly?

MR. ELEY: Yes.

MR. DREGGER: Okay, thank you very much.

And then also we talked about the nonresidential low sloped, you know, .55/.75. I didn't see any life cycle cost associated with that proposed change. Is there one coming?

MR. ELEY: Well that was I think in Hashem's report from last year.

MR. SHIRAKH: That was presented during a stakeholders workshop, it was the same justification.

MR. DREGGER: Okay, I just want to make sure I understand. So you're saying that the justification remains the 2002 PG&E report? That's what I'm --

MR. SHIRAKH: Hashem's report.

DR. AKBARI: I just came back from outside. If you'd repeat the question I would appreciate it.

MR. DREGGER: I was asking what was the life cycle cost justification for the nonresidential low sloped, you know, changes in the current, you know, proposed code. And the answer is, I'm sorry, help me out.

MR. ELEY: Basically there were no real changes to the non-res low slope. The only thing

we did is substitute SRI for the equation that was there before.

MR. SHIRAKH: And we used 50 cents instead of 20 cents.

MR. ELEY: Right. The thing that was added was residential high-rise and then steep slope.

MR. DREGGER: Okay, let me briefly -- Well it's in red and so I thought red meant a change. But it's not initial now, it's aged, so in a sense that's a change.

MR. ELEY: Yes.

MR. DREGGER: And also --

MR. ELEY: Well yes and no. I mean, you could still use -- an initial of 70 equates to an aged of 55. So we -- Previously it was expressed as the initial reflectance of 70, now it's expressed as an aged reflectance of 55. They're the same as far as the standards go.

MR. DREGGER: And also prescriptively insulation levels have changed.

MR. ELEY: Yes, now that's true.

MR. DREGGER: So the cost basis originally had a much different insulation basis and the calculations would have to be different

with the new insulation levels. But okay, I guess regardless I was --

MR. ELEY: For some, yes.

MR. DREGGER: Okay. But do I understand that it's either 20 cents or 50 cents, right? In the stakeholders we're talking 50 cents and in the 2002 it was 10 cents but the maximum 20 cents. I am just trying to paraphrase. Do you know what I am talking about?

MR. ELEY: No, I do not know what you're talking about.

MR. DREGGER: The cost premium associated with going cool in the 2002 proposed code changes I believe listed five cents and ten cents for most things but then either, later interpretations the bottom line was less than 20 cents. That's what I remember from that process. And I am just trying to reiterate it.

ADVISOR PENNINGTON: So we used a criteria of 50 cents in this most recent analysis.

MR. DREGGER: In the most current one, okay, I respect that.

MR. SHIRAKH: And what we did was we got Hashem's graph from 2005 proceedings and we corrected it to 2008 TDV values and we raised the

cost from 20 cent to 50 cents a square foot.

MR. DREGGER: And I want to echo I appreciate the flexibility and the working attitude, I see it. I guess what I would request is to be able to understand that more, where exactly it comes from. You know, where in the 2002 PG&E code proposal we had tables showing, you know, non-cool, cool and 50 cents. Not 50 cents, 10 cents, 5 cents. We had tables showing -- I'd like to have that sort of information regarding this new one.

DR. AKBARI: Philip, the life is much simpler than what you are projecting. This is Hashem Akbari.

In 2002 report there were energy calculations done and those energy calculations used the time dependant valuation of the 2005 cycle. What we did in this cycle, the part that LBNL did, we took that same energy data, used the new 2008 cycle time dependant valuation in order to create a new plot of energy savings.

MR. DREGGER: Yes, I understand that.

DR. AKBARI: And then now those numbers are being compared with, with an incremental cool roof cost that it is being assumed that's 50 cents

in here. I hope that's crystal clear.

MR. DREGGER: It is and it mirrors what I understood but maybe didn't communicate so thank you.

DR. AKBARI: I was hoping, you know, to hear some questions in here.

MR. DREGGER: It did. And so if we could just, you know, have copies of the, you know, the backup data on that for our review I'd appreciate that.

DR. AKBARI: That report is available and has been always available on the --

MR. SHIRAKH: It's on the web.

DR. AKBARI: -- California Energy Commission site.

MR. DREGGER: No, I'm not talking about the energy savings part, I'm talking about the cost part. I mean, I'm interested in both, right. The 50 cents came from somewhere.

MR. SHIRAKH: The 50 cents basically was -- You're going to hear from -- The cost of cool roofs, ARMA basically told us the cost of going to the cool technology is about a dollar, from cap sheets to a single ply. That was based on the study that you -- the survey that you did. And

there are others in the cool roof industry that are telling us the cost is much lower.

MR. DREGGER: And I respect that, a difference of opinion. I just would like to see the backup data for it.

MR. SHIRAKH: Well, maybe there's people in the audience that will speak up.

MR. DREGGER: They may or may not be. But will it, is that something we can expect the CEC to provide, the backup data that they made that assumption on?

MR. SHIRAKH: We'll ask them.

MR. DREGGER: Okay, thank you. And then I guess a very similar request. For the low-rise residential there was, the 50 cents was mentioned in that, the low slope portions of the residential. And thank you.

MR. ENNIS: I'm Mike Ennis representing SPRI, the Single Ply Roofing Industry association. In Mr. Wilcox's presentation he accurately mentioned that ballasted roofing assemblies were evaluated as a potential alternative to cool roofs in certain climate zones.

In the evaluation ballasted roofs, the energy performance of ballasted roofs were modeled

and compared with a baseline system and determined that they really were not a viable option.

SPRI contracted with Oak Ridge National Labs and conducted a study in which we evaluated the energy saving performance of ballasted roofs. And we learned that ballasted roofs do save energy. We learned that the amount of ballast per square foot, weight per square foot, impacts the amount of energy savings that occur.

But probably most importantly we learned in that study that traditional heat flow models cannot accurately predict the ballasted roofing assemblies and how they would perform. There are a number of factors why that was one of the things that we learned in that, in that study.

And in fact Andr, Desjarlais will be providing a presentation at the AHSRAE Building 10 conference, Building Envelopes 10 conference stating and detailing the energy saving benefits of ballasted roofs and the difficulty in modeling the performance of those roofs.

So SPRI is requesting that the staff please reconsider and reevaluate the effectiveness of ballasted roofs based on experimental data and not on modeling. So that's our request, we wanted

to get it on the record.

Any questions? Okay, thank you.

MR. FLAMM: Thank you.

MR. SHIRAKH: This was -- I'm sorry, the ballasted roof you were talking about was for low rise residential?

MR. ENNIS: Low rise, low rise roofing. So yeah, low rise nonresidential. And the graph presented was low rise residential.

MR. WILCOX: The proposal was for both.

MR. ENNIS: On the high-rise, low slope residential, right?

MR. ELEY: Right.

MR. SHIRAKH: But Charles, you're doing some analysis on that.

MR. ELEY: Well we've been looking at -- the ORNL study that I'm familiar with, one of the, one of the challenges we face is that the field data that was collected gives membrane temperature and heat flux through the roof for a black roof, a white roof and then a black roof with different, I think 10, 15, 20 pounds per square foot. Plus there was a paver system.

And the figure of merit that we use for California analysis is annual time dependant

valued energy. So taking, taking essentially measurements for a 24 hour period and translating it into something that we can use in our models that will predict, that will help us make an estimate of TDV energy savings is kind of the challenge that we face.

MR. ENNIS: Yes.

MR. ELEY: And I think that's true both on the residential and the nonresidential side. The specific details, the modeling challenges are different but essentially that's the, that's the challenge we face.

MR. WILCOX: I think the other issue with that proposal is that, the proposal essentially is that the solar reflectance of the ballasted roofs are not an issue. I mean, the roofs that were tested had a particular solar reflectance and there is, I think there is some reluctance to assume that all ballasted roofs will have that solar reflectance.

MR. ELEY: .2 I think it was.

MR. WILCOX: Yeah. You know, it's kind of a -- It seems a little extreme to propose that mass is so important that it doesn't matter what the color is of the roof, which is what you're

proposing. So, you know, that doesn't really fit the system.

MR. ENNIS: I think there will be some more comments on it so thank you.

MR. GOVEIA: Good afternoon, John Goveia from Pacific Building Consultants for ARMA. On behalf of ARMA as well as we're roof consultants in California. I'd like to thank you for the opportunity to be able to attend this and to speak. And Mazi, as you know, I have provided some comments for consideration on some wording changes and things like that.

Charles, I'd just like to say on this whole -- I hate to jump back to the same topic as Phil but this R-14 over the top of the deck. I think, you know, listening to Marty and to Bill Callahan and Jay Salazar, there is more of a cost impact than just the bare bones of the cost of the insulation and you have to really look at that.

I don't know what dollar number was used in the analysis but clearly from my experience installed we're still in the neighborhood of probably about $2.50 a square foot, roughly, for an R-14. That's about two-and-a-half inches of insulation installed. And that can go a lot of

different ways depending on the project complexity and so forth.

And Jay brought up the interesting point about, you know, equipment heights and things that are determined by planning commissions, maximum limitations on certain heights and having to raise equipment screens, only to find out that you can't raise the equipment screens because the building is already at its maximum height.

So one of the things I think we had asked for before, and again we're looking for what was the input data as it relates to the costing that was done there. We don't have to go through that now but the input data on the costing by AEC when they worked the costing on this.

And the same is true, and I'll just say it now Bruce, on the work that you have done. To look at the input data so that the people on this side can say, okay, this is odd, this is weird, this is fine, this is normal. Just to get the input data.

MR. SHIRAKH: We did forward Bruce's raw data to your counsel.

MR. GOVEIA: Was that the UMZ.zip file?

MR. SHIRAKH: Yes.

MR. GOVEIA: That was something different.

MR. WILCOX: No, I don't think we sent any raw data to counsel.

MR. GOVEIA: I know we requested it before.

MR. SHIRAKH: Did we send the Excel spreadsheet?

MR. WILCOX: Yes, the Excel spreadsheet, an earlier version, yeah.

MR. GOVEIA: Right. I don't think the ARMA site has received that. So again, it's important for us to get that. I saw that in the steep slope when you were working your analysis you had used the 35 cents, dollar figure for data input. It's close, it's the bottom end of the line from what the ARMA study cost request came up with on residential.

Where it stars to fall out of line is when you hit reroofing, and I think we talked about this in the past. When you hit reroofing you can expect an additional 10 to 25 percent cost increase. It just means the cost savings for reroofing or alterations go down because the alterations for reroofing steep slope were up at

somewhere in the $1.10 to $1.40.

MR. SHIRAKH: That's probably --

MR. ELEY: Would you say 10 to 15 percent increase for --

MR. GOVEIA: Contractors told me when we cost it out, when we did the -- I was working on the steep slope cost. That the costing that we provided to the Energy Commission was for new construction cost to the general contractor/ builder, new construction.

When I contacted the contractors I said okay, this is middle of the line. Not special deal, not high-priced. Middle of the line to builders. When I questioned five of the six contractors that provided us costing they varied anywhere from 5 percent to 40 percent is what they told me the reroof market would bear. So we'd see an increase in the amount of cost to go, quote, cool on the asphalt shingles. An increase over the 35 cents that we used for the new construction.

MR. SHIRAKH: Can I ask you a question?

MR. GOVEIA: Sure.

MR. SHIRAKH: Alterations, the requirement is .2 versus .25. Does that matter?

Does that reduce the cost at all?

MR. GOVEIA: No. As a matter of fact right now, and correct me if I'm wrong, I believe what is on the market right now is at around .2, .25.

MR. SHIRAKH: So .2, .25 costs the same, is that what you're saying?

MR. GOVEIA: I think it's going to be pretty darn close.

MR. WILCOX: So we'll change it to .25?

MR. SHIRAKH: So maybe we should make it .25.

MR. GOVEIA: But there is a wider range of colors at the .20. At the .25 isn't there something like --

MS. HARDY PIERCE: It's about 5 out of 11.

MR. GOVEIA: Maybe 5 out of 11 colors at the .25 level.

MR. SHIRAKH: And then for alterations we also provided these eight alternatives.

MR. GOVEIA: Say that again.

MR. SHIRAKH: In alternations we have all these other alternatives to cool roofs.

MR. GOVEIA: Correct. I think those are

good because we have a lot of houses out here that don't have ducts in the attic. I know mine doesn't, it's all under the house. And we've got a lot of houses that have a lot of insulation necessarily in the attic. Some of them have had retrofits and they have blown in insulation or they put batt but --

DR. AKBARI: Do you have a cool roof on your house?

MR. GOVEIA: No. Actually one thing I didn't see in the standards is a cool value for wood shakes. Why is it -- I mean, my understanding is a wood shake roof ends up somewhere around a .35.

SPEAKER IN THE AUDIENCE: I'd like to see that data.

MR. GOVEIA: What's that?

SPEAKER IN THE AUDIENCE: I would like to see that data.

MR. GOVEIA: You have never seen a wood shake?

SPEAKER IN THE AUDIENCE: The wood shake values, the wood shake data.

MR. GOVEIA: Oh, the data on it? I'm sure that could be obtained.

ADVISOR PENNINGTON: So is that a light weight or heavy weight roof?

MR. GOVEIA: That's got to be light. Yeah, it's got to be light.

MR. WILCOX: You know, it's got a substantial resistance too. I think the shake roofs are probably just fine. If we knew what the exact values were it would be better, I think.

MR. GOVEIA: I guess it's the difference between new and aged. The aged which turns a silver-gray. I think that's about all I have right now, thank you.

MR. SHIRAKH: Thank you.

MR. GILLENWATER: Hello, I am Dick Gillenwater with Carlisle SynTec, manufacturer of single ply roofing. There has been a lot of data flying around so I thought I'd do a very brief presentation so that we'd be able to kind of see the numbers up front. Is there a pointer? Here we go, to go through that.

First I want to start a little bit with our cost data. There has been a lot of talk about what the costs are on various roof systems. Next slide, please. So I want to start with some study. There was original data put in that was

supplied and there was a number that was focused on by the CEC, which was this $2.07 for, in this case, a base sheet, three plies and a cap. A built-up roof. Besides that they gave a number of what it would take that design to convert it into a cool design using a cool cap. And as you can see the number was a substantial increase.

They then supplied data for single plies and said, well single plies are pretty much in this range here. So we were talking over -- what we heard earlier, over a $1 increase in the cost of this system.

So there was a call that said, is there some data out there that says what is the cost of a single ply. So we have gone out to a number of roofing contractors to get the data. We went to contractors that were originally rather large, built-up roofing contractors that have moved into single plies so they knew both sides of that. And actually this data is over a couple of time periods. We supplied some data back in February and then again we supplied some more data related to this call recently in June.

And there's four examples here. There was more data available but I'm just taken and

highlighted some examples. This data here -- And let me qualify, this was for a wood deck. And as was pointed out in the original letter, which is correct, on a wood deck a built-up roof can go directly to the deck and have a fire rating of a Class B.

MS. DUNHAM: A.

MR. GILLENWATER: And single -- Class B.

MS. DUNHAM: A.

SPEAKER IN THE AUDIENCE: Yes, it's A.

MS. DUNHAM: Class A.

MR. GILLENWATER: That wasn't what was in the letter. Who wrote the letter? The qualification was a Class B.

SPEAKER IN THE AUDIENCE: It said minimum Class B.

MS. DUNHAM: It's possible to get a --

MR. GILLENWATER: A minimum Class B, okay.

MS. DUNHAM: It's possible to get a Class A is all I'm saying.

MR. GILLENWATER: That's fine. Very good, so you can get a Class A. But a minimum Class B, right?

MS. DUNHAM: Okay, sure, go ahead.

MR. GILLENWATER: Okay. Single-plies, single ply cannot go directly against a wood deck, it has to have some kind of underlayment underneath it to get a Class B or Class A rating. So these costs for the single plies include those underlayments. So the first cost over here has a half-inch dens deck in it. The next one over here has two plies of what is called an FR material, it's a fiberglass mat that goes down. I'll come back here in a second.

This one here is, again, another quarter-inch dens deck and this one here is two FR plies. Now the two dens deck are Class As fire rating and the two with the FR sheets in them are Class B fire ratings. And you can see the cost for the systems there run from $2.09 to a high of $2.39 to a low of $1.99. And there is some additional data in there, thickness of the membranes. There's both 45 and 60 there. But it kind of gives you a feel that single plies can run at the same cost as a built-up.

DR. AKBARI: Can I ask a question please?

MR. GILLENWATER: You certainly may.

DR. AKBARI: Do I understand your data

clearly in here that the cool roof, single ply cool roof, on the average costs about the same as a built-up asphalt roof?

MR. GILLENWATER: That's what the roofing contractors came back and told us.

DR. AKBARI: So in a way your data is really suggesting what I have been insisting for a long time, that the incremental cost would be less than 20 cents. These are the type of data that I have relied --

MR. GILLENWATER: Now I'll have to go back to the roofing contractor that made the comment.

DR. AKBARI: Sure.

MR. GILLENWATER: These are specific designs that were tailored very clean. That doesn't mean you're not going to see numbers all around the ballpark, depending on how high the building, how small it is, how many penetrations are on the roof. But this was a clean roof, a reasonably clean roof spec'ed out based on what they had done, a specific kind of size, and the contractors toned in on that. So that's the numbers.

DR. AKBARI: Thank you.

MR. GILLENWATER: Okay.

ADVISOR PENNINGTON: Don't a lot of those variables that you were describing move with the roof? So you --

MR. GILLENWATER: Well what happens, if for example if I go to a very small roof then the things that are around the edge of the roof, the edging, detailing and all that kind of stuff percentagewise, which is there are a lot of labor involved in that, becomes a much higher cost per square foot because it's influenced. The bigger I make the roof that becomes less of a percentage factor.

ADVISOR PENNINGTON: To go to single ply?

MR. GILLENWATER: It doesn't matter what kind of roof you do, a single ply, big roof.

ADVISOR PENNINGTON: That was my point.

MR. GILLENWATER: Yeah, so if you were doing that you would have everything --

MR. SHIRAKH: The track.

MR. GILLENWATER: That's why they took it all out and said Let's just keep it clean. This comes basic with the roof, a couple of drains, a few penetrations, that kind of thing

that would typically happen on a roof.

ADVISOR PENNINGTON: So then talking about that variation doesn't help us very much in trying to come up with an incremental cost.

MR. GILLENWATER: Right.

ADVISOR PENNINGTON: Because the different roofing systems' costs move with those variations.

MR. GILLENWATER: Right.

ADVISOR PENNINGTON: That was my question or point.

MR. GILLENWATER: Now the next one deals with steel deck. And the data that was supplied said, all right, we're going to take the built-up and we're just going to cost it on a steel deck. But with a steel deck, as was pointed out earlier, is a fluted deck and you can't go directly to it. You have to put some kind of substrate board down on it.

Well because of the energy requirements normally that's insulation board. And as was pointed out earlier with the built-ups, when I put down an insulation I have to usually use a cover board to prevent blistering. That cost was not included in their original data that was submitted

so you have to do that.

For single plies, at least in the single plies that we're doing here with cool roofs, 90 percent of those are mechanically fastened and they don't require the cover board over the insulation. So again we're taking -- This is the built up over here now that's --

MR. ELEY: You put the single ply in direct contact with the insulation.

MR. GILLENWATER: That's correct. So on this side here we have the built-up roofing, a couple of variations from different contractors. Again, the base, the three plies and the cap sheet, ISO and a cover board.

And then we have the single ply going over the deck with the membrane and the ISO. And again you can see the numbers there and how those relate. So that's some of the data, there's more data available. We can supply more, this was a limited amount of time and we did what we could.

DR. AKBARI: I would like to emphasize, if I may, one other point.

MR. GILLENWATER: Please.

DR. AKBARI: As I made this comment, this type of data had been made available to LBNL,

not necessarily from this gentleman but from all the other people. I seriously endorse this type of data that in many applications, based on the life cycle costs and sometimes based on the initial cost, a cool roof is cost competitive excluding of the energy savings compared to a built-up roof.

And these are some examples of those. And based on that I reiterate my comment and suggestion to the Commission that the incremental costs for the cool roofs in California should be considered no more than 20 cents per square foot.

MR. GILLENWATER: Now we could take all the insulations out, but based on the chart before they would come in about the same price as the built-up roof. If we wanted to go back to that, say, let's just go to the steel deck.

But with the wood deck they required us to put an underlayment underneath it to get the R ratings. Then I would think turnabout is fair play, that they would have to use their underlayment to prevent a defect in the field.

ADVISOR PENNINGTON: Dick, I'm sorry, I'm a little slow here. Can you explain again the difference between the left hand two bars and the

middle two bars.

MR. GILLENWATER: This one here is without any insulation, any board. It's just the base sheet up, okay. And as so saying, all right, I'm going to go lay this BUR directly to the deck. Well that's fine, you can do that. But like on the wood deck requirement, for single plies to work on a wood deck I've got to put a substrate in so that I can get a fire rating. On built-up when they go over a foam insulation they need to put a cover board in to prevent blistering.

ADVISOR PENNINGTON: Okay, so this is --

MR. GILLENWATER: They didn't price that in when they did that calculation so it makes their number look a little bit better against the single plies.

ADVISOR PENNINGTON: So you're arguing that the middle two bars is more appropriate for comparing to the cool roof.

MR. GILLENWATER: That is correct. So if we're going to do the same thing for wood deck we ought to apply the same kind of guidelines and stipulations for steel deck.

Now there's another side of this too and that's the energy calculations. As we all know in

the 2005 we take the new rated values by the Cool Roof Rating Council and then automatically age that because we know that they're going to age and they make a calculation based on that.

In 2008 if we have the aged value we can plug that directly in with no detriment to the number and we can apply that across there, all right. So if I took a new product which has a rating here -- This is a particular product. It's listed at CRRC as a .79. If I was to plug that in as a new I would use a value of .59.

Well we have on that membrane now received a CRRC-1 aging data and the three-year aged data is .7, not .59 or not .55 minimum, but it actually meets the criteria for a new product right now. If that number is plugged in to the energy calculations we are also going to see substantially better savings than what we were, most of the estimates have been made on.

Now that is a specific product, I am not sure what the other ones are going to be like, but that kind of sets a benchmark that says that that's available out there. And if you apply that -- Now this is, again, this is DOE calculated values so it's not what you guys would normally

do. It doesn't have the TDV in it, numbers, and that kind of stuff. It's just taking their calculation and plugged it in.

But we did one for 55, which would be the minimum, and then we're showing the 70. And you can see there's about 25 percent improvement in the energy savings by just being able to go up to that. Seventy-nine would have been the new value but we would actually degrade that and it would only be slightly better than the .55.

So you can see that in the different locations. This is total, this is for a year. The other slide, and I'll go down through them quickly, is savings per square foot and the other one is savings per year. But you can see the numbers here as you go through.

And there are places though that, again as you pointed out in your things, where a cool roof isn't cost effective and anything can be used. So there are applications where it shows it also in that and that's fine, we understand that.

Okay. And the last thing that I have always heard people comment about is their supply of cool roofs out there to be able to do that so I'll give you a rough feel for the number of

manufacturers. That represents seven major plants with an eighth plant announced. One plant out of those seven is located near the West and the one that has been announced will also be located in the West for a quick response to be able to supply the market.

And in PVC there are six plants in position to supply the market as well as there is one out here in the Westside for a quick response. So thank you for your time.

DR. AKBARI: Is this presentation available on the web?

MR. GILLENWATER: It will be. I just got done putting it together. Most of this data though that this was, this was a summary, is already on the website. It was posted last week and on Monday.

DR. AKBARI: Let me ask you this question. What is your recommendation to the Commission in terms of the incremental cost for the cool roofs, if there is such a thing? Based on your data you are suggesting that there is no incremental cost at all. Based on the initial --

MR. GILLENWATER: That's what we're showing to it. I can supply -- I mean, some of

the data we supplied earlier actually showed other parts of the country. So this is not a phenomenon just in California but it's the same in the other locations around the country. That the cool roof is very competitive against a traditional built-up roof.

DR. AKBARI: And this does not include the energy savings?

MR. GILLENWATER: No, this is just dollars per square foot to install the system.

DR. AKBARI: Is there any, is there any lifetime performance advantage or differences between these roofing systems?

MR. GILLENWATER: I am not gong to get into that argument because there are how many people in this room, and I bet I could get a different opinion from everybody on how long a roof lasts.

DR. AKBARI: Okay, okay,, I understand.

MR. GILLENWATER: If somebody asks me I say, reference warranties. And if you want to use a lifetime pick a system's warranty the manufacturer will stand behind. At least you know it's going to last that long because they'll stand there and they'll fix it. So I am not going to

say that one is, you know, one system is better than the other. A lot of it is probably related to workmanship, that's probably well known, but if it's well done I think it all performs quite adequately.

DR. AKBARI: Thank you.

MR. FLAMM: Jon.

MR. McHUGH: This is Jon McHugh. You showed negative energy savings for San Francisco. What kind of occupancy was that?

MR. GILLENWATER: That was -- I'll have to go back and double-check on that. I'm not sure exactly what building that was done on. I'll have to ask the guy who did the calculations for me. I think it was something in the range of a large retail store. I think that's what they used so you would have that kind of load. Most of the load is probably lighting that would be in there. Heat, that would be in there. But a building like that I believe is what it was but I can confirm that for you.

MR. McHUGH: In all your other climate zones you had positive energy savings, is that right?

MR. GILLENWATER: That is correct. But

there were a couple here, there are a couple of climate zones in here where it's what I call a break-even or slightly negative.

MR. McHUGH: All right.

MR. GILLENWATER: Okay?

MR. McHUGH: Thank you.

MR. GILLENWATER: I'll just add a couple of comments on the ballasted side of it. There was a comment about the reflectivity in the actual study that was done on the ballast part of it. There were two variables, there was the paver and the stone. The stone had reflectivity of .2. whereas the paver had a .5. And at the same weight they had almost identical lines that fell on top of each other. So that kind of says, when I get to a certain weight then the mass actually takes over compared to the reflectivity. And that was how that data was based on in that. So we could supply more information on that.

There's some additional data too that shows that it's just recently been done. It shows the surface temperature of the stone is basically the same as the membrane, so we're not adding to heat island effect or anything like that with the ballasted system. That was a question that we had

from the EPA. And we showed them through the data from the Oak Ridge study that the stone surface and the membrane surface temperatures were equal. Thank you.

MR. FLAMM: I want to do a time check. After this measure we're going to be, it's an open mic period for others. I'm just curious, how many people would like to speak after cool roofs on something else? Just Mike? Okay, then we can go until six o'clock (laughter). Just kidding, Mike.

MR. HODGSON: Gary, as long as you're buying I can talk.

MR. FLAMM: How many more people need to talk about cool roofs? I'm wondering if we should put a time limit to keep this moving. It's almost four.

MR. SHIRAKH: I would limit it to ten minutes per person.

MR. FLAMM: Okay. At ten minutes, at ten minutes we pull the plug.

DR. DREGGER: Phil Dregger, Pacific Building Consultants. A very quick comment. I want to thank Mr. Gillenwater. It would be helpful to increase the data pace of cost information. Hopefully we can submit to make sure

that the scopes are exactly the same, they're side-by-side comparisons. You know, wood deck, steel decks, what the configuration was, you know, consistent with how we approached our study. It would be very helpful.

And the other thing I wanted just to offer is -- is Dick still here?

SPEAKER IN THE AUDIENCE: He stepped outside.

MR. DREGGER: Okay. Well just to have him. He just may not be aware that built-up roofs can very well be installed without a separate cover board. When you have composite board you don't need a separate cover board. And also there is a perforated base sheet that will allow you to go directly onto the ISO. ConGlass, GAF I believe has a system exactly like that. He just may not be aware of that and so maybe he could adjust his slides to not have that additional cost in that.

Thank you. I yield the rest of my time to the representative from --

MR. KRINER: The gentleman from -- My name is Scott Kriner, I am representing the Metal Construction Association and the Cool Metal Roofing Coalition. And my questions are -- I only

have two questions and they're really for clarification. They're to clear up some confusion that I had with some of the slides, two slides in particular from Bruce's presentation compared to the language that was posted last Friday.

The first question has to do with, I believe it's slide number four. Yes, the list of equivalent options. If I draw your attention to item number four that's different than what was posted on Friday, which included language saying insulation with a thermal resistance of at least .85 hours a square foot, or at least a three-quarter inch air space is added to the roof deck over an attic. So my question is simply, which is the latest version of the CEC?

MR. ELEY: The standards.

MR. SHIRAKH: The standards.

MR. ELEY: The standards. Bruce's table I think is a little misleading because it shows all of these are equivalencies and actually three of them are identified as exceptions.

MR. KRINER: Exceptions, right.

MR. ELEY: Which is the no ducts in the attic, the R-30 insulation and radiant barrier.

MR. KRINER: Radiant barrier, okay.

MR. ELEY: So the language in the standard is correct.

MR. KRINER: Okay. That takes care of my second question because there was a discrepancy in the climate zones as well in one of the slides to the proposal.

MR. SHIRAKH: The standard is the --

MR. KRINER: Okay. I just wanted to make sure there wasn't a change made between Friday and today, that's all. Okay, thank you.

MR. WILCOX: The change was only failed to be made in my head, I think.

MR. KRINER: Okay.

MR. WILCOX: I apologize.

MR. DESJARLAIS: I'm Andr, Desjarlais with the Oak Ridge National Lab. I wanted to follow up on the ballast discussion. We submitted, Charles, an update to our ballast template about six months ago where we included annualized average energy savings for all of these other roofing systems.

So besides just a 24 hour snapshot of actual performance the information that has been supplied includes annual average performance, which I think can be used as a basis to make

comparisons between the performance of a ballasted roofing system and the performance of a prescriptively compliant single ply cool roof.

So I think you have the data that demonstrates the equivalency. I will personally send you a copy of the report, which has been on the, it's been on the supplier website for about a year as well that has that information. It's in the --

MR. ELEY: This report you sent that has the flux leaders and the template?

MR. DESJARLAIS: Yes. We actually updated that and sent an addendum which somehow didn't make it to you and that's fine, we'll get it to you.

I had also I guess a second topic, which is a question for Bruce, and I wonder if you might be able to just pull up the slide that you just had. In the alterations options one of the options you offer is this .85 R value and you make the comment, above roof deck. And it strikes me that the above part is somewhat unnecessary as long as it's up in the roof.

MR. WILCOX: Yes.

MR. DESJARLAIS: Would you, would the

Commission consider amending that to just say, .85 in the roof deck somewhere?

MR. WILCOX: I think in the standards -- Charles, the way you wrote that, it doesn't say about --

MR. DESJARLAIS: Okay.

ADVISOR PENNINGTON: Would you need to convert that to a U-factor then if you're considering framing below the roof? I mean --

MR. DESJARLAIS: You would have to actually have a little bit higher thermal resistance to get the same effective, the same effective as a continuous .85 value. But in my mind that offers, again, another alternative. I guess I like options and that creates a more realistic option as opposed to putting some form of insulation above. And it probably would lead to more durable roofing systems. I just suggest that as a friendly amendment. And Charles has already anticipated it so therefore --

MR. ELEY: What it says is thermal resistance of at least .85 or a three-quarter inch air space added to the roof deck.

MR. DESJARLAIS: Added.

MS. DUNHAM: Or, but they're talking

about the air space. It doesn't say where the insulation is.

MR. DESJARLAIS: Okay.

MR. ELEY: Okay.

MR. DESJARLAIS: But that is the intent.

MR. ELEY: That's the intent.

MR. DESJARLAIS: Okay, okay.

MR. ELEY: So we can clarify that and make sure it's above.

MR. DESJARLAIS: See, you perceived my need. Thank you, thank you.

MR. SHIRAKH: Before we continue, is Phil still around?

SPEAKER IN THE AUDIENCE: He's out in the hallway in line again.

MR. SHIRAKH: Can I ask him a question?

SPEAKER IN THE AUDIENCE: It's a loop. You notice there's nobody in the room. (Laughter)

MR. SHIRAKH: Phil, you made some comments about the cost of the cool roofs. Dick was out of the room and he is back. I really want to --

MR. DREGGER: Well good, yeah. In fact I was hoping that -- Somebody probably mentioned it to him. The totality was I wanted to say thank

you. We definitely benefit from additional cost data. The information that we have is limited. I think it only improves by having more cost data.

I did ask and suggest that we know the basis and we're very clear about, you know, contractor costs to install a specific scope. You know, nail it down so you have apples to apples as much as possible. And, you know, I embrace and invite that sort of thing.

The other thing I just wanted to point out, an inadvertent oversight, that there are, in fact BOR systems do not necessarily need a cover board over ISO. Obviously if your insulation is wood fiber, perlite or a composite board you would need it. But even ISO, there's perforated base sheets commonly installed directly over the ISO, a perforated base, two plies and a cap sheet so you don't necessarily need the cover board. So I just wanted to put that out there. ConGlass has it and GAF has it as a warranted system also. So just reconsider that.

MR. ELEY: If the cover board over the insulation is needed what does that add on a prescriptive basis?

MR. DREGGER: I'm sorry, what does it

add?

MR. ELEY: What is the incremental cost to the --

MS. DUNHAM: 50 to 75 cents.

MR. DREGGER: And we're talking, that's installed cost? Yeah. Not much R-value but the labor to put it down as a separate piece. But if you added it to the composite board I think it's almost a wash.

MS. DUNHAM: Yeah, if it's factory laminated, which is a good point. It could be factory laminated --

MR. SHIRAKH: She is not capturing your comments. You need to come up to the podium.

MS. DUNHAM: Oh, I'm sorry. I'm Martha Dunham, Marty Dunham, Enterprise Roofing. They do make a product, as they mentioned, that is factory laminated where the cover board, where you can mop directly to the polyisocyanurate is factory laminated. So that does save you the labor of putting down the second layer of insulation.

There is apparently a venting base sheet that can be utilized. Many of the manufacturers stopped warranting that application but apparently GAF and ConGlass still do warrant mopping to the

polyiso and not having problems with blistering.

MR. SHIRAKH: And you said the additional cost of that is about 50 cents?

MS. DUNHAM: For the separate layer I'd say 50 to 75 cents. If you had to install a second layer, a cover board per se, over the underlying polyisocyanurate. I did also though, the gentleman from Carlisle mentioned that there is no cover board needed on a mechanically attached system. And with some single ply systems that are fully adhered to the insulation, many of them then you do need a cover board or you do need a fire barrier. A different, a different type of assembly. Then it gets into whether mechanically attached is better than fully adhered. You know, I'm going to talk briefly in a bit. Did that answer your question?

MR. SHIRAKH: Yes.

MS. DUNHAM: Okay, thank you.

MR. OLSON: I'm Rick Olson with the Tile Roofing Institute. I just have a couple of things. Bruce isn't here but on his slide 13 I am still a little confused. I understand that for tile he came up with tables afterwards that would show how it would meet it with the air space

involved but I think this one, if it went out, would still leave some confusion. Because it shows how to treat an asphalt shingle but really doesn't show in those three zones how to, how to create the tile.

Now I know under the alterations you show and pick up the air space so you've heard a lot of comments about the air space. I just think we're still not totally clear on how that language will come out on the new construct side.

ADVISOR PENNINGTON: Can you hold that until Bruce is back to respond to you?

MR. OLSON: I can hold that until Bruce comes back. I'll go on to my other comment. One, I guess a question I have for the Commission. If these are adopted do you perceive they would take effect in January of 2008 or would the code get adopted and then it would be some later point after that?

MR. SHIRAKH: April 2009.

MR. OLSON: April 2009, okay. Then my final comment is, the Tile Institute probably doesn't represent 100 percent of all the tile made in California but I'll venture to guess we're 98 to 99 percent. And I just wanted to correct a

couple of comments I heard earlier from a citizen of California, my good friend Hashem.

And that is that he was saying most tiles already meet the .25. We had said at the stakeholders meeting, and I just wanted to say again in front of this group that less than one percent of the tiles meet a .25. I think Hashem is being confused with some of the tiles we sent him to look at specifically that had special coatings and some other things from one of our clay manufacturers. And he is maybe making the perception that that's all tile and that is not a correct perception.

The other thing is, a citizen --

ADVISOR PENNINGTON: Clarification on that. The one percent is market share for those products? Is that what you're talking about?

MR. OLSON: Of the amount of tiles and the types of tiles we make only probably one percent of the current tiles being manufactured would meet the .25 as it stands today. And I just want to clarify that because he had made the statement that almost all of them did.

And the other thing is I would welcome him to come meet with us and we'd be happy to

share cost. Because again at the stakeholders meeting the issue of cost came up. And I think he has a perception far less of what it really costs to put some of these products on. And we'll be happy to help educate him or anybody else that has some more information.

Going back then to my question, back to you, Bruce. I almost moved back in line. It was just on the slide 13. Where we understand in all other zones but I think we still need to have a little more clarification. Because if this table were read only as this table and they didn't have the other charts to go with it to show how that R value for the air space came into play somebody might look at that and say, well we don't know how to read for a tile product.

So I'm just saying if there is a way to either do like we do on the other table where for alterations we include one of the exception options over there as the air space, if there is a way to get that in there. Because right now as I am looking at 11, 13 and 15, I can't do tile, can I?

MR. WILCOX: This is the standard design. This is not a, this is not a, this is not

a mandatory requirement. This is a standard design for the performance.

MR. OLSON: So what would that be for tile then?

MR. WILCOX: You're comparing to asphalt shingles.

MR. OLSON: Okay, so I just have to be what an asphalt shingle is?

MR. WILCOX: Yes, better than an asphalt shingle.

MR. OLSON: Okay.

MR. WILCOX: And, you know, that's what I was trying to present in all those graphs and everything.

MR. OLSON: Okay.

MR. WILCOX: To show that that doesn't appear to be a problem. Okay?

MR. OLSON: Okay, fair enough. I just wanted to make sure it's clear.

And the final thing is I just I wanted to make sure that Oak Ridge is getting some, some recognition because they are the ones that have done a lot of our work on that air space. I know earlier you thanked Hashem, and Hashem has done a lot of work there, but we wanted to make sure that

Andr, also got for Oak Ridge his due diligence.

MR. WILCOX: Thank you, Andr,.

MR. OLSON: All right, thank you. Thank you, Andr,.

MS. DUNHAM: Martha Dunham, Marty Dunham Enterprise Roofing. And I'll be brief because I have been up here previously. But I am just a bit disturbed by the focus on the costs. Being someone, a contractor I like to keep things in layman's terms. I'm afraid in a sense that we are not seeing the forest for the trees. And with all due respect to the scientific community, in fact I'm sure they would concur that you could probably find five people saying one thing and five people saying the other and all the studies sort of washing it out.

But I think what it boils down to is that, you know, this is America. The building owner is a very sophisticated buyer these days. And each building owner, he or she has a specific idea, has probably studied up on these multimillion dollar investments they are putting on to protect their billions of dollars of merchandise or office space beneath it. So they have often done research and each of them may have

their own priority, their own idea of well gee, I like single ply better or I like built-up better.

And whether you're going back with a single ply or a built-up cool roof, if you are asking them to add an R-14 of insulation when they're removing an existing roof and installing a new one, then they are forced to come out of pocket and make some type of adjustment regardless of whether it's a single ply or a built-up roof system.

Hence my concerns about legislating. I know we have to do this, but legislating certain requirements such as, we must add this R-14, because it's adding costs. And then I don't think we should be overly focused on, you know, these studies. Because I'll tell you right now, depending on the foreman, you know, my per square foot cost varies. You're depending on certain companies that are more proficient in single ply or built-up. And crew to crew and foreman to foreman you're going to have disparity. I don't think that that should be necessarily the main focus.

And one other comment is that being the ones that ultimately have to read and understand

the regulations on all the reroofing work that we do, which is, you know, millions of dollars. And I think nationally the NRCA, what is it, an $18 billion industry a year, something like that, the roofing industry. I think that trying to follow up this reg with some type of user friendly synopsis for the contractors and building owners.

Because we're usually the ones breaking it to the building owner. Oh by the way, did you know about the new Title 24? No. And if I am the educated contractor that is advising the owner and the other contractor doesn't know then I look like the bad guy because I'm telling him he's got to spend all this extra money.

So I think some kind of a campaign for education of the public, for the building owners, and some kind of very user-friendly layman's term synopsis of, okay, how do we comply? Where do we go? What is the form? Has the form been developed, is it standardized? I think you understand what I'm saying. And I do appreciate your openness to listening to all our comments, thank you.

MR. SHIRAKH: I have just one comment.

MS. DUNHAM: Yes.

MR. SHIRAKH: This is the standards language, it's just one of the documents. Later in the process we're going to be developing the compliance manual in the residential and nonresidential. That's where we explain in layman's terms how to implement the standard requirements with examples, pictures.

MS. DUNHAM: Okay.

MR. SHIRAKH: And we also will have videos on-line.

MS. DUNHAM: Excellent.

MR. SHIRAKH: So we're going to have all sorts of tools.

MS. DUNHAM: I just hope that the money is there for distribution and advertising of these items and that there is a lag period of six months to a year between that 2009 date. That that documentation would be on the market and available to the public at least six months prior so that --

Also the building officials. We often come in, you know, I'm getting a building permit and I've got to comply and here is my Title 24 information and they don't even know. So, you know, there's a learning curve and that's part of what concerns me about getting this instituted.

So thank you.

DR. CALLAHAN: Bill Callahan, Associated Roofing Contractors. I had a specific question. I'll let it go to the side because I want to follow up on something Marty said.

I am part of an ad hoc group, Judy Holleran of Henry Company is here, Rick Salazar, a building official, that is trying to develop educational materials to inform contractors and building officials about the 2005 standards. I would expect the same thing would be done for 2008.

What I find really, really disappointing is that while we've been doing that for the last two years, Judy, or so?

MS. HOLLERAN: Right.

DR. CALLAHAN: It seems to me that while the contractors have been employed to help create educational materials they haven't been involved in this process until today. I keep hearing folks come up here and talk about the industry. I hear staff talk about reaching out to the industry. The Lawrence Berkeley Lab the same thing.

Stakeholder meetings, which I learned today there was one held on May 17. To my

knowledge not one single roofing contractor association in the United States was advised of this or invited to it. To my knowledge not one single roofing contractor participated in that meeting or was advised of it.

Several of the letters that are posted on the website refer to stakeholder meetings. How many have there been? Who has been invited? Are there minutes of those meetings? Is there any public record or public notice of them? It is really disappointing when you don't talk to the folks who have to do this day to day.

It is easy to sit in a lab and test thermal resistances and talk about boy, if we put R-14 on the roof we can save so much energy. But can you actually do it? Do you talk to somebody that actually installs roofs and knows how much insulation is underneath the existing roofs?

Did anybody consider that perhaps -- and Chuck Scislo of NRCA would probably know better than I on this, he's more technically oriented. When you start sandwiching insulation above and below the roof deck you create the possibility of moving the dew point within a roof deck, within a roof system, from above the deck to below it and

you can create rain in the house with attendant mold problems potentially too.

You should be talking to contractors about stuff like this. We have to do it. Their input can tell you what's practical, not just the result of some formula about how much energy you may or may not save. Putting three inches on a roof, as Marty indicated, can involve a hell of a lot more work and cost than simply the cost of the material. Mandating, you know, a minimum R-value as opposed to an average takes away a potential for you to use tapered insulation as opposed to straight.

All of these sorts of things are things that contractors who actually have to install this can contribute to the process. I think it's way too late to be talking about educational programs in the future to tell contractors and owners what they have to do. You need to involve them in the process so that you create mandates that are actually doable, that make sense for consumers and contractors alike.

And for building officials who, you know, you've put the primary responsibility on enforcing this. They have to go out in the field.

And Jay is going to go out there and he's going to say, hey yeah, it complies with Title 24 but you've got to tear the whole damn thing down because now your building is two inches too high.

And that is shameful. I am really, really disappointed that apparently -- I asked this question by e-mail last week and have not gotten an answer, that this informal process has been going on for over a year and nobody bothers to talk to the people who actually do this work.

MR. SHIRAKH: May I ask a question?

DR. CALLAHAN: Absolutely.

MR. SHIRAKH: We had two stakeholder meetings and people who were involved were industry associations like ARMA.

DR. CALLAHAN: A manufacturing association.

MR. SHIRAKH: Cool Roof. These are all -- So they don't represent the contractors, they're just manufacturers?

DR. CALLAHAN: They all represent manufacturers. The roofing contractors associations are well known to the Energy Commission. We worked with Elaine Hebert for two years on trying to understand the 2005 and develop

training materials to explain it to contractors.

And a big part of our problem is that as we go through this contractors look at the code and say, hey wait a minute, what do we do with this shape roof? What do we do in this situation? How do you balance out the insulation and potential of a dew point moving?

And that's after the fact. That's damage control. You can call it education but it's damage control. That's what Jay's problem is. He's got people that have to enforce it. And he is given a set of ENV-1, -2, -3 and -4 forms that none of his people can understand or want to deal with or want to be trained at. They want something that works within their system.

And if somebody had asked them in the first place we might have avoided a lot of expenditure of wasteful time and energy. And here we are at the same place. And we're working, you know, regularly. We met with Payam a couple of months ago after he took Elaine's place, to keep working on the educational materials. So we're around, people know who we are. The national contractors association comes, I come, building officials come.

And yet when you're developing new standards does anybody reach out to us, invite us to these meetings? No. Is anything posted on your website? No. Are there any minutes of these meetings? Was there any public notice? I'd sure like an invitation list. Just so I know for the record. Because I think I'm pretty, 99 percent sure, not 100 percent because I haven't seen the record, it's informal, were any contractor associations invited or contractors participate?

And we wouldn't be talking about problems like this today after all of this great work and effort has gone into it if you had brought in a contractor in the first place. I would certainly encourage you to do so as the process goes forward or there will be a lot of opposition to these regulations. Thank you.

MR. SHIRAKH: Thanks.

MR. McHUGH: Can I ask a basic question?

DR. CALLAHAN: Absolutely.

MR. McHUGH: I'm trying to understand your comment about moving the dew point. If you have a roof that has insulation underneath the roof deck and you put insulation on top of the roof deck how does that create a problem for

moisture? I don't understand the concept, would you explain that.

DR. CALLAHAN: Chuck, would you come up.

MR. SCISLO: I don't know what the configuration would be --

DR. CALLAHAN: Chuck, could you come up. Chuck Scislo is with the National Roofing Contractors Association. We ran into situations -- I am not a technical person. In the past where there was inadequate ventilation and over-insulation homeowners were getting rain in their homes. It became a big problem.

MR. SCISLO: Chuck Scislo, National Roofing Contractors Association. Just reading some of the verbiage contained in some of the documents kind of painted a picture of, or I visualized a structural wood deck with joists or roof rafters and insulation, I assume insulation batts underneath directly to the wood deck and then you're calling for insulation on top of that. Can't that affect the dew point?

MR. McHUGH: Yes, but I would think it would affect the dew point in a positive format because now the dew point is higher underneath the roof deck, not lower.

MR. SCISLO: Okay. But wouldn't it cause a problem from mold or anything?

MR. McHUGH: It would be just the opposite because now you are not condensing water, right?

MR. SCISLO: Okay.

MR. McHUGH: So you'd have more likelihood of having condensation without the insulation on top of the deck.

MR. SCISLO: What happens if the insulation is not directly to the underside of this deck?

MR. McHUGH: So then you have even less of a problem because you've got a ventilated area underneath the deck.

MR. SCISLO: Okay.

MR. McHUGH: I'm just not -- You know, if I look at the physics of it I don't understand what that concept is.

MR. SCISLO: All right, you explained the concept.

DR. AKBARI: Move it from the negative side to the positive side that comment.

MR. SCISLO: Okay, thank you.

MR. WILCOX: The problem happens with

the original insulation under the deck.

DR. CALLAHAN: Don't lose sight of the fact that nobody has bothered to include us in the process, that's the major point.

MR. KOLB: My name is Matt Kolb. I am the president of National Coatings and also a citizen of the state of California. I pay energy bills for the business and my home residence as well so this is important to me on several different levels. The Energy Commission has an objective to reduce peak demand. That's what we're talking about here today is how we achieve the primary objective, right? Okay.

In a previous life I used to work for Arthur Andersen. I was senior manager for a national, strategic cost management team. We would go anywhere in the world to work on strategic cost issues. And I always stressed looking at the total cost. That means life cycle cost in this case.

We can't focus just on installed cost. That's not what people buy on all the time. There's installed cost, there's life cycle cost. There's lot of different reasons. Colors. Something they read, something they studied about

on the web. People buy for a lot of different reasons, it's not just the bottom line dollar.

Many of the written comments submitted to the CEC submitted from April through June adequately addressed the study performed by Pacific Building Consultants. While it has its issues it does highlight one thing in particular, and that is that there is a wide variety of roofing options in this state of ours. Many of the letters on the website point this out.

Something else that hasn't really been addressed fully, it's about the sheer number of choices that the consumers in this state have. When ENERGY START started its roof products program, or since it started its roof products program there's been 185 companies participate with 1387 different, distinct products. The Cool Roof Rating Council as of yesterday has between 100 and 200 different companies with 878 listed products. All of course which have initial values and many are now receiving their three-year aged values.

National Coatings, for example, just received three-year aged values on some of their products on their first submissions and the

reflectivity, which has been modeled to drop dramatically by about 20 percent in our case only came back about eight to nine percent less than the initial values. Still higher than the initial requirement for Title 24.

Our thermal emittance values rose. And we're not exactly sure why but it's a phenomena that we're hearing from other competitors of ours that is being found out. So there may be a need to adjust the model for these kinds of findings. The reflectivity is not dripping as dramatically as has been modeled and also the thermal emittance numbers are rising.

Lastly, National Coatings a few months ago, and this is part of the total cost picture, a few months ago issued a press release that was our best, conservative calculation on how many million pounds of CO2 we helped avoid the state be generated through the use of what we produced just last year. And although it is not enough to make a huge dent, if you take 100 and some-odd companies that are listed with the Cool Roof Rating Council trying to sell 800 and some-odd different products into the state it is going to make a huge difference.

Twenty-four million pounds. That's a lot. That's a lot of cars, that's a lot of energy that didn't have to be generated. Okay. All the different manufacturers in this room plus all the other ones that didn't make it here today, we can have a significant impact. The companies are rising to the challenge. Products are being created, they're being modified. They're offered for sale, the consumer has a choice.

One last thing that I think is worth noting is a gentleman from Carlisle SynTec mentioned in his note that has been posted on the CEC website, is that, you know, there's nothing like actual field experience and data to confirm performance. It's that kind of data that is going to really make a difference here. The data that is out in the field that over the life of the roof. The life cycle cost, not the installed cost, that is going to make a difference. Please don't lose sight of that. Thank you.

MR. GOVEIA: John Goveia representing Pacific Building Consultants as a roof consultant in the area. Charles, maybe you can help me out real quick. On a low-slope alteration, a reroof job, steel deck where they're taking off, they're

taking off the roof insulation. It's damaged, it's wet, whatever, they've got to look at the deck. They go back with -- Let's say it was R-11. Do they go back with R-11 or do they go back with R-19 or do they go back with R-11 plus? It's all above the deck.

MR. SHIRAKH: You know, this is creating a lot of anxiety, this measure. We need to go back and look at this.

MR. GOVEIA: Okay. Mine was just a simple question. Do you just bring it up to current code because you are now replacing it all and therefore under an alteration?

MR. ELEY: Well the R-14 is less stringent than current code because it's constrained by the opportunities of only putting the insulation above the deck. I think the, the requirements in the standard right now are not clear about what you do if you have something between. If you have some insulation but it's not quite R-19. And I think a lot of questions have been brought up here today. We're going to have to sort of think that through and come up with something that makes sense.

MR. GOVEIA: I agree.

MR. ELEY: I think what I heard today is that we need to improve this language and to make it more clear. I think Phil also brought the question up about recoating. So I think we need to get, we need to get more clear about what our intent is there too.

MR. GOVEIA: Not just recoating but coating period.

MR. ELEY: Right.

MR. GOVEIA: Which is one mechanism by which you can go cool. It's not just recoating, it's coating.

MR. ELEY: It wasn't our intent that that trigger the insulation requirement.

MR. SHIRAKH: Yes. I inserted some language here that we'd only make it applicable to reroofing. You leave out recoating and re-covering and all that.

MR. ELEY: So we'll also take a, take a look at the cost that, the cost figures that we've heard from you today and see how close our assumptions are to the numbers that have been thrown out on the table --

MR. GOVEIA: Yes.

MR. ELEY: -- today from Martha and

others.

MR. SHIRAKH: We've heard you.

MR. GOVEIA: You've heard us? Who is next? No.

MR. SHIRAKH: Don't talk about R-14.

MR. ELEY: The R-14 requirement, we've heard that.

MR. GOVEIA: A separate question or maybe comment is that bear in mind, I know when Bruce was running his analysis in order for him to simulate, let's say there's a .85 for the U-factor above roof deck. Be aware that in steep slope roofing you can't put an insulation board on top of the deck without having to put plywood or some other nailable base over the top of that. That's under the building code.

In the building code if you put insulation on top of the wood deck and you're doing a steep slope system it requires that you put a nailable surface. You can't nail down through the insulation. So just be aware of that when you're working through that. That's the current California Building Code, which is based as you know on the IBC. I believe that the IBC which will be coming shortly has a similar

provision.

ADVISOR PENNINGTON: So that is a concern about a particular alternative? I'm not understanding the context of what you're telling us.

MR. GOVEIA: I'm just saying that if you have some systems that have been analyzed, and in the way that they worked and the analyzation process in running simulations used an insulation board on top of the wood deck as part of a system.

MR. ELEY: Well I think the R -- the .85 you could probably achieve by just the sheet of plywood practically.

MR. WILCOX: What we're really, what we're really doing here is the air space.

MR. ELEY: It's the air space where this was based on.

MR. GOVEIA: Right.

MR. ELEY: Our .85 R value is not very much.

MR. GOVEIA: Right. I just bring to up so in case there were systems that had insulation on top of the deck, there's more than just insulation that would have to go on top of the deck if it was being put up there, okay.

And then a third thing, just a quick comment on, I think it was Mr. Gillenwater's comment about buying membranes based on warranty. I would suggest that all warranties, they're legal documents, there are legal implications and to contact legal counsel. You don't buy membrane systems based on a warranty.

Okay, thank you. Any questions?

MR. McHUGH: I've got a question.

MR. GOVEIA: Sure.

MR. McHUGH: We heard a lot about the R-14 on top of the deck. In the situation where you are reroofing and you have insufficient insulation what is your recommendation? What do you think makes sense? I know that you have probably thought about this, a little bit about how the current proposal doesn't work. Do you have a counter-proposal about what actually does yield some energy savings for the state and addresses the opportunity posed by reroofing?

MR. GOVEIA: That would be far beyond what our scope of involvement is. We're on the technical side of the roofing portion. The cost analysis and benefit analysis would be more in the realm of like Mr. Akbari does or Oak Ridge

National Labs, things like that.

MR. McHUGH: Okay, thanks.

MR. GOVEIA: Okay.

MR. DREGGER: Phil Dregger. I wanted to clarify and see if I understood. There seems to be a change in how cost premiums are determined and I wanted to see if I was reading it right. Our PBC report, infamous as it is now, was structured from the 2002 PG&E structure and the 2002 PG&E co-change proposal, which looked at a system, non-cool, how do we make it cool. Non-cool, how do we make it cool?

We added coatings, you know. We did cementitious, all sorts of things. White -- Black sheet/white sheet, okay. It was take the system, change it premium as defined. In fact, that's the way our report was completely structured. We'd look at the system, how do you tweak a non-cool to make it cool. Okay.

Recently, and especially with some of the cost data that's been presented it looks like it's changed from a cost premium associated with how to make a given system cool to switching systems. It's a moving target. Is that what the rules -- I mean, is that the intent, to change the

criteria? And I'm just asking, has it been changed? Well first I'll just ask that question. Am I reading it right? And then I guess --

ADVISOR PENNINGTON: So I think the question is, how do you go from a system, any base system to a cool roof. What is the most reasonable way to do that?

MR. DREGGER: Yes.

ADVISOR PENNINGTON: And moving to a single ply system that's cool is a reasonable way to do that, regardless of what the base would be. Another possibility is if you're talking about a metal roof. You know, what does that cost to make it cool. So that seems to be in the 50 cents per square foot range also. The latter two approaches make up the large market share, right? So those are, those are quite plausible ways of doing it within the market.

MR. DREGGER: And I just want it clarified because it seems to have evolved and it's evolving, okay. Because the report that we originally did, I would structure it differently. A single ply roof I wouldn't just leave it open, any single ply. I would check the cost-effectiveness of 45 mil, 60 mil, 80 mil.

I mean, I would do, you know, there would be a much different kind of snapshot survey if we were going to go, what is the difference between going from one system to another system. Instead of a base, a three and a cap, a base, one and a cap, a base, two and a cap. All extremely different costs.

But if you're looking at what is the cost premium from going to a built-up system, no matter how many plies to cool, that's the same because you do something to the surface. But its initial cost, whether it's a base, one and a cap -- I mean, how many people know that a base, one and a cap is installed? I mean, it's installed and it's a different cost.

So I just wanted to make sure I understand what the parameters are and then I would, I would look at it a little bit differently. And that's all, thank you. Any questions?

MR. MAEDA: I have a quick comment. Bruce Maeda, Energy Commission staff. I think in some cases, particularly for low slope, you have probably more flexibility in terms of whether you can switch systems or not. Whereas in a high

slope you may not be able to switch systems as easily because you're trying to achieve different things. So I think there may be differences between those two situations.

MR. DREGGER: I concur. It's been a bit of a moving target so I just would like to clearly understand what the parameters are and then I can, you know, comment on them. Thank you.

MR. HARRIS: Hello, I'm Ted Harris California Strategies, representing the Cool Metal Roof Coalition. I first want to say that we really are very, very thankful for the process. I feel like it's been a successful public information, kind of public participation process that's incorporated stakeholder input and it really has been a success.

The only point that I'd really like to make is on above sheathing ventilation. We've heard that new construction typically uses a performance approach, we understand that. But in California what are the numbers? Two percent. You know, whatever it is there are lots and lots of homes and buildings built every year in California. Even if it's a small percentage it's still thousands of homes and buildings and in

California that's a big deal. It's important to our group.

So taking into consideration we really appreciate what you have done on the reroofing adaptation side. The same language seems like it would be relatively easy to fold into the new construction and we really appreciate it.

And then the other item on the climate zones, we'll look at the insulation stuff in detail and we'll continue the dialogue. So thank you so much. Thank you.

MR. SHIRAKH: I think the only thing -- and we talked about this. In nonres 98 percent of the cases are performance where this would be available to anyone. I guess you're concerned about the two percent where we're going to go prescriptive.

MR. HARRIS: Yes and, you know, I don't know exactly how many buildings. But my understanding of home construction on the res side, we've got a couple of hundred thousand homes. You know, things are down a little bit. But two percent, you're still looking at four or five thousand homes on the building side. I'm sure we're talking hundreds, maybe thousands, even

at two percent.

So that might not be a large percentage but why not fold in that opportunity for those folks to realize that benefit that gets you energy reduction and associated greenhouse gas reductions. It just seems like it should recognize that benefit. Thank you.

MR. VOGEL: Hello, Mike Vogel with US Clay Roof Tiles. I just wanted -- We were talking about costs all day today. When it comes to clay roof tiles for cool roofs there is no cost difference between a cool roof and a non-cool roof for us. Cool roofs, we charge no extra for that so on a cost basis from the clay roof standpoint there is a zero assumed cost gain.

With the infamous slide 13 I had some questions about it. What is the rationale for having a much lower reflectance value on a lightweight roofing material than a heavier product? That was my question. And what is, what is the basis of the five pound product considered a lightweight versus when it comes to reroofing standards mostly anyone would say that a sub-six pound product would be a lightweight roof?

MR. WILCOX: Can I answer?

MR. VOGEL: Absolutely.

MR. WILCOX: I'd be happy to change that to six pounds if everyone thought that was a better number. That's really just designed to be a way to differentiate cleanly between lightweight products, particularly tile systems. So if six pounds is better six pounds is fine, I think, if no one objects to that.

And the .08 and the .15 numbers are supposed to represent typical kind of dark colored, low reflectance products in the market. And if that's, if we're wrong about that maybe we should hear about that. But .08 shingles, you know, is a very dark colored shingle.

MR. ELEY: Black.

MR. WILCOX: Black. And such things are really out there. The .15 tile is a -- concrete tile seems to be a pretty reasonable value for a dark, conventional tile.

MR. VOGEL: And one last thing. The emmitance, did it change? Was it .75 or is it now .9?

MR. WILCOX: Well, there's a difference between the prescriptive requirement and the standard design here because the attempt here is

to represent typical real products with the standard design. Otherwise we end up giving people ten point reflectance credit for simply having a normal black shingle if we say the criteria is .75. Because the models actually account for the .75. And if you come in and you say minus .9, that's -- We did some numbers on that, it's a ten point reflectance change.

MR. SHIRAKH: The prescriptive requirement is .75. In performance we use .90 because most products --

MR. ELEY: And also the SRI numbers are based on .9.

MR. SHIRAKH: The SRI are -- Well, the SRI and prescriptive is based on .75, I think, no?

DR. AKBARI: No, SRI is .9.

MR. ELEY: It's .9.

MR. SHIRAKH: It's .9, okay.

MR. FLAMM: Jay.

MR. WILCOX: You missed your chance.

MR. SALAZAR: Jay Salazar, City of Vacaville, CALBO. I have a question about this slide and then slide four. And it's not a bad question. I'm like the GEICO caveman, man, I just don't get this stuff so you've got to bear with me

here (laughter).

The thing, the thing I want to understand about the performance calculation. Now these numbers are going to go into the model, correct, or proposed to go into the model?

MR. WILCOX: Yes.

MR. SALAZAR: And so in plan review when I am at the local jurisdiction level, now is my plan reviewer going to be responsible for checking the architect's inputs into their calculations? Because if they want to take credit for a special roofing system are they going to be able to have the availability or the ability to plug those numbers if they're using a specific kind of product to get credit for it?

If I understand this correctly we're going to plug this, this is going to be the standard stuff that goes into the standard model, the standard house we compare it to. Then when the architect or whoever does the energy calcs when they want to, they want to you know, they're trying to shave their energy calculations somehow and they specify some sort of let's say special concrete tile at a special reflectance and emittance. Will the new proposed standards

require the software to have them input that in separately, do you think? And maybe I'm ahead of the train here.

MR. WILCOX: Yes. Yes.

MR. SALAZAR: Okay. So here is my concern. This is why I want to make sure that yes, that's going to happen.

MR. SHIRAKH: Yes, you're ahead of the train, I think. (Laughter)

MR. SALAZAR: That's exactly what's going to happen. So from an implementation point of view at the local level it is going to be a little more difficult for us because that's going to be one more thing we're going to have to look for.

Now I realize this sounds easy but as people have said many times and there have been many news articles about this and probably someone will say it again today, gee whiz, those building officials aren't doing a very good job with energy conservation implementation. And I'd be the first one to say, you know what, you're absolutely right. It's kind of hard.

And what we're asking the Energy Commission to look at, and staff, is when we get

to the implementation stage. At that level down where it's at the local jurisdiction, make it as simple as possible. So here is an example. If there is a way, if there is a way that we don't give all those options. Something that we don't have to plan check just one more that would be great and yet still get the energy savings.

I'm not sure what that way is. I really don't know and maybe that's further discussions. But if we could take the burden off the local plan reviewer to verify. Oh gosh, now he's got to check the asphalt shingle input and he's got to check something else. And the radiant barrier isn't so hard to check, that's easy.

But just two or three or four more things we have to check is just a little bit more that can go wrong on our end. So I'm wondering if in this public process if we can take a look at, is there a way to simplify it.

Then the other disconnect that I am experiencing right now, and I think many other building officials are, is the performance calculations get generated by an energy consultant and there is no, there is no tieback to the architect's design. In other words they --

For instance, I can see it happening now. The architect just shows asphalt shingles or clay tiles, they don't specify a specific kind. But yet their energy consultant will specify a very specific kind in the energy calculations and there will be no connection between the two. So when my inspector goes out to inspect he or she won't know what they're looking for.

We've brought this up in other meetings where we said somehow we'd like to have either the energy consultants signing the plans or somebody doing something along the lines of closing that gap. Because what happens is it comes down on the inspector and the plan reviewer.

But you know what, that's not the real disconnect. The real disconnect is the architect. And I don't mean to make architects sound like lawyers but the architect just doesn't always look carefully at the energy calculations. Especially, especially on tract housing.

I mean, tract housing, it is going to be our biggest energy user in the coming decade. We all know that. Single family dwelling units, we look at all the studies. They're going to be our large energy consumers. But on tract housing we

have all these options and we have the most number of disconnects. The highest number of variables that can go wrong with respect to implementing the energy standards at the inspection and plan review stage.

So what CALBO and what I'm asking for in this public comment is let's take a look at little things like this. This is great. If there is a way to simplify it, to make it easier, I'm not sure what that way is. I don't have a solution yet. But maybe if we talk about it we can get to that point.

Then on slide four I had a question about the residential reroof. And bear with me because I'm not quite clear.

MR. WILCOX: I think that's the one that is wrong, isn't it?

MR. SALAZAR: No, I'm okay. Again, it's not a technical question, it's an implementation question.

MR. WILCOX: Okay.

MR. SALAZAR: So if the standard were to go into effect and somebody came to my counter and wanted a permit, I'm in climate zone 12. So I need to verify or the building permit would need

to say something along the lines that you have this aged reflectance of .2 and emittance of .75, is that correct?

MR. WILCOX: Right.

MR. SALAZAR: Okay. And then if they didn't want to do that, which as I understand from staff this is actually pretty standard in the industry right now. It's not?

MR. WILCOX: No.

MR. SALAZAR: Okay. The .2, I thought the .2 was?

MR. ELEY: It's common but --

MR. SALAZAR: It's common.

MR. ELEY: -- it's hard to get materials that have actually been tested to --

MR. SALAZAR: Okay, okay, all right. No, that's good. So then if they don't, can't meet that standard then they've got the seven things over here.

MR. WILCOX: Right.

MR. SALAZAR: Now what I have been directed by CALBO to say is, we don't think it's a good idea to get inside the house on a reroof permit. We think that it is a de-motivator to people pulling permits. I'll give you an example.

How many people took the freeway here today? Just raise your hand. Okay. How many people who took the freeway today maintained their top speed below 70 miles per hour, raise your hand. That's right. The speed limit is 70 miles per hour. We are all good-meaning, ethical people. But even in our daily lives something as simple as meeting a speed limit, we don't meet it. And that is the same experience we building officials have with people not pulling permits. That's the issue.

And we have the best contractors who are coming to these meetings. They're the ones that are really doing the right thing. But there are all sorts of people out there doing reroofs and roofing jobs that aren't doing the right thing. And the example of the speed limit issue I like to bring up because we all tend to break that. Well just imagine people who have a real economic interest not following the rules.

So I think those are some of the implementation problems that we face at the local level. So that's one thing that we would like, like you to consider on the reroof requirement. Is try to stay outside of the -- make it as easy

as possible.

The other direction we think we'd like to see the Commission take a look at is we have an awful big problem with the real estate industry. What happens is they like to do a lot of reroofs. Real estate agents hire roofers to do reroofs on resales often and yet we don't see very many permits. While we try to track the numbers of illegal work in Vacaville, I've tried to track it, it's somewhere around 20 percent. We issue about 500 reroof permits on residentials a year and we think we're missing about 250 of those don't get permits. So we should be issuing about 750.

So there's all these implementation issues that we need to get at. And one way that the Energy Commission may be able to get at that is to talk to the legislative staff about having legislation that mandates real estate agents on resales to require cool roofs or duct ceiling or something along those lines. But don't place the entire implementation burden on the building inspection staff and the building officials.

And that's all, thank you very much.

MR. WILCOX: I think those are all very important points. We have all been struggling

with what to do about alterations with duct ceiling, with all kinds of measures because it's a real issue. The concept about, the comment about keeping it outside of the roof. These are optional alternatives, right? I'm not sure that I see that as a problem if we give somebody an option to do something that they can do if they'd like to.

So it's not like we're saying, if you're going to reroof you have to fix your duct system. We're saying, if you don't want to do a cool roof these are the following things you can do, all of which are calculated to give you the same energy savings. So I don't really see that as an issue of the kind you're talking about. It's not like the one where we say, if you are replacing your cooling system you have to fix the ducts. That's the one that is problematic, right?

ADVISOR PENNINGTON: So what of these are not inspectable from outside? I guess it's the ceiling insulation. The radiant barrier ought to be fairly easy to inspect. I mean, an example --

MR. SALAZAR: In that capacity CALBO asked me to make that comment, California Building

Officials. That if we are doing a public policy implementation strategy let's, let's take a look seriously on a reroof permit at keeping stuff that we can inspect right off the bat.

Our concern is that people are going to get overwhelmed, they're going to come in to the counter and it's going to be, you don't have reflectance of .2 or an emittance of .75, and then they're going to leave and we're going to never see them again and they're going to do the reroof. That's the reality that we face.

ADVISOR PENNINGTON: So the alternatives may help that, right? The alternatives --

MR. SALAZAR: Well they won't if it's the typical contractor we see because they don't have the resources to have a full list of subs or people to get a hold of to do the interior work. They're C-39. They rarely get the homeowner home on the day that they're doing the reroof.

ADVISOR PENNINGTON: So you're suggestion would be to not have alternatives that require a different sub to be involved with.

MR. SALAZAR: Correct, correct, correct. That's what CALBO has asked me to express.

ADVISOR PENNINGTON: And I don't know

what the industry's view of that is. I mean, we sort of talked about that as a possibility at one point in the discussion, that we keep this strictly to what a roofing contractor could do. And I think the industry has asked us to go a little bit farther than that in providing them with options that are plausible to do at the point that the reroofing job is being done.

MR. SALAZAR: Right. And what we think is that those respectable colleagues in the industry might be missing is the vast reality of people who don't get permits and then get de-motivated not to get a permit. And the inability of local jurisdictions to go after those people. We don't have the resources to chase after a roofer that doesn't get a permit.

We'll send an e-mail to the Contractors State License Board but you've got 400 jurisdictions in California. If they're all issuing about 500 residential reroof permits a year and they're missing about 30 percent of those there is not CSLB staff to prosecute that many people.

So we've got some larger public policy issues about, at the implementation stage that are

going un-analyzed and really unnoticed. And that I would argue is the disconnect you see when we have an expectation that certain products and certain facilities be built to a specific standard and yet we're not seeing it.

ADVISOR PENNINGTON: I'm not sure what our alternatives are for resolving this. I don't know if at the counter point you could say, you need to choose something here on this list and commit to it before you walk away. And it's not, you know, see ya, you know. That's not the transaction you're trying to have.

MR. SALAZAR: We agree.

ADVISOR PENNINGTON: So I don't know if we could work that out.

MR. SALAZAR: There may be, there may be --

ADVISOR PENNINGTON: So you have a checklist here. Okay, you need to do one of these. I don't know if we could work that out or not.

MR. SALAZAR: Well, or take that very good list and attach it to some other implementation strategy but not at the building permit strategy. Attach it to the real estate

resale, the real estate resale legislation. That houses that go through a resale must have performed one of these items on that list.

MR. SHIRAKH: Jay, you need to get closer to one of these mics.

ADVISOR PENNINGTON: I can hear (laughter).

MR. SALAZAR: I'm sorry.

MS. HARDY PIERCE: Bill.

ADVISOR PENNINGTON: Yes.

MS. HARDY PIERCE: My name is Helene Hardy Pierce with GAF and I'd like to address it just from a different, a different perspective. The contractor who goes in and then gets fumboozled and then never pulls a permit, whether you have these equivalents or not, they either will or won't pull a permit. Because remember, through the performance analysis they don't have to use a reflective shingle anyway. So they can go and buy whatever they want and put it up there anyway if they follow those other --

So I think that there is a little bit about those who want to follow the intent of the regulation and those who don't. And those wanting to follow the intent of the regulation, these

equivalent prescriptive requirements, which yes industry is behind a lot, make sense and they're there for the right reasons. So thank you.

DR. AKBARI: I would like to add a comment. There are some items in here that an average roofing contractor can easily do that. Clearly SRI and the first item there or the aged solar reflectance are about the same. A roofing contractor can immediately see whether there's ducts in the attic or not.

But the roofing contractor would have a problem to find out whether there is an R-30 insulation, whether there is an R .05 grade above the deck, whether the ducts are sealed, and whether the attic is ventilated 30 percent. So these are the things that the typical roofing contractor cannot do that.

MR. SHIRAKH: Actually the way it is in the standards a lot of these are exceptions rather than alternatives. Like if you seal your ducts then you don't have to do -- so it's not really an alternative. It looks worse than it actually is.

DR. AKBARI: But someone, someone has to check these things.

MR. SHIRAKH: Right.

DR. AKBARI: Who is that someone? The building official said that they would like not to go to the site. And the contractor, the roofing contractor cannot put a check mark in front of item number seven.

MR. McHUGH: Why not?

SPEAKER IN THE AUDIENCE: Well seven they could.

MR. McHUGH: Why not? Seven they should.

DR. AKBARI: The vent area.

MR. McHUGH: I think contractors should --

DR. AKBARI: The calculation would be 30 percent of vent area.

MR. SHIRAKH: You either have radiant areas or you don't. You either have ducts in the attic or you don't. I mean, these are not really --

DR. AKBARI: So a roofing contractor can do that, that's interesting. Okay. And the same thing, your roofing contractor can say whether there is an R .85 above the --

MR. McHUGH: Sure, if there's some good materials.

ADVISOR PENNINGTON: Do you have a comment, Jay?

MR. SALAZAR: Just a reality check. Yeah, the person with the license may be trained in that but reality is they have a staff of 30 that have varying academic backgrounds that have no clue. And so when they come to the counter and I say, I want you to check to see if you have SRI 29 or 19, they'll look at me with like a deer in the headlights kind of expression. And then they'll go, yeah, okay, I'll go check, and then I won't see them.

I just really think that's important to bring to light in a public forum that that implementation issue at the local level is very difficult and it is not as easy as it would appear to be when we're developing the standards.

DR. AKBARI: Let me, let me put another comment there. Whenever there is going to be a label that label would have the solar reflectance, thermal emittance. That same label can easily have the SRI. So we do not have to pick on that one. I was mostly worried about the other items that I was assured it's not a big problem.

MR. McHUGH: So some examples in that

area. Do you feel that they wouldn't be able to identify what fraction of the roof area is in vents? I mean, isn't it labeled right on the vents?

MR. SALAZAR: They could identify it but I think the reality is what they want to do is pull the permit, get out there on a Saturday, get the roof stripped, put it back on, have us come by, do the final and leave. And that's what the contractors we work with are used to. Not --

And there are a lot of contractors here who actually go the extra mile. A lot of roofing contractors who show up to these meetings are the ones we love dealing with because they're always the ones that propose higher bids, that propose to do the right thing. They know the standards. But that's like here's all the contractors and that's like this many of them.

And that's -- I mean, this is not a criticism of CEC staff or anybody. I just think the building officials in California haven't made this an issue in the past. So we have been merrily trotting along thinking everything is okay until contractors realize they go to a counter at some jurisdiction and the counter staff doesn't

know what's going on. So we try to point out these kind of implementation issues now. Not as a criticism, just as a reality check.

MR. HITCHCOCK: That's not what I got up here to talk about but I'll just make one comment on that. (Laughter) The roofing industry groups I work with, I work with two of them, and both of them support options in the code and this is one way to get there. And I haven't seen a better way yet come out of this process.

We want flexibility in the marketplace, we want the consumer to have choice in terms of what they put on their building and what they put on their home. You know, choice of product, choice of color, choice of, you know, whatever roofing product best suits them and their building.

That aside, what I got up here to ask was really for the benefit of our groups and the other groups here. I'm curious what the next steps and time line are in relation to this process.

MR. SHIRAKH: This is the last of the workshops. I guess Gary mentioned -- You weren't here this morning. Next October or November we'll

have the rulemaking hearing where we'll present the 45 day language.

MR. ELEY: Between now and then we'll be probably in touch with many of you trying to work out these details.

MR. HITCHCOCK: I was just going to ask, is there still opportunity between now and then for, you know, individual associations to approach you to meet on specific topics or what have you?

MR. ELEY: If you have raised issues or questions here that we feel we can address then we'll try to do it.

MS. HITCHCOCK: In that case I would refer you to my May 25 letter from Jim Mattesich. Thank you.

MR. ELEY: Bring some contractors with you next time. (Laughter)

MR. HODGSON: Mike Hodgson, California Building Industry Association. I would like to draw the roofing portion of this session to a close. (Applause)

ADVISOR PENNINGTON: So actually Scott wanted more information on the time line. That was the question he had.

MR. SHIRAKH: Again, in October or

November we'll have a hearing that is going to be conducted by the Commissioners in their offices and we'll present the 45 day language. Then after that there will be an adoption hearing in January. Probably late, the second business meeting in January, where the full Commission will be there to consider adoption of the standards.

SPEAKER FROM THE AUDIENCE: Those are closed sessions, correct?

MR. SHIRAKH: No, they're open.

ADVISOR PENNINGTON: I might just go beyond that a little bit. The way we normally conduct a rulemaking, it's a formal proceeding. It's the formal part of all of this. So we would make a formal proposal. This is not a proposal, this is a draft. This is a work in progress draft that we're talking to you about today.

But to start the rulemaking we would make a proposal and there would be a notice that would begin a 45 day comment period.

And our practice is to hold a, for the Energy Efficiency Committee to hold a hearing maybe a couple of weeks into that 45 day period. And it would be an open, public hearing where people could testify and whatever. And we

certainly would be accepting written comments also on what was proposed. So for 45 days there would be an open, an open period. We'd hold a hearing, we would accept your comments, we would be thinking about your comments.

If we decided not to make any changes to the proposal during that process then there would be an adoption hearing at the end of that 45 day period before the full Energy Commission. My experience has been that it has to be an unbelievably simple idea that is being proposed for adoption for the Commission not to change the proposal in response to comment during that 45 day period.

So the normal thing to do is that at the end of the 45 day period for there to be a revision of the proposal that attempts to respond to the comments that would go out as 15 day language and that would be a separate process. And there would have to be a minimum of 15 days of comment allowed for that.

Normally the Commission meets every 14 days so you can't get a Commission meeting and the 15 day thing to line up exactly right. So it usually is like a 28 day time period for that 15

day language process.

So normally we try to close on the issues to the maximum extent possible when we release that 15 day language. And, you know, if there's any issues left after that it's a total disagreement. You know, the Energy Commission doesn't agree with the comment. If there is any agreement we try to address the issue.

MR. KRINER (FROM THE AUDIENCE): So once it's adopted by the CEC did I hear earlier that it would not go into effect until April of the following year?

ADVISOR PENNINGTON: Correct.

MR. KRINER (FROM THE AUDIENCE): That's correct. Nothing happens in-between there?

MR. ELEY: Well yeah, a lot of things happen in-between there.

MR. KRINER (FROM THE AUDIENCE): Well, the manual comes out and stuff.

MR. ELEY: Right, right.

MR. KRINER (FROM THE AUDIENCE): But the language itself (inaudible).

MR. ELEY: Well it goes -- After the Energy Commission adopts it, it goes to the State Building Standards Commission and it goes through

a few other perfunctory approvals. But the main, the main adoption is here at the Energy Commission.

ADVISOR PENNINGTON: So we're basically working on implementation things after that. We have to prepare compliance manuals, so that's what Mazi was talking about earlier. We would be trying to provide examples, provide forms, trying to clarify what it is that the standards do. And those have to be approved by the Commission at least six months in advance of the effective date of the standard.

There is also the compliance software have to be updated to be consistent with the changes and the Commission has to approve the compliance software updates. So that happens during that time period also.

MR. FLAMM: I'd like to bring up that there is an opportunity for this industry to get involved with staff in writing those manuals as we are trying to take the technical language and convert it to layman's language. And so there is an opportunity for the industry to help us do that.

MS. DUNHAM: Should I give you my card?

MR. SHIRAKH: You need to come closer.

MR. GOVEIA: Can you hear me?

ADVISOR PENNINGTON: No, not as well.

MR. SHIRAKH: If she can hear you we can hear you.

MS. DUNHAM: I was volunteering, Martha Dunham, Enterprise Roofing. I was volunteering to help with the layman's language.

MR. SHIRAKH: Well give me a business card.

MS. DUNHAM: Okay.

MR. GOVEIA: Bill, a quick question.

ADVISOR PENNINGTON: If you can get, if you can get Jay to say your question then it would be perfect, otherwise you should come up.

DR. AKBARI: A point of order. You have a speaker there.

MR. HODGSON: It's me, it's okay.

(Laughter)

MR. GOVEIA: I'm sorry, it was a simple question on the time line. So you're saying that somewhere around plus or minus January of 2009 would be the publish date or January 2009 would be the date it goes into force?

MR. ELEY: That's the enforcement date.

MR. SHIRAKH: No, no, no, adoption date.
MR. GOVEIA: The adoption date. So then you have 180 days after the adoption date until it finally goes into effect, right?
MR. ELEY: No, no.
ADVISOR PENNINGTON: The adoption date we are trying to shoot for, around January of 2008.
MR. GOVEIA: Okay.
ADVISOR PENNINGTON: The standards would get published somewhere in the latter part of 2008.
MR. ELEY: But basically you'd have a copy of them when they were, when they were adopted.
ADVISOR PENNINGTON: You would have it right then, you would know what they were, but we wouldn't formally publish -- The Building Code publishing organizations do the publishing.
MR. GOVEIA: Right.
ADVISOR PENNINGTON: So that's sort of a detail.
ASSOCIATE MEMBER ROSENFELD: Then there is an effective date.
ADVISOR PENNINGTON: The effective date

would be April of 2009.

MR. GOVEIA: Okay. I can work backwards from that, that's fine.

MR. ELEY: The compliance manuals would be finished in the fall of '08.

MR. SHIRAKH: October of 2008.

MR. GOVEIA: Great, thanks.

MR. HODGSON: My goal is to finish by five p.m. It is now 4:57, okay.

MR. SHIRAKH: You volunteered five times.

MR. HODGSON: I have just some general comments since I noticed on today's and Friday's agenda, this is really the only time I saw for general comments. And speaking for the California Building Industry Association and Bob Raymer who is not here today. Just a little preface, CBIA is a statewide organization representing around 7500 member companies and we're involved primarily in residential and some light commercial construction. And the CBIA members build about 80 percent of the new housing in the state.

We have covered the issues of regulatory time line, which is Bob's first issue of implementation date and when does it go to

building standards.

We have a couple of questions which probably cannot be answered today but we'd like to put them into the public record.And that is, what is the Energy Commission's savings goal for the 2008 update. This is a question that has been asked at every public workshop from CBIA. The last two standards were approximately 10 to 15 percent. We want to know what the current standards are going to be and how they interact with the Governor's goal to reach his mandates.

A very important question that has not been really addressed is the accumulated compliance cost of these standards. We've been talking about a very small section of 2008 today and we would like to know what's the incremental cost of compliance for a new home in the variety of climate zones. We'd be happy to work with your consultants as we always will do and staff in working on those and giving you feedback.

In order to do that and determine the cost-effectiveness of the standards we need an accurate compliance tool and we're wondering when that compliance tool will be available to do performance budget calculations for small, medium,

large homes in the variety of climate zones as well as attached housing, stacked housing, et cetera. This is the same, as we call it, drill we have been doing for the last 15 years and we need to be engaged in that to give you accurate feedback.

Probably the biggest issue, and I think Jay began to address it when he accused me of speeding on my way here, which is perfectly accurate and I've never met Jay until today. But that really emphasizes the need for ongoing compliance, education and training.

Just for those of us in the room who follow the standards and work within the standards, the RER study that was published back in '04 looked at the 2001 standards and basically said there was about a 44 percent noncompliance with Title 24.

The QuanTech study released last month and funded by public goods funds really didn't have an overall general estimate of noncompliance. They looked at specific portions of the standards. Twenty-eight percent of the lighting in the 2005 standards were noncompliant, 68 percent of window replacements were noncompliant, 73 percent of duct

improvements were noncompliant.

We have a real issue here. We've done an informal survey in 2006 in the fourth quarter of 60 jurisdictions. Fifty-two percent of those did not require CF4Rs or CF6Rs. And of those 60 jurisdictions they represented 74.7 percent of the permits in the state of California.

So the issue that I think CALBO has brought up and we reiterate from the building industry is our regulations are getting more complex. And as they get more complex they get harder to enforce. And if you just look at the independent studies that are looking at our standards and we're trying to claim energy savings, we really have a disconnect. So we need to work together to figure out how to reduce the issue of noncompliance in the standards.

And CBIA makes that pledge to do that. We've had informal conversations with CALBO. We need to be brought in to these discussions as the previous speaker said, who is really the person who implements it in the field. We need to be here at the beginning to discuss how these things actually get implemented.

Because if you are going to base cost

effectiveness on something our recommendation as people who do some EM&D work or monitoring and evaluation work is you should downgrade your energy savings by the effectiveness of your regulations. And right now our guess is they're somewhere between 50 and 75 percent ineffective. So we would like to bring that issue to the forefront and work with the Commission on how to improve these standards.

I would like to make a general comment about AB 549, for those of us who spent a fair amount of time working with the Energy Commission and the Legislature to bring residential existing housing stock into the picture of energy code regulations. There are 12.2 million housing units in the state of California. This year we'll build 85,000 new units, single family detached, and 126,000 total units in the state. That's less than one percent.

So we're talking about primarily in the new construction market the regulations affecting less than one percent of our existing housing stock. I understand the retrofit market has been represented here on an issue. The new construction market welcomes that but we think

there can be substantially larger strides and some suggestions like other points of contact besides a local jurisdiction need to be implemented.

And quite frankly the AB 549 recommendations were really non-existent. So we were very disappointed in that study. We were very disappointed that we spent the time in the Legislature to do that. The study actually estimated gross potential annual peak savings from residential buildings to be about 2.9 thousand megawatts. That's a huge number. Much more than the standards would do for residential new construction.

So we have two large issues that we don't think have been addressed. One is the residential market I think needs to be a little bit more aggressively looked at from our perspective. And then the bigger picture is if you're going to make new standards let's enforce the ones we have already. I will also enter Bob Raymer's comments in writing to the record. Thanks. Any questions?

PRESIDING COMMISSIONER ROSENFELD: Bob, I just want to say I agree with everything you said. I agree that the Energy Commission's job on

AB 549 was sort of pathetic.

ADVISOR PENNINGTON: I would disagree with that comment I guess. (Laughter) AB 549 posed a variety of measures that California in total could pursue to save energy in existing buildings. We specifically called out things that the Energy Commission could do and pursued getting resources for doing that.

And we have been vigorously pursuing trying to get resources to do that. It doesn't come easy, let me tell you. We are getting, we are making some progress on getting resources. So we are getting a position where we're more able to address these things.

MR. HODGSON: Well we're here to support that effort. And Commissioner Rosenfeld, I agree 100 percent with you but I will never disagree with Mr. Pennington in his presence. I know where things happen sometimes. (Laughter)

However, I think there is a very big opportunity here. You have a pretty active group from the building officials side, from the home building side and from the compliance enforcement side. And we need to seize that opportunity because if we don't I think by the time we get to

the 2008 adoption cycle you will have much stronger opposition to more rigorous and complicated standards. So we'd like to see some movement now.

I know I'm repeating myself to Bill because we've had these informal discussions. But we really need to see some level playing fields in enforcement of standards that you have been adopting for 20 years. Thank you.

MR. FLAMM: Does anybody else have any additional comments? It is after five I warn you. (Laughter) Did somebody say yes? No?

Well I thank you all for spending a long day. I feel like I've run a marathon. And I've never run a marathon so I don't know what that feels like but that's what I feel like. Thank you all for spending the whole day with us and we look forward to continue working with you. Thank you, goodbye.

(Whereupon, at 5:05 p.m., the Committee Workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, RAMONA COTA, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Committee Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 29th day of June, 2007.