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BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the matter of:	)	
	)	Docket No. 21-BSTD-01
2022 Building Energy Efficiency	)	
Standards (2022 Energy Code)	)	

LEAD COMMISSIONER HEARING

2022 BUILDING ENERGY EFFICIENCY STANDARDS

(TITLE 24, PART 1 AND PART 6)

REMOTE ACESS ONLY

WARREN-ALQUIST STATE ENERGY BUILDING

1516 NINTH STREET

1ST FLOOR, ARTHUR ROSENFELD HEARING ROOM

SACRAMENTO, CALIFORNIA 95814

MONDAY, MAY 24, 2021

9:03 A.M.

Reported By:
Martha Nelson

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Andrew McAllister, Lead Commissioner

Staff Present

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INDEX

INDEX(Cont.)

P R O C E E D I N G S

MAY 24, 2021

9:03 A.M.

MR. BOZORGCHAMI: So, good morning everyone. Apologize, a minor technical difficulty here. My name is Payam Bozorgchami, Project Manager of the 2022 Building Energy Efficiency Standards.

Let's start the workshop by -- I want to welcome, new to the Energy Commission, virtually, Commissioner Hearings for the upcoming California Energy Code. The Lead Commissioner overseeing the work that is being done for the 2022 Energy Code is Commissioner Andrew McAllister, and he's participating today in this hearing.

This hearing is one of three hearings that are going to be held this week on the 45-day express terms where we would like to receive your comments regarding the proposed languages for Part 1 and Part 6 of Title 24.

In these hearings we will not be discussion the Environmental Impact Report. Later in my presentation I will provide you with the docket number and the email link, if you folks would like to make comments on or have questions regarding the Environmental Impact Report.

Let's start first with some housekeeping rules. We will be muting everyone. And after each proposed subchapter is presented you can either raise your hand and we will unmute you or you can submit your questions in the Q&A window. And we will have a group of panelists who will try to answer your question as they come in.

We will have Peter Strait, who will be reading out the questions in the Q&A so that everybody could participate an hear the answer at the same time.

Also, if you are participating by phone you can use *9 to raise your hand and *6 to mute and unmute yourself.

One important thing to remember is that when we do unmute you, you also need to unmute yourself from your end. And please state your name and who you're affiliated with. This workshop is being recorded and it will be transcribed. And by stating your name and affiliation we can figure out who we need to reach out to for further discussion, if needed.

Also, we are going to implement the 3-minute rule today and we're asking for one speaker per organization to provide comments. But depending on the number of commenters who would like to comment, we may actually need to shorten that time period maybe down to

two minutes -- excuse me -- so that we could get through everyone's comments and get through the presentations today.

This is a long -- this is going to be a long day. I think we're going to go all the way to 5:30 and just want to be respectful for everybody's time.

Before we start, Commissioner would you like to give a few words?

COMMISSIONER MCALLISTER: Indeed I would. thank you Payam, I really appreciate that.

One note, I just saw just now, actually a couple of minutes ago, Russ King put a comment that said he was having trouble with the link, and then he actually had to go to zoom.com and enter the meeting number and passcode. So, I'm not sure about that link, you might want to update that.

MR. BOZORGCHAMI: Yeah, I think Tajanay (phonetic) and Amber are looking into that right now, sir.

COMMISSIONER MCALLISTER: Okay. Okay, great. Well, so if -- let's keep an eye on the participant numbers and just if they spike up after we update that, I think we should maybe consider, you know, just giving folks a rundown of what's already happened before they joined.

But in any case, thank you for that intro Payam. I have to say, I have been looking forward to this week's hearings for quite a long time. I'm sure many of the folks on today, so far, that will be listening in throughout the course of today, and Thursday, and Friday also have been really anxious to have this discussion in the formal rulemaking process. And so, we're now in 45-day language. The formal rulemaking is open and in process. And it's really key that folks, you know, pay attention to the details.

And I just wanted to make a few comments, general comments and then a few specific ones. So, thanks to you, Payam, to all the staff that's been marshaling this. And it's a huge, more than a village effort. It's really, you know, a fundamental responsibility of the Energy Commission. It's one of the reasons the Energy Commission was formed in the first place to promote Building Energy Efficiency Standards. It's in our original statute, in the Warren-Alquist Act. And it really has moved the needle in terms of minimum standards for building technologies and construction practices over the course of more than four decades.

So, that's the context that we're operating in here today. We're updating a set of regulations that

already has I'd say a global leadership position in improving the performance of our building stock.

So, you'll see a list of some of the key staff throughout, who've been involved throughout the development of this Building Code update, of the Building Energy Efficiency Standards update. But just know it really was a much, much bigger team and that we're still very much paying attention. There's a lot of things to be done. Every single comment that comes in has to be answered adequately. And so, that is still on our plate to do and we will dot all those I's and cross all those T's.

And to all the stakeholders out there, you know, you have been an incredible resource to improve, develop, deepen and specify these Building Energy Efficiency Standards, the proposal that's in front of us today. And the process has been very extensive. You know, over the last couple of years, really we've gotten I'd say close to a thousand comments already. We've had dozens of workshops, and meetings, and different forums, many dozens, and made a lot of revisions in response to those comments. And so, you know, please keep doing that. That's really the lifeblood of this process. And I just encourage everyone to submit their written comments, particularly.

Obviously, we can have a little bit of interaction about specific technical issues and things during the course of these hearings but, really, there's no substitute for having written comments. And I would just encourage everyone to get those in as soon as possible. There is a comment deadline, but the sooner those comments come in the more quickly, you know, the higher they'll be on the priority list. Or at least, you know, they kind of come in and we deal with them as they come in. So, the sooner they come in, the more fully and immediately they can get resolved.

And so, I just want to encourage people to get your specific comments in as soon as you possibly can.

We scheduled these hearings relatively early on in the 45-day language period for that reason, to give plenty of time for people to develop their considered comments. And so that you don't -- you know, anyone who wants to submit a comment doesn't wait until the last day. We really want to encourage those comments to come in soon.

You know, it is a complex Building Code. In California, you know, part of the impact of leading on this issue is that we're always looking for opportunities to push the envelope. And that means that we're -- we often have to do specific things for

specific building sectors, and specific, you know, types of end uses. And so, that requires a lot of back and forth to really find where those opportunities are and take advantage of them as much as we can.

And so, that's part of the driver of the complex nature of the Building Code. Certainly Part 6 and Part 1, but primarily Part 6 that the Energy Commission develops. And so, it's really important to get all those details right because the marketplace depends on our getting them right. So, I just want to again encourage folks to, you know, submit early and then be open to a little bit of back and forth, if that's needed, to dial in where the code details land.

We're pivoting California toward the technology, towards a set of technologies that we will depend on to decarbonize our building stock for the long term. And so, that's really a big change or that's the main kind of innovation, I think, that this Building Code is signaling.

The '19 update, the 2019 update took a monumental step. It dial in and improve a lot of efficiency qualities and characteristics of new construction and, you know, alterations. And so, certainly don't want to minimize that. But the requirement that low-rise and single-family residential

have small solar systems, open compliance credit to battery systems, and some of the other elements of that, of the 2019 Code update really did push carbon reductions. It resulted in great carbon reductions from our building stock.

And this code update continues, you know, leveraging -- you know, we got huge carbon reductions from 2019, so the new buildings coming in really are highly carbon efficient.

And now what we're doing is sort of taking advantage of those innovations in the 2019 code update and pivoting more towards electric technologies. Because we know that that is a primary strategy for decarbonizing our building stock for the long term.

So, that's sort of a context for this code update. You know, really like Wayne Gretzky said, you know, you put the puck -- you know, really great players -- good players go to where they think the puck is and great players go to where the puck is going to be. And so, we're trying to make the Building Code, you know, shoot toward where we know we have to be in the long term and really push the marketplace to develop technologies, get them more accessible, that supply chain open, and that supply pipe big for these technologies so that we can really scale up, and get the

costs down, and do it in an equitable, energy efficient manner.

So again, this is an Energy Efficiency Code, right, so anything that is inherently more efficient is going to do well in terms of keeping a building within its energy budget.

So, I wanted to just -- so, the big picture here, you know, is that we are trying to decarbonize across our whole economy. And so, you know, we have aggressive goals for carbon. You know, we may -- sort of 2045 we're trying to, as you all probably know, get to zero carbon electric system, but it may actually happen -- I think it's likely it will happen quicker than that as markets develop and costs continue to decline for all low-carbon technologies, including storage options.

You know, and the Building Energy Efficiency Standards is one key element of that decarbonization. As we decrease the energy requirement of our building stock, we decrease the scale of the endeavor of the enterprise to decarbonize our energy systems as a whole. So, building efficiency and load flexibility, which is a relatively newcomer to this, you know to the modern digital economy and I think it's really exciting. Those two things are still at the top of the loading order,

energy efficiency and demand response. And the new version, the modern version of demand response is really load flexibility, digitized energy flexibility and those are still at the very top of California's priorities for energy, for clean energy.

So, I think what we're doing here in that context is really the -- among the most important things that we can do in California that we have authority around as a state.

So, Appliance Standards now for energy efficiency, which you all know about, and for load flexibility actually we have new authority to do that within our appliances that complements these Building Standards very well.

Load Management Standards is sort of the third standards of the triumvirate of buildings, appliances and load management that is also stepping into its role, I think coming into its heyday, really, as a solution for not only decarbonization, but also enhanced reliability and cost management equity.

So, you know, I think we're really starting to fire on all cylinders in terms of using all of our authority to pivot our buildings, and our appliances, and our end uses toward low carbon for the future.

We also have a significant R&D portfolio that's

focused on these issues. We're funding a lot on all of the above, including flexibility now, recently. And we, along with the PUC and the Air Resources Board, operate a number of programs. Like Build Program, like the SB 1477, and yeah, that's the Build Program and AB 841, which is targeted at schools. So, those programs. Vehicles are really key I think to beginning. You know, we need a lot of resources here, so programs are meant to really orient the marketplace and get experience so that that scale up can happen.

But we definitely are targeting, you know, longer term efforts that have sustained funding. So, if we get federal funding, you know, there's a lot of places we can use that to pivot our existing building stock for sure, but also support these market developments that we're talking about.

So, this is just context that I wanted to lay out before our first day of the three days of hearings. Because, just to put it in context, you know, what we're doing here is really important. And so, I want to just highlight that gravitas and thank everyone for being here. And, hopefully, you'll participate robustly not only this week, but also with your written comments.

And again, as Payam said, if we have just a huge number of comments, just because there's only so many

seconds in the day, we'll start out at three minutes but, you know, if there are lots of comments we might have to go to two. And if there are just a huge number of comments, we'll go to one minute. But, you know, hopefully -- we don't usually have to do that, but time management kind of dictates that depending on the volume of comments we might have to.

So, anyway, just encourage everyone to chime in. And as Payam said, you know, one person per organization. And also, we just encourage that if the points that you want to make have already been made, then it's sort of expeditious, more expeditious to say I agree with so and so, or I want to second the point that was made about whatever.

So, I think, you know, we want all your comments. We want to know what everybody wants to contribute. But we also want to avoid redundancy just for time management purposes. So, I'd really appreciate people being attentive to those needs, of just our format here today.

So again, this is about Part 6 and Part 1. The Environmental Impact Report is out now, it is public, so people can look at that and then engage in that process. But it is a separate project -- or process, rather, about the Environmental Impact Report. And, obviously,

also an important set of issues but different from what we're talking about today, which is the particulars of the 45-day language, the express terms of Part 6 and Part 1.

So, with that I want to just, again, thank everyone, thank staff, and thank all of our stakeholders, you know, that are here today and have contributed over the months and years leading up to today. And then, hope and encourage everyone will continue to contribute until we really get through the 45-day languages, and then onwards as we move toward adoption which we're ending in August, at the August Business Meeting. And then, as we move toward the development of the implementation details, right, all of the compliance manuals and all of those further details after the actual regulations have been adopted.

So, lots to come here, but I think today and this week is really an auspicious moment to take stock of where we are and to kind of recommit to making these regulations work as best they can for each project that they touch, and for the State of California, over the long term as we decarbonize our buildings and our economy.

So, I want to again thank everybody for being here and turn the mic back over to Payam.

MR. BOZORGCHAMI: Thank you, Commissioner.

Folks, I just wanted to give you guys a quick update. I guess we're having a little bit of a difficulty with the Zoom link that's on the notice. But if you take -- if your colleagues would like to take the meeting number and the password, and go to the Zoom website itself and place it there, the system will work. So, if you have an opportunity, please pass that along to your members. Thank you.

So, what are we going to cover today? We will cover heat pump water heating, heat pump space heating, photovoltaic commerce, plus battery storage this morning. Then, we will do a quick time check and see if we have time to go to the next topic or should we take a lunch break.

Unfortunately, we've got a lot to cover and so we're going to do about a 30-minute lunch break today. And after that we're going to be going into -- like I said, after the time check we'll decide if we're going to do the community-shared solar or electric generation system commerce in Part 1, or sooner than lunch, or maybe after lunch.

Then, we'll do the nonresidential hotel/motel occupancy measures. Those are the mandatory mechanical systems, the mandatory lighting, and lighting equipment

systems, the performance and prescriptive compliance approaches, and additions, and alterations, and repairs.

I'm hoping we get done before 5:30, but 5:30 is our target. Hopefully, we can meet that ahead of 5:30 or we may have to go a little bit longer. Unfortunately, we only have three days and I don't have a fourth day, so we have to finish what's on the agenda today.

With that, also just want to remind everybody that for this code cycle one of the biggest, major change that we did to the Energy Code is we separated out multifamily from both low-rise residential and nonresidential building sections. Now, the multifamily, high-rise, and also low-rise family have their own separate sections, the 160, 170, 180s, which we will be presenting that on Thursday, the 27th, in the afternoon. Javier Perez will be presenting on that.

So, with that let me start quickly with a quick history of how all this started. Two California Assemblymen, Charles Warren and Al Alquist coauthored what's known today as the Warren-Alquist Act. This act gives authority to the Energy Commission to develop the Energy Codes on a triennial basis, and local jurisdictions to enforce the Energy Code through the building permit process.

The Energy Code is developed to reduce wasteful, uneconomic, inefficient and unnecessary consumption of energy. This act was signed into law in 1974 by Governor Ronald Reagan. And Governor -- and the Energy Commission was launched by Governor Jerry Brown in 1975.

With the appointment of the first five Commissioners, the Commission immediately set out to meet the extensive mandates of the Warren-Alquist Act, including the adoption of the first Building Energy Efficiency Standards that went into effect in 1978. I'm sounding like a historian here, but that's how it all started.

There's other -- other goals that have recently been bestowed on us here at the Energy Commission. Through the Energy Code, we need to consider reduction of greenhouse gases. We need to look at other measures, demand flexibility, self-utilization of PV and generation, and looking at reducing residential buildings impact on the electricity grid.

So, we're looking at a lot of other areas that we never did in the past. So, as Commissioner McAllister said, the 2022 standards are going to be very important as we go forward.

As you know -- I have to bring this up because a lot people who work in other parts of the country, they

look at California based on the IECC climate data, which has, I think, California in seven climate zones, which really doesn't work for us here in California.

And the IECC has Death Valley in the same climate zone as they do in Sacramento, in Climate Zone 3, where we know that the hottest part of the country is not the same and doesn't have the same cooling load or the heating load as we do here in Sacramento.

So, for us at the California Energy Commission, we looked at the heating degree days and cooling degree days from the beginning. And we decided that, all right, now, the 16 climate zones are sufficient and they're a little bit different than what IECC has.

You folks, I get calls on this all the time and I just wanted to make sure that we're clear on this during the workshops as we go forward.

Staff, with the help of our consultants and utility partners, Pacific Gas & Electric, Southern California Edison, San Diego Gas and Electric, Sacramento Municipal Utility District, Los Angeles Department of Water and Power who, with their consultants help support our efforts in moving the measure for 2022 forward.

For this code cycle, the utilities sponsored 25 workshops where they presented the proposals that they

will be making to the Energy Commission for public feedback. And the Energy Commission staff had 18 staff workshops during our pre-rulemaking sessions, where we proposed what we're going to be presenting for the 2022 Energy Codes.

Meanwhile, we also had two entities, the California Energy Alliance and a company named Vertiv, who also submitted a proposed (indiscernible) for us to consider for the 2022 standards.

I also, now, would personally like to thank Alanna Torres, Heidi Werner from Energy Solutions, and Kelly Cunningham from PG&E who really did a fabulous job in keeping the coordination for the pre-rulemaking, the continuous support throughout the release of the express terms and the 45-day language. They were tremendous in keeping us alive and keeping the process moving forward.

Everything that we are presenting today did go through a vigorous lifecycle cost analyzing using the latest TDV. And we updated TDV this code cycle and we had those workshops earlier on in 2020 and we had, I believe, two workshops on those to show very -- cost effectiveness, and the cost effectiveness has to be to the building owner.

Here's our current schedule as we move forward with our hearings. Currently May 24th, 27th and 28th

are the Lead Commissioner hearings for the 45-day language. We're hoping that we get your comments and questions sooner than the due date of June 21st. We have a lot to do and a lot to consider, and we just want to make sure that we get the right message, the right standards out for public to implement and through the Building Standards by January 1st, 2023. And meanwhile, we will still be working on the compliance manual, electronic documents, and the computer programming. So, those will be available for you folks to use, too, for meeting the energy codes.

Earlier on I talked about the Environmental Impact Report and how that's not going to be presented today or the next two hearings, also. If you're interested in the Environmental Impact Report, here's the link below. And the Docket Number 21-BSTD-02. That's a separate document, separate entity, a separate set of staff that are working on those. If you're concerned, that's the link that you would like to use to obtain a copy of the impact report or provide comments, and questions, too.

The BSTD-01 is what's to be used for our workshop -- excuse me, I keep calling it workshop. These are hearings. I apologize. The 21-BSTD-01 are the ones that we would like you to use to submit your

comments to. And you can also go to that website and obtain a copy of the set of standards, reference appendices, the ACM approval manual.

We have the Building Energy Standards Program website. Here you can find the latest, the 2019 set of standards, the set of documents, the certified computer programs that you can use to meet compliance. We have our pre-rulemaking comments. Those are the pre-rulemaking workshops and the comments that we received during the last cycle of the development of the codes.

And the bottom one is the link to the IOU website where they held, and the comments they received on the proposed case reports that they submitted to the Energy Commission.

This slide here, again you're going to see this over and over again. We really are trying to push to get your comments and your questions sooner than later, hopefully for these workshops this week, we should hopefully get your comments in a week or two at the latest, so that we can really sit down and look at those, and make a decision how to go forward with our code language.

I encourage you to submit your comments in our docket versus sending it by mail, or emailing it to us. As you know, most of us are not working in the office no

longer. We're working remotely. And to go in and pick up mail is very time consuming and might be a little difficult to get in.

So, I recommend you submit your comments through our docket. But if you need to, you could also mail in your comments.

With that, any questions? I'm not seeing any. I'm not going to wait too long on this. We're going to go right into the heart of this. Oh, I have one raised hand. Bob, go ahead. I'm going to unmute you. And please state your name and your affiliation. Thank you.

MR. GUNN: Hi Payam, thanks for the introduction. This is Bob Gunn with Synergy. I'm sorry if I missed it, but is the agenda for the next couple of days available or at least the order?

MR. BOZORGCHAMI: Yes. Yes, they are. They're already posted on our website.

MR. GUNN: Okay.

MR. BOZORGCHAMI: And if you go into that BSTD -- 21-BSTD-01 and just do a control F, and type in agenda, it should come up, the three days.

MR. GUNN: Okay. All right, thanks. Sorry for asking something so --

MR. BOZORGCHAMI: No, no, it's all good. Thank you.

MR. GUNN: Okay, I'll talk to you later then, thanks.

MR. BOZORGCHAMI: Alrighty. Okay, with that I'm going to pass the presentation to Mazi Shirakh and Danny Tam. Mazi Shirakh being our Senior Mechanical Engineer working on the baselines on PV and battery, and Danny Tam being our Subject Matter Mechanical Engineer here at the Energy Commission. We'll do a tag team during this morning's presentation.

MR. SHIRAKH: So, good morning Payam, thank you. I want to switch to my own presentation because I have made some changes. Let me know if you can.

Good morning everyone. I'm Mazi Shirakh, a member of the Building Standards Office. So, me and Danny Tam will be presenting the main building decarbonization measures this morning, which includes heat pump baselines, and photovoltaics, and battery storage system for multifamily and selected nonresidential buildings.

I just want to pause for a moment and introduce our Building Decarbonization Team. Many people have helped with this effort besides myself.

It's my long time colleague Bill Pennington, tremendous contributions by him to all topics related to this code cycle.

Danny Tam, which you'll be hearing from a little bit later. Payam, you just heard from him.

Will Vicent, who's our Office Manager. RJ Wichert and Cheng Moua, both mechanical engineers.

We also had an extended consulting team that helped with many aspects of income baselines, and photovoltaic and battery storage system. It in Bruce Wilcox, Ken Nittler, Jon McHugh from McHugh Energy, E3, MORESCO, TRC, Energy Solutions. And also, I want to recognize the efforts of the California's utilities, the IOUs who helped many of the measures that will be presented today, and the hearings later in the week.

So, Building Standards have recognized decarbonization as a primary goal for this round of standards. It's a switch from the past. And so, we have instituted certain policies to moving that direction.

One of them is to adopt building energy performance standards. And, you know, all the measures that we consider for our buildings must be feasible and cost effective, and building decarbonization measures are no exception.

We will adopt performance standard baselines that are based on or encourage heat pump technology to achieve energy efficiency. So, in general our standards

are performance standards. We have a prescriptive baseline that establishes the basis for the performance standards, and establishes a budget for the performance standards. And once that budget is established people can use the performance software to do tradeoffs. So, you know, even though we encourage certain technologies through our prescriptive standards, the builders always have a choice to do tradeoffs, if they wish.

We will also, as part of these standards they'll be requiring PVs and storage. You know, this was first introduced in the 2019 standards for low-rise residential. We're expanding that to multifamily and selected nonresidential buildings.

We're also going to be including a reach code proposal, which is a separate hearing as part of the Part 11, and we'll have an additional recommendation for that, which will be presented in a separate workshop in the near future.

So, as I mentioned with this round we're beginning the transition to the heat pump technology. This is a key technology to reduce emissions from buildings. But also, it's a nascent technology in many ways for buildings and it needs, basically, some time to make the transition more successful and seamless.

Currently, there's very low market share for

heat pumps. For instance, with heat pump water heaters for residential buildings comprise less than 2 percent of the installations. So, you know, we're making a major jump in that and we need to make sure that the market is prepared for it.

There's limited builder and consumer experience. They're not rocket science but, you know, it does require the builders and the installers to basically make a switch. And it does also required that the consumers to become comfortable with them. And, you know, we think they're great technologies and it's just a matter of adopting them and adjusted the expectations slightly.

Concerns about the supply chain is valid. You know, once we go from basically 2 percent to 90 percent, you know, we want to make sure that the supply chain is there to support this transition.

There are also issues related to heat pumps. They're less efficient at very cold temperatures and you'll see that reflected in our recommendations. In the colder climate zones, like our Climate Zone 16, the mountains, Lake Tahoe Climate Zone 1, which is the north coast, Humboldt County in the heat pumps, traditional heat pumps don't do well. Because of heavy reliance on resistance backup. So, you know, we have alternative

proposals sometimes for those climate zones.

One major change in this cycle is the inclusion of long-run marginal source energy, which is the proxy for carbon emissions from the building, as a second metric in addition to the TDV. We've historically used time dependent valuation, TDV, as a metric for cost effective, and also as a currency for doing tradeoffs within the standards performance path.

Now, as part of this decarbonization effort, we've introduced the source energy. Now, we have two levers, two metrics. And by fine tuning both of them carefully, we can facilitate building decarbonization, while protecting envelope and other efficiency measures, and also maintaining grid harmonization signals.

So, what have we accomplished with this cycle of standards? This is kind of a quick overview of the -- this is emissions savings. And the numbers here are metric tons of CO2 equivalent.

So, this is a 2016 standard level emissions, close to about 600,000, you know, metrics of CO2e from all buildings. And then, we went to 2019 standards where we introduced solar for the first time. And then, this is the current 2022 standards.

Interesting conclusion is that, you know, our historic emphasis on energy efficiency not only has been

helping us to save significant sums of money for the occupants, but they've also been helping reducing emissions from our buildings. So, measures that we introduced in the past, like high performance walls, rooftop insulation, and better windows, more efficiency in general have also been helping with building decarbonization.

What we're also finding is that PV and battery storage are also key, and perhaps (indiscernible) component in reducing emissions from the buildings. And now, with this cycle, you know, we're interested in seeing heat pump technology for either space heating and space cooling.

So, when we look at the total emissions from single-family, multifamily, non-res, and this is the state total, this is direct emissions. The direct emissions, but they do not include the GWP, global warming potential, of the refrigerants. You know, heat pumps are like any air conditioning, they have refrigerants and they leak occasionally, both on an annual basis and end of life. And heat pumps tend to have a little bit more refrigerants than the traditional air conditioning units. So, they have an increased GSG impact compared to traditional air conditioning system.

And that is the difference between the table on

the top and table on the bottom. You know, without the GHG -- the GWP impact, you know, we have larger savings. Once you include the GWP it eats into the savings of emissions, but we're still significantly net positive.

The good thing is that in the future, you know, we expect by the middle of this decade most air conditioning systems are going to be switching to lower GWP refrigerants, A2L for instance. So, you know, this gap is going to narrow in the future and, you know, we can probably have better results from our switching for a heat pump.

So, we can create a heat pump baseline, and which is what we've done for both space heating and water heating. And they're going to be part of the prescriptive baseline for this upcoming code cycle. In fact, when it's adopted. And again, that sets the baseline for our performance plat.

So, the buildings we're considering are low-rise residential, high-rise multifamily and selected nonresidential occupancies.

So, heat pumps are very efficient technologies. They have COPs in excess of 3, 3 and a half, which causes both reduction in energy bills and GHGs. But like any other measure, you know, we have to demonstrate that they are feasible and cost effective. And that's

where you'll see in the next slides that there are variances between climate zones. Because, you know, we have to pick the option that was feasible and cost effective for that climate zone.

So, getting into the details. Heat pumps baselines for nonresidential buildings. We're adding a new section, 140.4(a)2 for single zone space conditioning systems. So, those only applies in nonresidential buildings with single zone systems with direct expansion cooling, that's DX cooling, that's less than 240,000 Btu per hour. That's a 10 ton system.

So, you know, if you have a system that's bigger than 10 ton or it's not a direct expansion, then this doesn't apply. The good news is the vast majority of package system in those buildings actually fall within this limit.

Other system types can comply. They must use the performance pack. Again, as I mentioned, you know, we have both source energy and TDV. You know, we're establishing performance targets. And for both of those metrics you can use the performance apps to do tradeoffs.

And these are -- these requirements are not applicable to systems using central boiler and chiller systems. This will be something we're going to look at

as part of the next cycle of standards, in 2025.

So, this table summarizes our recommendations for nonresidential buildings in Section 140.4 for retail, grocery, and grocery buildings. Climate Zones at 2-15. That's the baseline's going to be a heat pump. Space heating units, as I mentioned in the previous slide, you know, it has to be less than 10 tons.

Now, for the same buildings in Climate Zones 1 and 16, for units that are smaller than 65,000 Btu per hour, that's about 5 and a half tons. For those colder climate zones baseline will remain an AC with a furnace. The heat pump simply was not cost effective in those climate zones.

For retail and grocery buildings in Climate Zone 1 and 16, for units that are greater than 65,000, then the baseline becomes a dual-fuel heat pump. The dual-fuel heat pump is actually a promising technology. It behalves just like a heat pump at temperatures above 35 degrees C -- sorry, Fahrenheit. And, but when it gets colder, instead of turning on a resistance it actually has a traditional furnace that kicks in. In most climate zones it actually has similar TDV and source energy benefits similar to the heat pump. It actually has better performance in the colder climate zones. But it does cost a little bit more. So, that's why, you

know, for the smaller system it wasn't cost effective. So, that's for retail and grocery.

School buildings, Climate Zones 2 through 15 gets a heat pump space heater. The same, school buildings Climate Zone 1 and 16 it's a dual-fuel heat pump. Again, that worked out, had good both TDV and source energy savings, and it was cost effective.

Office, financial institutions like banks and library buildings, Climate Zone 1 through 15 is a heat pump space heater.

The same, buildings in Climate Zone 16 for smaller than 65,000 Btu per hour is an AC with a furnace. And the same, buildings, if it's larger than 65,000, then it's a dual-fuel heat pump.

Any warehouses, offices only, in all climate zones the baseline will be a heat pump space heater.

For single family, so we looked at every single climate zone, we looked at our two prototypes, and we have recommended heat pump either for space heating or water heating, depending on the climate zone.

So, the requirement is proposed to be a heat pump space heater in Climate Zones 3, 4, 10, 13, and 14. So, 3 is San Francisco/Alameda, 4 is San Jose, 10 is East San Diego, 13 is Bakersfield, you know, the Fresno area, and 14 is high desert.

In the remaining climates, Zone 1 in North Coast, 2 is Santa Rosa, 5 through 9 are mild, coastal, Southern California climate zones, 11 is the Shasta or Redding, 12 is Sacramento, 15 is the low desert, Palm Springs, and 16 is the mountains. So, for those climate zones it's a heat pump water heater is proposed to be the baseline.

Again, other system types can comply using the performance path. You know, if you want to do something else, you have to basically use additional measures to make up the difference. As long as you meet the performance targets, you're good to go.

We are -- we may be proposing switching Climate Zone 10 from a heat pump water heater to a heat pump -- sorry, from a heat pump space heater to a heat pump water heater. It has similar energy savings, the savings don't change very much, but it has a larger environmental benefit. So, you know, we'll be considering that as part of the 15-day language.

Heat pump space heater baselines for multifamily, Section 170.2(c)3A add new requirements for space conditioning. These are again applicable to buildings with direct expansion cooling, serving individual dwelling units.

Again, you know, we can begin to see the pattern

here that we're going after packaged units serving individual units. We're not going after central systems at this point in time. That's for the next cycle of standards. Similar to other occupancies that other systems can comply using the performance path. And these are not applicable to systems using multi-zone, or central boiler, or chiller systems.

Heat pump space heater baseline for low-rise multifamily, these are -- the high-rise is four stories and higher, low-rise is three stories and lower. Climate Zones 1 through 15, the baseline shall be a heat pump space heater.

For Climate Zone 16, the space conditioning system shall be an air conditioner with furnace, as it currently is. Neither heat pump space heater or dual-fuel heat pump was cost effective in this climate zone.

Additionally, for Climate Zones 4 through 10, for balanced ventilation systems that they don't have recovery, the fan recovery must be at least of a 0.4 watt per cfm, or better. That's spelled out in Section 160.2(b)2Aivb1. That's a long one.

Anyway, heat pump baselines for high-rise multifamily. And so, again this is four habitable stories and greater. For Climate Zones 2 through 15, the baseline shall be a heat pump space heater.

For Climate Zones 1 and 16, the space conditioner shall be a dual-fuel heat pump.

So, I think that concludes the space heating baselines and I'm going to turn it over to Danny. He's going to talk about the water heating baseline. And I'll come back one more time after Danny to talk about photovoltaics, and battery storage, and other exciting measures that we have. Danny.

MR. BOZORGCHAMI: Mazi, this is Payam. I'm going to jump in real quick, I apologize.

MR. SHIRAKH: Sure.

MR. BOZORGCHAMI: I did not clarify that these presentations will be posted on our docket tomorrow. We're not going to be able to do it today because by the time we're done with the workshops, the docket folks will probably be left for the day. So, we'll docket all these PowerPoint presentations tomorrow morning. Thank you.

MR. TAM: Hi, I'm Danny Tam from CEC, and I'll be presenting the water heating heat pump baseline. First, we'll go over the single family changes, which are in Section 150.1(c)8.

So, we're proposing to remove the existing gas prescriptive options. And as mentioned before is a note that gas water heaters can still be installed and comply

using the performance compliance method.

Next we are proposing to modify our two existing heat pump water heaters options. The first option will now be a 240 volt heat pump water heater. In addition, in Climate Zone 1 and 16 there's additional requirement for compact hot water distribution. And also, additionally for Climate Zone 16, they need a drain water heat recovery device.

The second heat pump water heater option is a heat pump water heater that meets the Northwest Energy Efficiency Alliance, NEEA, advanced water heating spec Tier 3 and above. And in addition, in Climate Zone 16 they also need a drain water heat recovery device.

Finally, we're proposing a new prescriptive option for solar, a hot water system with electric backup.

The next slide, please. As Mazi mentioned before, the single family heat pump baselines for space heating and water heating are supposed to work together. So, we're proposing a new Exception 1 for gas instantaneous water heater in Climate Zones 3, 4, 10, 13 and 14. These are the same climate zones that are identified and they have to be a heat pump space heater.

So, we are proposing to move Climate Zone 10 from heat pump space heater to heat pump water heater.

So, under the 15-day language Climate Zone 10 will not be part of this exception.

We're adding a new Exception 2 for point-of-use electric water heater for junior ADUs. These are a really small structure where physical space might be limited for a heat pump water heater.

We're also proposing to add Exception 3 for a 120 volt heat pump water heater instead of 240 volt for the two heat pump options. That's for dwellings with one bedroom or less. Again, this exception is geared towards ADUs. Sometimes they have some electrical panel constraints.

So, next slide. So, moving on to the heat pump water heater baseline for small schools. In Section 140.5 we're proposing to add a new subsection (a)1 for school buildings less than 25,000 square feet and less than 4 stories in Climate Zones 2 through 15.

The new requirement is that the water heating system needs to be a heat pump. Again, gas equipment can still comply using the performance compliance method.

We're also adding an exception from the heat pump requirement if the water heater -- if the water heater is only serving a bathroom space, in which case the water heater can be instantaneous or tankless

electric water heater.

The next slide. We'll cover this part again later today. I just want to mention, for newly constructed nonresidential buildings there's a new requirement for high capacity gas service water heating systems. This aligns with the current requirements in ASHRE 90.1.

It will raise the thermal efficiency to weighted thermal efficiency of 90 percent. It will apply to system capacity of 1 million Btu per hour or greater.

There is some exceptions. If 25 percent of the water heating load is met by onsite solar, or side recovered energy.

The next slide. So, now we're opening it up for questions and comments on the section we just covered, the heat pump baselines for nonres buildings, single family, and multifamily.

MR. STRAIT: We have two questions in chat. the first question I see is from Jonny Kocher of RMI who asks: Is the baseline for these savings 2016?

MR. SHIRAKH: So, I didn't get the question. Is the base -- no, the baseline of -- you know, the point of comparison for all of our energy and emissions savings is the 2019 standards, not 2016. We presented 2016 just as an additional point of information. So,

you know, people can see how the standards have actually been making progress towards the ZNE goal. But all of our cost effectiveness and emissions estimates, they use 2019 standards as the basis.

MR. STRAIT: Laura Petrillo-Groh, I hope I'm saying that right, who I believe represents AHRI, asks: Can a minimum efficiency heat pump or water heater, as applicable, be used to meet the 150.1(c)7 and 8 proposals?

MR. SHIRAKH: Yes. I mean all of our baselines that, you know, we've specified here in this table -- let me go back up. So, like, yeah, these -- everything that you see here, these are minimally compliant federal -- federally compliant devices, appliances.

MR. STRAIT: Gina Rhoda and Martin Cooper both are asking effectively the same question: Are the proposed standards also applicable to alterations or replacements?

MR. SHIRAKH: So, certain alterations in the future might fall under these. But in general, when we do alterations you are allowed to replace the system with another like system. So, that's the to-be-determined for the future. But at this time we're only presenting this as requirements for newly constructed buildings. Additions certainly fall under these

requirements, but alterations are going to be a case by case basis.

MR. STRAIT: All right. We're getting additional typing -- questions by type. Bruce Severance asks: Has staff considered preheating to feed a heat pump water heater with either solar, thermal, or drain water heat recovery?

MR. SHIRAKH: We actually did consider solar thermal. They all had cost effectiveness issues. We did extensive studies on many, many alternatives with our contractors. And, yeah, the cost effectiveness basically drove us to this set of measures.

Now, again, you can use the systems that Bruce is proposing on the proposed side. There's nothing to stop you from doing that. So, you know, we're using minimally compliant appliances to establish our baselines. The performance path, we can use that (indiscernible) -- so, yeah, and you can definitely use those systems to comply.

MR. STRAIT: Bruce Severance wants to clarify that this is: Has staff considered preheating -- have staff considered that preheating can damage compressors at full condensing if refrigerant is inhibited by lower temperature rise?

I don't believe we are placing design

constraints. That's really up to the design professional.

MR. SHIRAKH: Yeah.

MR. STRAIT: Yeah.

MR. SHIRAKH: Yeah, we're not doing that.

MR. STRAIT: So, we're specifying equipment. The design or more detailed interactions between different equipment that's not mandated by the Energy Code really is up to that design professional.

Laura Petrillo-Groh -- no, wait, I'm sorry. Aaron Berger asks: When looking at heat pump technologies did the Energy Commission consider gas heat pumps?

MR. SHIRAKH: So, that dual-fuel heat pump is a gas pump, so we looked at them. And, you know, you can see them here, that's a dual-fuel heat pump. Basically what this is, is a heat pump, but instead of a backup resistance it uses a furnace. They perform well in colder climate zones like Tahoe. But, you know, they have an additional cost associated with them relative to straight heat pumps. And so, again, we actually look at these technologies for every single climate zone and building types and it did turn out that in the colder climate zones dual-fuel heat pumps actually outperformed regular heat pumps, or ACs with a furnace. So, yes, we

did consider it.

MR. STRAIT: I think he might have meant there are some gas absorption water heaters. So, there's none that's commercially available, to my knowledge. I mean in the future, I mean we could consider it, but we did not consider it this code cycle.

MR. SHIRAKH: I suspect that cost effectiveness will also be an issue. But again, this is just our standard baseline. You can use that technology in your building using the performance path, if that's what the designer or the building owner wants, and they find it to be cost effective or desired.

MR. STRAIT: Laura Petrillo-Groh asks: Can you please expand on what is meant by a case-by-case basis for alterations?

MR. SHIRAKH: So, again I think we need to have a separate discussion. In most cases when you do alterations and you replace like a water heater, you can replace it with a similar water heater. So, these standards are not going to kick in.

But if there's an alteration where, you know, the building is a scrip basically to the studs, and they're rebuilding the entire house, you know, some of these requirements may actually kick in. But if you're just simply replacing your air conditioning system in

the future and that's the only change you're doing then, no, these will not kick in the way the code is currently written.

But again, if you're doing a gut rehab, that might be a different scenario.

MR. STRAIT: Okay. Ted Tiffany asks: You didn't go into detail on the central heat pump water heater baselines for multifamily. Has the baseline proposal change from previous presentations? And can we detail unitary versus central baselines for multifamily?

MR. SHIRAKH: Danny?

MR. TAM: So, multifamily is on, I forgot, Thursday or Friday. So, we -- so those will be covered on that day. We have not made a decision about, you know, the performance baseline for central heat pump water heater. Most likely it's got to be the base on the proposal for the prescription option for central heat pump water heater.

MR. STRAIT: Danny, this is Payam. I'm going to interject here real quick. The multifamily, it's going to be presented on Thursday afternoon.

So, effectively the reasons we're going to get into more detail on the multifamily questions in a later workshop -- or, later hearing.

MR. TAM: I think another thing is, you know,

these are like a single baseline for central water heating system. We're probably going to stick with two baselines, like one for gas and one for it's the central heat pump water heater. It's going to be two separate baselines.

MR. STRAIT: So, Bruce Severance asks: Why were dual-fuel heat pumps found to be cost effective in grocery applications in Climate Zone 16, and not in office/library applications in the same climate zone? And how different were the cost effectiveness calcs?

I don't know that we're getting into this level of detail in this hearing since we need to be able to open it up for a --

MR. SHIRAKH: I can briefly mention it. But, yeah, you know, if he wants to take it offline. Because, you know, these are two entirely different levels, retails and schools have different schedules, different loads. They're not the same. So, even though they're in the same climate zone, you know, they have entirely different operating hours, they have different loads. So, the results are not unreasonable to be different. So, we can get into the details of that offline. But you'll see that in many of our analyses, including PVs and battery storage, that in the same climate zone sometimes because of the schedules and the

loads the results are different for the same systems.

MR. STRAIT: Thanks Mazi. That's all for our typed questions.

MR. BOZORGCHAMI: Thanks Peter. Thanks Mazi.

We're going to go now to the raised hands and I'm going to open it up. So, Ann Harvey, I'm going to unmute you. Go ahead and state your name and your affiliation, please.

MS. HARVEY: Hi, my name is Ann Harvey. I live in Oakland. I'm I retired family doctor. I have a question first, which is on the slide about the CO2 equivalent savings. There were two charts on the left and the top one -- yeah, thank you.

So, the direct emission savings on the bottom includes the global warming potential of leaked refrigerants. Does either of these include the global warming potential of leaked natural gas from the site of extraction through transmission, through the actual home, which you know is 85 or more times strong global warming gas than C02.

MR. SHIRAKH: Well, thank you, Doctor that's a good question. We consider gas leaks within the building or the deeper gas infrastructure that is within the subdivision and in the buildings. But we do not consider leaks from the well head and, you know, the

pipelines per event.

MS. HARVEY: Well, I would encourage you to because that is one reason to not go with one appliance per building. It's a reason to go with all appliances per building so that you can stop building out more leaking natural gas infrastructure in the whole state.

MR. SHIRAKH: Yeah, I mean --

MS. HARVEY: Because we're in an emergency. You know, this is --

MR. SHIRAKH: Yeah. No, I understand and the CPUC is looking at that. But, you know, this is a building standard and, as such, you know, we can only consider energy or emission impacts that are related to buildings. What you're describing are more societal and I mean they should be considered in some other forum.

But, you know, we are dealing with the building standards here, so our authority, our mission is related to those occupancies. That's not to say what you're saying is not valuable or important, it's just when we're dealing with building standards we consider only energy emissions that are impacted by the building.

MS. HARVEY: Yeah, but each building requires the gas lines to the building if it has gas appliances. I'll be quiet now, but I think each building has responsibility for the gas lines to the building.

MR. SHIRAKH: Thank you.

MR. BOZORGCHAMI: Okay, next is Cynthia Mahone -- Mahoney. Sorry about that, apologize. Go ahead and state your name and your affiliation, please. You need to unmute yourself.

MS. MAHONEY: Yes. Thank you. Hi, my name is Cynthia Mahoney. I am a physician in East Bay, Danville, California. And I'm speaking on behalf of Climate Health Now, which is a group of nearly 500 health professionals across the state who are concerned about the climate emergency.

We would urge the Energy Commission to move to all electric buildings in the 2022 Code cycle. There are a number of reasons for this. The health impacts are tremendous. We know that children living with gas stoves have a much higher incidence of asthma symptoms, 42 percent higher. It's like living in a home with passive smoking.

New data out just in the last couple weeks show that exposure to pollution, even preconception, before the child is conceived increases the risk of asthma. And it's from ultrafine particles which are released by gas stoves.

This adds to the burden of pollution which we know is going to increase from fires and it's

compounding inequities and racial injustice.

We're in a climate health emergency. These heat pumps have the added benefit of cooling, as well as heating, which is going to be very, very important as we are subjected to more and more heat. So, we cannot afford to wait for another three-year cycle. The climate emergency is accelerating with more impacts than people realized.

And I would say that building new homes with gas lines is tying us into emissions we cannot afford. It's like saying my doctor told me to quit smoking, but since I already bought, you know, enough cartons of cigarettes to last for the next 20 years I'm going to use them first, and then I'll quit. We have to take away this almost like a stranded asset of building something that then people will feel like they have to use to get back their investment.

So, I want to thank you for protecting us from pollution and the climate health emergency by implementing all electric building codes in the 2022 cycle. Thank you.

MR. SHIRAKH: Thank you, Dr. Mahoney. Just I wanted to make one quick note is that on these buildings that you see here, which is a good number of buildings, and commercial, nonresidential, the space heating

actually represents the larger load compared to the water heating. So like, you know, in retail offices, you know, you can imagine that the space heating and cooling is a much larger load than water heating.

So, by this change we actually accomplish the majority of emission savings that can be attained from heat pumps. So, I just wanted to point that out that this is not a 50/50 thing. It's like, more like 80/20 thing. So, that was just my response.

And, you know, we are working -- we will be working in the next cycle to switch the remainder. And some of the problems that we ran into is that, you know, for water heating there are simply not currently cost effective or even feasible options for central boiler systems. So, you know, we really didn't have a choice there.

But, you know, technology is improving and so, hopefully, by the next round we will have a more comprehensive set of standards. But I think we've captured the lion's share with these requirements here.

And also, just as important is the PV and battery storage and their impact on emissions, and which we'll be talking about shortly, after this. Thank you.

MR. BOZORGCHAMI: Thank you, Mazi.

I'm seeing a lot of raised hands coming in. Can

we implement the 2-minute rule.

MR. STRAIT: Actually, before we do that, I think what we need to do is focus first on folks with questions about what was presented before we move on to general comments.

MR. BOZORGCHAMI: Sure.

MR. STRAIT: But, yes, I think we're willing to implement a limit when we move to general comments.

MR. BOZORGCHAMI: That was my next comment, yes. Commissioner, are you okay with that?

COMMISSIONER MCALLISTER: Yes, I am good with that. Hopefully, you can hear me. I believe I'm unmuted now.

MR. BOZORGCHAMI: Yes, yes. Yeah, great, thank you.

COMMISSIONER MCALLISTER: Okay, great. Yeah, just I want to encourage people to focus on the particulars of the proposal. I mean, absolutely want to hear your general comments as well. We do just, unfortunately, only have so many minutes in the day, and so I just want to make sure that staff has a chance to get through the proposals and that we can, you know, ensure that everyone who has comments has time to input those comments at the appropriate moment of the day.

So, we're going to try to keep -- I'm going to

ask staff to try to keep track of how many -- you know, the chat, of course, and then how many raised hands we have, and then when we really need to move on to the next section of the day. And then we can adjust, sort of do the math and adjust the time period that each person has for their comments. And we can go to two minutes, or even one minute, if just we're really pressed for time.

And then also, I would just ask with the staff responses let's try to be, you know, as sort of surgical as we can so we can make sure to keep on time. So, thanks everyone for just your understanding about the process. And it's a limitation, so thanks.

MR. BOZORGCHAMI: Thank you.

So, Laura, I'm going to unmute you. Go ahead and state your name and your affiliation.

MS. NEISH: Laura Neish, 350 Bay Area. And just wanted to quickly respond to your last comment. That, you know, within the home that you're taking care of a bunch of the emissions with the heat pump for air conditioning. But that doesn't account for the leakage along the network. So, at every stage of getting the natural gas out of the ground and into our homes, where it creates, you know, a level of toxic air pollution it is leaking. And if you look at the spikes in methane

that have recently been recorded, it is catastrophic.

So, even the International Energy Agency acknowledges that increased fossil fuel development is madness. And we just have to take a minute to stop and listen to that. We do have time before the rollout of the code, and the technology is racing along. We are the fifth largest economy in the world and I venture to guess that when we make this all electric new requirement that the technology will in fact catch up.

So, really do appreciate your support and understand the complexity of the situation, but we have run out of time. And extending the fossil fuel infrastructure network at this point in time is absolute madness. So, thank you for listening.

MR. SHIRAKH: Thank you. And again, I don't disagree with the comment. It's just the building standards has limitations. And many of these pipelines and wellheads are in other states. So, you know, there should be other proceedings that address that. But for building standards we are limited to the impact of the buildings. Thank you.

MR. BOZORGCHAMI: Ben Davis, I'm going to unmute you. Go ahead and state your name and affiliation, please. And unmute yourself. There you go.

MR. DAVIS: Hi, Benjamin Davis, California Solar

and Storage Association. Good morning, everyone. This is probably the most exciting discussion I've been a part of, of a Monday morning in a while, so thank you, folks. Thank you to Mazi and Danny for all your work on the electrification baseline and, specifically, for making sure CBAG gives solar thermal appropriate credit.

We understand that a full electrification baseline or even a requirement isn't in the cards for these standards. But we hope that this is, indeed, a two-cycle process.

We also appreciate that while the baseline is set for heat pumps that both the prescriptive approach and the performance approach are technology agnostic on how to meet the baseline. And that obviously allows solar hot water to be a compliance technology. And that's important because there's a high savings, energy savings and a cost savings over the life of the product, even as the initial upfront cost is higher than heat pumps. So, glad it's in there and can be a compliance option.

We expect the electrification baseline to spur the demand for solar water heating for many building types. And I just wanted to say that the solar thermal industry has been paying attention, and is excited, and they are ready and here to help meet that demand. So,

thank you.

MR. BOZORGCHAMI: Thank you, Ben.

Stephanie Morris, I'm going to unmute you. Go ahead and unmute yourself, yeah. Please unmute yourself and state your name and affiliation.

MS. MORRIS: Yes, thank you. Hi, my name is Stephanie Morris. I'm a mother and a volunteer with Mothers Out Front Silicon Valley. And our chapter represents over 2,000 people locally and 35,000 people nationally. And we're all mobilized. We are out of time. And as many people have mentioned today, the climate crisis is happening now. And you have this powerful change you can make. I've been working with local cities in our area to work to have all electric building codes implemented, and they are working, and we are doing this. And I really don't understand why for most climate zones we can't build all electric.

The key thing, I know it keeps getting batted around that we can't do this because we're not quite ready, but I don't understand that because we are locking ourselves into eight more years, potentially, of gas infrastructure. And that gas infrastructure is the problem because we're going to be losing millions of dollars, and it's totally incompatible with the science and the climate reality that we're experiencing.

So, I really would like to have more justification. I feel like I have converted my home to electric appliances. There are all electric homes. They are functioning, they are working, and contractors will adjust when the market conditions reflect our climate reality.

So, a weak code now is going to result in a dire future for millions of children. So, I'd like to hear more about why we can't do this now. I think it's imperative that we do it now. We're out of time. Thank you very much.

MR. SHIRAKH: I don't think this is a weak code. As I mentioned, you know, we are capturing the lion's share of emissions. And, you know, we are allowing the transition to an electric baseline for the next cycle. But, you know, between -- you know, we picked the most impactful loads in the buildings and we're switching them to heat pumps in all building sectors. And again, we're adding more energy efficiency. We're adding more PV and battery storage. And the entire package has a very significant impact in results in emissions reductions. So, I do not characterize this as weak and --

COMMISSIONER MCALLISTER: Mazi?

MR. SHIRAKH: Go ahead.

COMMISSIONER MCALLISTER: So, yeah this is Commissioner McAllister. I want to just acknowledge the comments about the climate urgency. I agree. I'm speaking to you from all electric passive house that I have built myself to understand, so to make sure that I understand all these technologies and how they're coming down the pike. And I agree with you, there are amazing technologies that will be helping us solve this problem over the coming few years, really. You know, again we do have urgency.

But the framework around, from the Warren-Alquist Act onward, the framework around the Building Energy Efficiency Codes, and they are Energy Efficiency Codes, we need to remember that, the Building Energy Efficiency Standards.

And so, it's based on an energy metric, energy efficiency metric. And it's not a -- you know, there are -- there's a framework around the way that the Building Code has to be developed and justified. And it doesn't not include dictating end uses. You know, it doesn't include clothes dryers and it doesn't include cooktops. And it does require very rigorous feasibility and cost effectiveness studies.

And so, those have -- you know, we push the

envelope a lot to get to the point -- and I agree with Mazi, it's a very strong code. It is going to help scale up, it's really going to use the marketplace for heat pumps. We live within a diverse state. You know, people have brought up it's the fifth largest economy. It's a very diverse state, lots of different climate zones, lots of different energy usage patterns, and lots of different technologies that will be solutions in those, you know, colder, hotter climates, et cetera.

And so, you know, I'm confident in the analysis behind this. But there are many jurisdictions in the state beyond this very specific one on the Building Energy Efficiency Standards that deal with air quality directly, that deal with infrastructure planning. The PUC does a ratemaking around electricity and gas, and authorizes expenditures in the gas infrastructure. We don't do that at the Energy Commission.

So, we're collaborating across all the agencies to get a more integrated policy environment for shifting to zero carbon technologies. And the Building Code certainly is one tool within that toolbox. But it's not, and it can't be actually, legally, the only tool we use.

And so, while we certainly understand and sympathize with the comment and the urgency, and I think

we all at the Energy Commission share it, we have to not only use the Building Code appropriately, but we have to work with the other agencies to do complementary things in the Building Code to address these more structural, societal, broader challenges that we have to really to get to where we're going as a state.

So, that is happening for sure. And so, you know, I just wanted to acknowledge those comments and appreciate them, but also keep focused on the task at hand here on the Building Code update. So, thanks.

MR. SHIRAKH: Thank you, Commissioner McAllister. I just want to add on one more point. You know, for some of these buildings with central boiler and chiller systems, there simply is not a heat pump alternative. And we looked at that one and there's simply no current technology that's feasible or cost effective. Thank you.

COMMISSIONER MCALLISTER: And also -- also, I'd just add, also, finally that it is obviously -- maybe it goes without saying, but I'll say it, it's obviously legal and actually an easier path to comply with the Building Code in many ways if you do build all electric. And so, it's certainly -- you know, this is a minimum standard we're talking about. So, you know, we do anticipate that based on this, and as builders, and

contractors, and all the trades, and trade allies figure out, and as consumers understand and really start to understand that these technologies have great service quality and that they are reliable, and they last a long time, as everybody kind of gets on that track the markets will really optimize this and we'll be able to push further in fairly short order.

But I think, you know, the path towards this -- this opens a nice path towards, you know, electric technologies and zero carbon building. So, I think I just wanted to make that. We're not -- we're certainly not prohibiting adopting electric. And, you know, really this code promotes it strongly. So.

MR. BOZORGCHAMI: Thank you, Commissioner. Commissioner, are you okay if we ask people only to comment on what they've heard today kind of so far?

COMMISSIONER MCALLISTER: Yeah, I think --

MR. BOZORGCHAMI: Because I'm a little concerned about the time schedule.

COMMISSIONER MCALLISTER: Remind us when the next section needs to start, according to the agenda that we have?

MR. BOZORGCHAMI: Well, we still have Danny, who's going to be talking more about the mandatory requirements for energy storage systems and electric

grid use. So, I do really want --

MR. SHIRAKH: And we still have PV systems, too.

MR. BOZORGCHAMI: And we have PV systems.

COMMISSIONER MCALLISTER: And we need to get through all that by lunchtime, correct?

MR. BOZORGCHAMI: Yes, yes.

COMMISSIONER MCALLISTER: Okay.

MR. BOZORGCHAMI: And so, if --

COMMISSIONER MCALLISTER: So, I would just ask people to be very targeted, as targeted as they can be. And then, when we do open for general comments, which is at the end of the day, is that correct?

MR. BOZORGCHAMI: Yes.

COMMISSIONER MCALLISTER: Okay, so at the end of the day if you have broader comments, it would be really helpful to save those until the end of the day when we wrap up with general comments.

MR. BOZORGCHAMI: Yes, please.

COMMISSIONER MCALLISTER: We really need -- you know, we really need to keep focused on the proposal in front of us and specific changes that people would ask.

MR. BOZORGCHAMI: Yeah, and then if you wanted to, you could also submit your comments through our docket. We take those just as important, as serious as we do with these comments that we're hearing today. So,

don't feel that if you send it to comments, it's going to get lost in all the docketed information. No, we'll take a serious look at those, too.

COMMISSIONER MCALLISTER: And, in fact, every comment must be looked at --

MR. BOZORGCHAMI: Yes.

COMMISSIONER MCALLISTER: -- by the Energy Commission and responded to. So, written comments will absolutely get read and they will be considered in any modifications that we were to make in the 45-day language.

MR. BOZORGCHAMI: Yes. So, with that, Robert Gould, I'm going to unmute you. Go ahead and state your name and your affiliation.

Oh, Mary Dateo, I'm going to unmute you. Go ahead and state your affiliation.

MR. GOULD: Hi. Hello?

MR. BOZORGCHAMI: Hello.

MR. GOULD: This is Robert Gould. You had called on me. I just needed to unmute.

MR. BOZORGCHAMI: Sure, sure, sure, go ahead.

MR. GOULD: Can you hear me okay?

MR. BOZORGCHAMI: Sure.

MR. GOULD: You know, I came in a little late on this, so I just wanted to say very quickly I understand

you're looking for more specific comments. So, I have prepared testimony that I will submit the full comments, if you could provide the link to do that. So, I'll be briefer than what my intention was.

MR. BOZORGCHAMI: Thank you.

MR. GOULD: Just so you know, I'm an Associate Adjunct Professor at UCSF School of Medicine. I work with our program on Reproductive Health and the Environment. And I'm speaking today, representing San Francisco Bay Physicians for Social Responsibility, which I'm President of, representing hundreds of health professionals who speak for the health of our patients and communities personally impacted by impacts of global warming.

So, I think that's -- those issues have been, you know, represented in the concerns of other people who have spoken as well. But we would want to weigh in our unequivocal support that the Energy Commission should immediately move towards all building -- all electric buildings in the 2022 Code cycle, which we consider consistent with the positions of the California Air Resources Board and the Bay Area Air Quality Management District. Because we believe that, as they, that all electric buildings are cheaper to build and operate (inaudible) -- on the critical pathway to

protect us from our climate crisis.

So, I don't want to -- you know, I don't need to I think reiterate, but I will submit for public comments the wide variety of health studies that have been done indicating the significant impacts of nitrous dioxide on asthma, and children's health. But we would really want to make sure that you understood that health professionals in California, certainly in our organization, strongly support the most rapid --

MR. BOZORGCHAMI: Thank you, Doctor. I need to stop because it just passed the two-minute line. Apologize for that.

MR. GOULD: Okay.

MR. BOZORGCHAMI: Thank you.

Mary Dateo, please unmute yourself and state your name and affiliation. Thank you.

MS. DATEO: Hi, Mary Dateo, Member of Carbon Free Mountain View and a recent converter to an all electric home. It did take quite a bit of effort and cost to make this conversion.

Part of the reason we're in a climate crisis is that as a society we are inefficient, and waste energy, and we waste resources. So, the state has set a goal to be carbon neutral by 2045, which is just over two decades away. And that means all of our buildings are

going to need to be off of fossil fuels by then.

Why we would we have gotten natural gas to be connected to a building that we know will need to be disconnected within 20 years? That is wasteful. And with the climate change already increasing our temperatures and exacerbating both droughts and fires, that type of wastefulness is something we can't afford.

So, there are multiple studies showing that all electric technology is cost effective in all California climate zones, it's cleaner and healthier than natural gas. Natural gas pollutes and it's relatively inefficient technology.

Please don't delay. Please do move towards all electric buildings in the 2022 Code cycle. Thank you.

MR. BOZORGCHAMI: Thank you.

Robin Moller, please unmute yourself and state your name and affiliation.

MR. MOLLER: Great. Actually, this is David Moller. I'm with the Climate Reality Project Bay Area. Generally, I want to urge the Commission to adopt an all electric baseline for all building types in the 2022 Code cycle, with exceptions based on need.

And I do want to thank the Commission and staff for the considerable progress that has been made toward this absolutely essential goal since the early

workshops. In particular, the requirement that mixed-fuel buildings be electric really is a huge step forward.

I am concerned that the requirements for heat pump water heaters and heat pump space heaters are not the default, with exceptions based on demonstrated need, particular with regard to multi-unit dwellings.

There's been in the comments this morning a couple of items brought up by staff that I want to address. And one is regarding the availability of technology. And I really want to urge the Commission to adopt the standard with exceptions if the technology is not available, rather than saying because the technology is not available, we're not going to adopt the standard. It should really be the flip.

A number of California cities, large cities, including San Francisco, San Jose, and Oakland, you know, are representing millions of people, millions of residences, millions of businesses have adopted all electric code requirements with exceptions. If it can work for those people, in those communities, why not the whole state?

It's very clear to me, and especially with the Commissioner's comments there, that the CEC clearly understands what's at stake here. We don't need to

describe that to you. But I urge you to complete taking this important step while the opportunity is here. Thank you very much.

MR. BOZORGCHAMI: Thank you, Mr. Moller.

Pierre --

COMMISSIONER MCALLISTER: I want to step in real quick. Payam, I just want to -- I want to sort of just comment on one thing. So, you know, I talked about multiple jurisdictions and local governments do have multiple jurisdictions. And for instance, San Jose's ordinance that you referred to did not use their energy efficiency ordinance capability authority to get to where they wanted to go locally. The local jurisdictions have a broad array of powers, police powers, health and safety regulations.

So, they did -- San Jose in fact did not actually ask us to kind of consider, look at what they did because it's not an energy efficiency code. So, you know, that's a -- so, we're all trying to work together within our existing jurisdictions.

And again, the Air Resources Board, for example, has jurisdiction within the Building Code, in Part 11 for example, that they, you know, can look at, and we can work with them, and we will do this going forward to look at how we can use other parts of the Building Code

to achieve these goals, you know, within our respective authorities.

So, I think all your points are very well taken and certainly we all want to move in this direction and, you know, we're trying to do it in the best -- in the best and most kind of -- the least sort of -- the most streamlined and the most sort of straight forward, clearest jurisdictional path that we can.

MR. BOZORGCHAMI: Thank you, Commissioner.

Pierre, go ahead and state your name and affiliation.

MR. DELFORGE: Yeah, good morning Commissioner and staff. My name is Pierre Delforge, with Natural Resources Defense Council, NRDC.

So, we appreciate the Commission's hard work on this code update. And given the time constraint, I'm going to focus my comments on specific issues. And just say at a high level that we strongly support all comments made so far on the climate emergency, and the need to move to clean electric technologies as soon as possible in new construction.

For the voluntary flexible approach, as currently proposed by the Commission, to work, you know, that approach that encourages, but not require electrification, it's essential that the incentives are

strong and consistent throughout the state. And also, that we do more in larger buildings. Most of the focus has been, you know, primarily to date on the smaller buildings.

So, the top four issues I want to raise to improve this code proposal is first, you know, completely support, strongly support the proposal that I heard this morning to switch Climate Zone 10 to have the stronger baseline. Climate Zone 10, which is -- you know, goes from East San Diego to Western Riverside County is a high construction zone and it is important to have a consistent incentive with the rest of the state and not allow three more years of, you know, gas construction and stranded gas infrastructure.

And the second point for improvement is around nonresidential multifamily buildings. The proposed baseline is duel-fuel in Climate Zone 1 and 16, which means that heat pumps are not allowed prescriptively, only under the performance path. And that would be a significant barrier to adoption of heat pump technology, which would expand gas infrastructure for another three years. So, we should at the minimum allow, prescriptively, heat pumps in those climate zones.

The third point is around -- still around nonresidential and multifamily buildings is to expand

incentives for clean electric systems from just single zone systems to multi-zone package systems, central systems as soon as possible.

And fourth and last is back to single family, and in the retrofit space allow heat pump water heaters to be installed in retrofits in Climate Zone 16 under the prescriptive path.

MR. BOZORGCHAMI: Thank you, Pierre.

MR. DELFORGE: Thank you.

MR. BOZORGCHAMI: We will -- go ahead and submit your comments in writing and we'll take a look at those as soon as the --

MR. SHIRAKH: Yeah, Pierre, that would be nice if you do that. Just one quick comment. You said these requirements are for smaller buildings. That is not the case for buildings that you see here, retail, grocery, office, banks. There is no building size limit.

There is a size limit on the type of equipment that's impacted, the 10-ton. And that's basically a state of technology thing that's not -- that we were trying to capture the benefits from the packaged units and so that's where that size limit came. But there is no building size limit for these recommendations. Thank you.

MR. BOZORGCHAMI: Thank you, Pierre.

Ronni Solman, I'm going to unmute you. Go ahead and state your name and affiliation.

MS. SOLMAN: Hi. Hi, my name is Ronni Solman, and I'm with SO CAL 350 Climate Action. I'd like to talk today about how -- I'm also a retired teacher with L.A. Unified.

I feel that the CEC should move more aggressively towards adopting a single all electric baseline, as others have said. The draft code that you're proposing would require one all electric appliance for residential buildings, multifamily and small commercial buildings, and all residential buildings would be required to be all electric ready.

And this is an important first step. But like others have said, I think it's not aggressive enough for now. It would be a substantial cost savings if we would require all electric appliances for both space and water heating and it would achieve not only a substantial cost savings, but it would avoid gas lines being put in which would be safer, and avoid the dangers, and reduce the stranded asset risk of using fossil fuels.

It would also reduce construction costs. And I think that the gas industry, frankly, is the obstacle in the way of progress because the gas industry doesn't want to lose its business model. And an industry-led

opposition campaign has been spreading false information about the costs and the public support of electrification.

So, I just don't think we should have an incremental approach. I think it's an emergency and we just don't want to stay with gas.

Finally, we have leadership in the White House that will support a radical approach to electrification nationwide, which is what our planet needs. And California has been a leader in the past, let us lead now. Please alter the proposal to adopt a single all electric baseline for all building types now, rather than later. Thank you.

MR. BOZORGCHAMI: Thank you, Ronni.

Next, Mary did -- I'm going to -- give me one second, I apologize. Mary, you had your hand raised. Did you want to speak or did you have already --

MS. DATEO: Oh, my apologies. I already spoke.

MR. BOZORGCHAMI: Okay, thank you.

Sven, I'm going to unmute you. Go ahead and state your name and affiliation. Sven, you need to unmute yourself, first.

MR. THESEN: Good morning. Thank you. My name is Sven Thesen. I'm a chemical engineer, business owner, dad, and man of faith. I'm speaking on behalf of

Project Green Home, my children, your children, near about everybody's children. And I'm asking, begging, cajoling, and a little bit of shaming the CEC to require all electric buildings in the 2022 Code cycle.

Like Andrew McAllister, my family has lived and enjoyed the health, convenience, and cost savings of an all electric, net zero energy, beyond platinum lead passive home for the last ten years.

To say that this sort of code, that the all electric -- that all electric buildings are not cost effective and that the technology is not there is really not true.

My relatives in Norway, they are in and enjoying all electric buildings, cost effective all electric buildings right now. So, not to be insulting, but to say please stop hiding behind we can't because of the regulatory framework and the way we've designed this to not permit this to go forward.

MR. BOZORGCHAMI: Thank you.

MR. THESEN: My wife's a physician, this is in the vernacular, regularly cuts out skin cancer. She does not incrementally cut out the skin cancer, like 80 percent of it and leave 20 percent of the cancer in. To paraphrase our governor, she cuts the whole damn thing out.

So guys, Mazi, Andrew, most of us on this call, we're old and we're going to be dead when this goes down. We've already lost four percent of the state's acreage to fire in the last ten years. What sort of legacy do we want to leave? We have the technology, it's cost effective, we can do this. Be strong, be bold, be proud of yourselves. Thank you.

MR. BOZORGCHAMI: Thank you, Sven.

Next, Christy, I'm going to unmute you. Go ahead and state your name and your affiliation, please.

MS. ZAMANI: Good afternoon, Commissioners. My name is Christy Zamani. I'm the Executive Director for Day One. I've been in public health for over 30 years.

I would like to quickly express my support for moving towards adopting a single all electric baseline for all building types. We know all electric is simply better for public health and our planet.

I'll tell you, from working with low-income communities of color, I can vouch that the pandemic has only highlighted the systemic racism and disparity that have impacted low-income communities for decades. Crammed families in single-unit apartments don't have the luxury to quarantine, be socially distant, or have access to clean fresh air.

Children living in areas of high levels of

outdoor air pollution are low-income African Americans and Hispanic children with asthma, who are disproportionately burdened by indoor air pollution from gas stoves.

Again, as a local nonprofit, like all of us we've had to hustle and get creative to make it through the pandemic. And even though I know there's barriers right now, I think we have enough wisdom and intelligence amongst all of us to get there. So, I think this is the time for all of us to come together to come up with solutions so we can start moving forward. Thank you for your time.

MR. BOZORGCHAMI: Thank you, Christy.

Jenny Green, I'm going to unmute you. Go ahead and state your name and affiliation.

MS. GREEN: Hi, my name is Jenny Green. I live in San Jose and I'm speaking on behalf of Mothers Out Front, a growing grassroots movement of 35,000 mothers and others mobilizing for a livable climate for all children. We have over 6,000 California supports. And we urge you to adopt an all electric requirement for all building types in the 2022 Code.

May Californian communities have already implemented all electric codes successfully on the local level and there are both health and climate reasons to

do it. And previous speakers have already covered that, so I'll just add a couple of quick things.

Last week, the International Energy Agency issued a report on what the world needs to do to reach net zero emissions by 2050. And one of their points was that within the next few years we need to stop installing new gas-powered appliances in buildings.

The CEC needs to enact an all electric code now, especially because the rest of this country looks to California to lead on climate. We already have the technology to do this. And as a California resident and especially as a mother I'm horrified that you're continuing to delay. I can't understand who you are trying to help, except the gas companies by delaying the transition to an all electric code.

The quicker you switch to an all electric standard, the more money you are going to save California families. My family has been slowly switching over to electric appliances and it would have been so much cheaper if we could have bought a house that was all electric from the beginning.

If you have a house that runs on gas, switching out the old gas appliances does cost money, and it's money I wish I could be spending on something else. I don't see why you'd choose to put more families in this

position and at some point having to spend money to remove gas from their homes, or businesses having at some point to spend money to remove gas from their business.

Mothers Out Front is asking you to step up now. It makes no sense to continue to build new buildings with outdated gas infrastructure. Please revise the 2022 Code to require all electric buildings only. Thanks.

MR. BOZORGCHAMI: Thank you, Jenny.

Helena, I'm going to unmute you. Go ahead and state your name and affiliation.

MS. BIRECKI: Thank you very much. Can you hear me?

MR. BOZORGCHAMI: Yes.

MS. BIRECKI: Great. Hello Commissioners. I'm Helena Birecki and I'm a lifelong California resident and a member of the San Francisco Climate Emergency Coalition.

I want to strongly support all of the comments I have heard thus far. And I want to specifically speak to the Commissioners about what I've heard you say. You say your hands are tied. You're only responsible for what's directly in the building. I understand the emissions coming directly from the buildings. I

understand that those are the constraints you've been put in historically.

But we are in an emergency and we have seen through COVID that when the state takes an emergency seriously, it can do wonders. In this case, in the climate emergency, our Governor Newsom stated: This is a damn climate emergency. Our goals are inadequate to the reality we're experiencing.

Let's make them adequate. And I urge you to ask the governor to allow you to consider the emissions from the well that feeds the pipeline, that feeds the water heater. Because to say that, oh, we're only responsible for what happens inside the building is just like somebody shooting a gun and saying they're not responsible for where that bullet ends up.

You turn on the stove in your house, if it's gas, and it's pulling from the pipeline, which then creates more demand in the well.

So, the buildings are part of the systemic problem. And if you truly believe that we are in a climate emergency, and if our governor truly believes that we are in a climate emergency we should treat it as one, and make all electric new building the baseline in the 2022 code immediately. Because it is what we need to do.

As somebody else mentioned, the last fire season was so disastrous for so many families. The direct fires, the smoke that caused thousands of people to go to the emergency rooms with asthma attacks and --

MR. BOZORGCHAMI: Sorry, Helena, I'm going to have to stop you because we have to keep on with the time schedule. Thank you.

MS. BIRECKI: Thank you.

MR. STRAIT: One thing, as a quick courtesy I'm going to go to the typed questions for a moment. And if you have technical questions, rather than general comments or, you know, support for the electrification comments thus far please type them into chat, and we will try to prioritize technical questions about the standards as a part of this hearing.

Also, do we have -- can we get a general time check? I know we'll need to move on to some other presentations.

MR. BOZORGCHAMI: Yeah, we're out of time technically, because we're almost hitting 11:00 and we still have the PV and storage still to go, and then -- and I understand everybody's concern. We've heard your concern. But if people would like to talk about it over and over again, that's fine with me.

But in the meanwhile, we will be going farther

in the evening because we do have to finish what we have set for today.

MR. STRAIT: Yeah. So, there are -- so, one question that's in the typed questions right now is from Marie Chen, who asks: With respect to alterations are there going to be standards that bridge to the stud versus replacement of appliances, possibly based on cost of alternation square footage percent, et cetera.

I think it's a follow on for Mazi's answers.

MR. SHIRAKH: So, again for alternations the current language, I believe, and I need to look at it more carefully, it basically -- if you're replacing an appliance, like an air conditioning, you can replace it with a similar appliance.

The difficulty in alterations is that, you know, the heat pump is not simply a drop in. For an AC, you need additional wiring. You know, in the case of water heaters the same thing, you need additional wiring. And, you know, the piping might be different.

So, yeah, the cost effectiveness is very different for alterations. So, those would have to be a separate consideration in the future to determine what may or may not be cost effective.

But has I've shown in the slides, the cost effectiveness was only for newly constructed buildings.

So, I mean that's all I have on this topic.

MR. STRAIT: All right. Let's see, so Cynthia Mahoney of Climate Health Now is asking a question about our authority versus the authority of other agencies.

Russ King is asking a procedural question about the docketing of comments.

Do we want to -- again, do we -- I'm going to keep the focus on technical questions about the proposal. But I will at least answer that for folks who have docketed comments in that prerulemaking language, or in that prerulemaking period, those have been considered by staff as we developed the rulemaking materials. If there are additional comments you would want to make on the rulemaking materials in the formal period, you would please put those comments into the record for the rulemaking period.

You know, there's not a need to re-docket everything that was on the prerulemaking docket. But if there are additional follow-up comments you feel are appropriate based on the content of the 45-day language, then please put those comments on the 45-day public comment period.

Mark Palmer has --

COMMISSIONER MCALLISTER: Peter, I wanted to just --

MR. STRAIT: Okay.

COMMISSIONER MCALLISTER: This is Commissioner McAllister. I just wanted to just say on the authority question, I think this is about the language within the regulatory that this process has produced, and so I think we need to keep focused on that task at hand right now. And our authority question I think is better -- is really something that we can, you know, follow up with after the conversation, after today's hearings. But I think it's not productive to get into a discussion about the various authorities of the agencies in California in this particular forum, which is much more specific than that.

MR. STRAIT: All right. Ann Harvey asks: If the 30 or 15 years lifecycle calculation, whether it includes bringing gas lines to the building and to the development when applicable?

MR. SHIRAKH: So, again what we considered in our cost effectiveness is the costs for appliances, and plumbing, and other infrastructure that's within the building between the meter and what's in the building. So, those are the costs that we considered. Not any other savings or additional costs that are on the other side of the meter.

MR. STRAIT: Someone was asking if we're going

to go back to verbal comments. We are. That's the last thing in here.

Mark Palmer notes the chat is disabled. Chat is reserved for us to communicate in typed messages as needed to folks that are attending. But correct, the chat is disabled.

And we can go back to raised hands, now.

MR. BOZORGCHAMI: Okay, thank you Peter.

So, next in line is Jackie Garcia Mann. If you like, go ahead and unmute yourself, and state your name and --

MS. GARCIA MANN: Hi, I'm Jackie Garcia Mann, and I'm a representative of 350 Contra Costa. And I just really want to support what everyone has said, and especially Helena. Because, you know, as you -- you can't underestimate the system level impacts of your choices in these ordinances right now. And you have a great influence in what will be kind of in style, what people will want in their homes.

And as someone who has built a minor subdivision, it's very important what is in style, what people want. But part of what people want is what they're allowed to have.

So, I heard you kept saying in places that there was a choice of what the designer or building owner

wants. But truthfully, you are part of the process driving that and the -- what clearly everyone is asking for is an all electric ordinance so that everybody would have the same thing, and we don't have some people who are holding out for gas because they think gas is superior.

So, I just want to reiterate the need for a fast change. And that your Building Codes have system level impacts and you don't operate in a vacuum, and it's really disingenuous to say you're not influenced by other things because I'm sure building trades, and fossil fuel industries influence when they say, no, we want to keep gas in buildings. So, they have some kind of influence.

Anyway, I hope you can move things along really fast. Thank you.

MR. BOZORGCHAMI: Thank you, Jackie.

COMMISSIONER MCALLISTER: I'm going to suggest that -- do we have any estimate of how many raised hands we have?

MR. BOZORGCHAMI: We have nine more.

COMMISSIONER MCALLISTER: I just want to try to keep things on schedule.

MR. BOZORGCHAMI: Should we --

COMMISSIONER MCALLISTER: Let's go to one

minute. And if people want to speak more extensively than that, perhaps we can accommodate at the end of the day as we run into the evening, perhaps, so in general comments.

MR. BOZORGCHAMI: Sure.

COMMISSIONER MCALLISTER: But I think for targeted comments about what's been presented so far, invite people to make those comments. But, of course, anybody can speak as they like, but we're going to have to reduce to one minute in order to keep things moving along.

MR. BOZORGCHAMI: Sure. Okay.

COMMISSIONER MCALLISTER: Thanks.

MR. BOZORGCHAMI: Thank you, Commissioner.

Sam, go ahead and unmute yourself, and state your name and affiliation.

MR. JAMMAL: Thank you. Sam Jammal, I'm with Schlegel and Associates, here on behalf of SERES (phonetic), which is a nonprofit sustainability advocacy organization. SERES runs a business innovation network of 70 major businesses, including a number of companies that have headquarters and interests in California.

We've filed letters in support of an all electric code in December, and we had 55 companies sign on to another letter supporting just broader building

electrification, building decarbonization. Want to just first quickly thank the Commissioner for all the hard work you guys have done. We know how hard this is and you're trying to balance a lot of different interests.

We also want to say that the business community, we're ready to do this. We're ready to electrify our buildings, we're ready to decarbonize. We believe that the market's ready. We believe there are options for consumers. We see a lot of the companies we work with already taking these steps.

And so for us, we want to just make sure we do this in a cost effective way, which means doing the all electric code in 2022 so that we don't lock in these stranded assets down the road when we do get to electrification or --

MR. BOZORGCHAMI: Thank you. I apologize, I'm going to have you submit yours in writing, if possible.

MR. JAMMAL: Yeah, will do.

MR. BOZORGCHAMI: Thank you so much.

Jonny, go ahead and state your name, and affiliation.

MR. KOCHER: Hey there, thank you for the opportunity to comment. My name is Jonny Kocher and I work in the Oakland Office of Rocky Mountain Institute.

Regarding Commissioner McAllister's comment,

many of us understand the limits of the Warren/Alquist Act and we know that heat pumps save energy. They're about three to four times as energy efficient as natural gas furnaces.

We also understand that TDV is an extremely complex metric for energy efficiency, but it also includes a carbon metric which will likely increase as our society realizes the dire costs of the climate crisis.

My analysis of the Harvard T.H. Chan School of Public Health Study Data found that burning natural gas in buildings costs the State of California $4.9 billion a year in health costs annually. Once we start to incorporate these costs into our TVD metric, it's likely that we'll show that all electric buildings have always been cheaper to build than natural gas buildings.

It's time for the CEC to go all electric in 2022 and stop installing fossil fuel infrastructure that we know we'll have to abandon in the future. Thank you.

MR. BOZORGCHAMI: Thank you. Thank you, Jonny.

Kat Selm, I'm going to unmute you. Go ahead and unmute yourself. State your name and affiliation, please.

MS. SELM: Hi. Can you hear me?

MR. BOZORGCHAMI: Yes.

MS. SELM: My name is Kat Selm and I'm here representing the Canejo Climate Coalition. I want to echo all the other great speakers here today when I say we believe the CEC should move towards all electric buildings in the 2022 Code cycle. Partial electrification does not go far enough in addressing the climate crisis we find ourselves in, and it puts us out of step with the state and the nation.

The Biden campaign has pledged to cut building sector emissions in half by 2035 and to eliminate all power sector emissions by the same year.

Fellow state level agencies, like CARB and the Bay Area Quality Management District, have submitted letters to you and made oral statements that the CEC should move to all electric in 2022.

Your own building decarb assessment says: Newly constructed buildings have the lower decarb costs and that accelerating efficient electrification of building end uses in both new and existing buildings represents the most predictable pathway to achieve deep reductions in building emissions.

Perhaps the most important point to me, as I live somewhere that's currently working on a land use map update that incorporated several RENA (phonetic) cycles worth of housing allocations is a point also made

in your decarb assessment. That building decarbonization --

MR. BOZORGCHAMI: Ms. Selm, I need to stop you and have you submit your comments in writing. Thank you.

MS. SELM: Okay.

MR. BOZORGCHAMI: Lauren Collum, I'm going to unmute you. Go ahead and state your name and affiliation.

MS. COLLUM: Hi. I'm Lauren Collum on behalf of Sierra Club California, representing 13 local chapters in California and half a million members and supporters throughout the state.

I'd like to thank the Energy Commission for the work they've done on the 2022 Energy Code. And while I believe that the proposed 2022 Building Code update is a step in the right direction to encourage electrification with these baseline changes, and recognize that a significant effort has gone into this, we believe that this latest proposal can go even farther to cut the pollution from gas appliances that are threatening the health and safety of Californians, and fueling the climate crisis.

So, I'd also like to just echo and support the comments of those speaking before me that were speaking

to the climate crisis and health concerns associated with continuing to expand the gas system, and building new fossil fuel homes.

As you know, the International Energy Agency report, released last week, set forth the necessary steps that we need to take to achieve a zero carbon future. And among those recommendations is a moratorium on the sales of fossil fuel boilers.

The CEC still has time and a huge opportunity to strengthen the current proposal by incorporating the IEA's recommendations.

And we'll be including more details in our written comments. But in sum, Sierra Club urges the CEC to strengthen the current proposal with stronger electric standards. Each measure that is strengthened and moved in the direction of --

MR. BOZORGCHAMI: Lauren, thank you so much.

MS. COLLUM: Yeah.

MR. BOZORGCHAMI: Thank you. Thank you.

Elena, I'm going to unmute you. Go ahead and state your name and affiliation. Elena, you need to unmute yourself, I'm sorry.

MS. ENGEL: Yes, I just did. Elena Engel, I'm with 350 San Francisco. Everyone has said it all, already. Commissioners, we all know that burning

methane is inconsistent with a livable planet. If you wait three more years, that does not make methane go away, it does not help at all. So, our future literally is in your hands. Ban natural gas in all new buildings today, go all electric. Thank you.

MR. BOZORGCHAMI: Thank you, Elena.

Paul Wermer, I'm going to unmute you. Go ahead and state your name and your affiliation.

MR. WERMER: Yes, hello. My name is Paul Wermer and I'm with the San Francisco Climate Emergency Coalition.

I would like to go on a slightly different direction question about the cost effectiveness decisions. And it is a question for you. How can gas be cost effective over a 30-year residential lifetime if we're talking about a 2022 Building Code, and in the 30-year lifecycle cost or 30-year lifespan of the cost model they will have to convert and replace the existing gas-fueled appliances if we are going to meet the drop dead of 2050, and the much more common expectations of 2040 to 2045 for no more natural gas use in buildings?

Even for the commercial, 50 years, that's a problem.

MR. BOZORGCHAMI: Mr. Wermer, I need to stop. Go ahead and submit your comments to the docket.

MR. SHIRAKH: And I think actually --

MR. BOZORGCHAMI: Yeah, I was going to have Mazi answer that question.

MR. SHIRAKH: We found heat pumps to be cost effective that's what we are recommending for many of these buildings so --

MR. BOZORGCHAMI: Also, as a note for, we are -- we do have electric-ready requirements when gas equipment is installed, and those are what's addressing the cost of retrofitting in the future, at least in part.

MR. SHIRAKH: So, where we didn't in the commercial buildings, and the high rise multifamily we didn't recommend heat pump that was for water heating, and mostly because there's really technical barriers. But in all space heating applications, where most of the building load and emission savings are coming from, we have established heat pump baselines and they are cost effective. Thank you.

MR. BOZORGCHAMI: Thank you, Mazi.

Commissioner, we have three more raised hands, Elise, Wes and Jacob. And I recommend after those three we move on to the next topic.

COMMISSIONER MCALLISTER: Agreed. Thanks everyone for your contributions and your comments, we

really appreciate it.

MR. BOZORGCHAMI: So, go ahead, Elise, and state your name and affiliation please. Thank you.

MS. KALFAYAN: Yes, thank you. Hello, my name is Elise Kalfayan. I represent the Glendale Environmental Coalition which is in favor of building electrification throughout California and updating the Building Code in 2022 to reflect that.

I'm a homeowner. Just three years ago, when I was looking to replace my gas water heater I discussed alternatives with contractors and none of them gave me information about electric-powered heat pump water heaters. We need the CEC to update the Building Code so that all contractors become educated on these climate-protecting alternatives. We need fast change in the code so that good information is available to all consumers, contractors and builders. Thank you.

MR. BOZORGCHAMI: Thank you, Elise.

Wes, go ahead and I'm going to unmute you.

MR. REUTIMANN: Hi, good morning Commissioners and staff. My name is Wes Reutimann, speaking on behalf of Active San Gabriel Valley. We're a place-based nonprofit committed to promoting sustainability, equity, and livability in the San Gabriel Valley and East Los Angeles County.

While a step forward, staff's recommendation as proposed is also a significant missed opportunity. It represents two to three years wasted, time that we do not have to spare. It also represents years of time that a stronger policy could accelerate change in other states around the U.S., as well as in other countries.

Finally, it represents lifelong health impacts to the many Californians who will be unnecessarily exposed to increased indoor air pollution from methane.

As a community-based organization, we strongly urge you to bring the benefits of reach codes to the entire state. Here in Southern California, many, many disadvantaged communities do not have the benefits of these code updates and it's incredibly difficult to move them forward since they tend to be under-resourced and understaffed.

We hope and join many of the partner organizations today in urging you to move towards an all electric building standard in 2022, not in 2025. Thanks.

MR. BOZORGCHAMI: Thank you.

So, right now that's all the comments we're going to take on this. I encourage if any further comments do come in, please submit them in writing to us.

And one thing I do encourage, if your association and your sister associations could submit maybe one comment and have everyone sign the bottom, so we know exactly who has the same concerns that would be much more appreciated. I thank you so much.

With that, next I'm going to let Mazi take over and present on the PV and battery storage systems. Go ahead, Mazi.

MR. SHIRAKH: Good morning again. This is Mazi Shirakh. And so, this time we're going to be talking about prescriptive requirements for photovoltaic systems and battery storage systems.

When it comes to reducing emissions from our buildings, PV and battery storage systems are just as potent as the heat pump technologies that has been demonstrated in the 2019 Standards, when we first introduced PVs into the Building Code.

So, the current 2019 Standards introduced for the first time in the Building Code and planned PVs into the buildings for low-rise residential, which is single families and multifamilies that are three stories and lower.

And they were basically sized to displace the annual kilowatts of a mixed-fuel home that conformed with Net Energy Metering, or NEM, rules. And a rough

average statewide was about a 3 kilowatt PV system and this size actually varies by the size of the house, and the climate zones. So, I mean that's just 3 is an average.

We found PVs to be cost effective in all 16 climate zones, even if the exports, the hourly exports were compensated at avoided cost. And which is probably a likely future for where NEM is headed. Time will tell. This recommendation resulted in large energy and CO2 emission savings.

For the 2019 Standards, battery storage was an option and could receive a substantial compliance credit but it's paired --- when it was paired with a PV system, but it was not a mandatory or prescriptive requirement.

The 2022 Standards proposes to expand the PVs paired with battery storage systems to multifamily and selected nonresidential buildings.

So, for the current cycle update we're proposing what we call a lean and mean solar and storage, and I'll define what we mean by lean and mean in the next slide.

For consideration are high-rise residential four or more habitable stories and selected nonresidential buildings. This includes office, retail, grocery, school, warehouse, and will also have minimal PV requirements that are similar to warehouses for

auditoriums, convention centers, hotel/motels, library, medical/clinic, restaurant and theater.

What we mean by lean and mean is basically a battery storage system that is designed not to offset the entire electric load, annual load of the building. Rather, it's designed to minimize exports to the grid and maximize self-utilization, and use control strategies that brings the maximum benefits to the occupants, and the grid, and the environment.

So, you know, we limit the hourly exports to 20 percent of the total PV generation without batteries. And then, once we add batteries the exports are limited to 10 percent of the total generation or less. We found this strategy to be cost effective in most buildings and climate zones, even with exports at avoided costs, which may be a like NEM3 scenario. But, you know, the CPUC is considering comments on NEM3 and they may have a decision in the near future. Time will tell whether they will reduce the compensation for exports.

So, there are some exceptions for PVs and battery storage systems. You know, it's like any system, you know, one-size-fits-all doesn't work. So, we have introduced this concept of solar access roof area or SARA. And so, I will have a slide to explain what the solar access roof area is.

But basically, these are all the areas on the roof and around the building that have suitable solar access for PVs. And so, where PVs can be installed and have an effective generation.

So, there are some buildings where SARA is limited to 3 percent or less of the conditioned floor area, that's what CFA is. Think about those tall buildings in downtown San Francisco, or any city, where you have the tall buildings with very limited roof area. It comes to a point where PV is basically -- gets so small compared to the building load that it is trivial. So, there is an exception for that.

There is an exception for PV systems less than 4 kilowatts. I mean these are really small, basically residential PV systems, now, that basically are not sufficient for nonresidential buildings.

We have an exception for areas of buildings with high snow loads. This was -- we received many comments on this after the adoption of the 2019 Standards, so we've worked that into an exception for this round.

There's no PV in a multi-tenant buildings in a jurisdiction or area where there's no virtual net metering or community solar program. So, if you have a multi-tenant building in a jurisdiction, and there is no virtual net metering that the IOUs offer, or there is no

community solar program there is no PV requirement. Because the only other alternative would be in a multi-tenant building where all the PVs and battery storage system would have to be direct wired to each dwelling unit, and that is not cost effective.

There will be no battery storage requirements in buildings and tenant lease spaces that are less than 5,000 square feet.

And no battery storage requirement if the battery size ends up to be less than 10 kWh, which is basically one battery pack. So, we get into a fraction of a battery less than that.

There's no battery storage for offices, schools and warehouses in Climate Zone 1. And Climate Zone 1 is, again that's North Coast California, just below Oregon, Humboldt County. It tends to be a little bit more foggy than other climate zones, and that's why the cost effectiveness for PVs and battery storage were a little bit closer or less than the required margins.

So, this concept of solar access roof area, or SARA, you know, we've introduced that section to PV requirements for all building types, single family, multifamily, and nonresidential buildings. It clarifies where the PVs should go and it actually replaces many of the existing exceptions that are in the 2019 Code.

So, what does SARA include? It includes building's roof space and all areas of roof on covered parking areas, carports, and all newly constructed structures that are capable of supporting PVs. So, in the gap. You know, this complex it's got a rooftop, it's got carports, community buildings. If they are there and they can structurally support PV system, and they have favorable solar access that's greater than 70 percent, then those are all fair game for solar installation.

SARA does not include any areas that have less than 70 percent of annual solar access. This could be sloped roofs that are facing north, or areas of the building that are impacted by obstructions that may be external to the building that's casting a shade, or obstructions that are part of the building design and elevation features.

So, again, these set of requirements that you see here are specific to Section 140.10, which is the nonresidential section. There are slight variations between these requirements for other building types, like low-rise residential.

Storage can help manage the building electricity and the demand on grid. I mean, storage can play really a pivotal role. They can store the PV -- the

electricity that's generated in the middle of the day from photovoltaic systems, which is very clean energy, and make it available to the building and the grid during the evening ramp when the emissions actually go up, and so do the costs.

So, carefully using the battery storage system can really help meet our policy goals, while also helping to save costs for the building, and help the environment. They provide flexibility to avoid basically sending the rooftop electrons back to the grid in the middle of the day, the so-called duck curve. And they can all help lower electricity bills.

They can also be a tool in helping us achieve the SB 100 goals of, you know, a clean grid by 2045. And it does enhance the reliability of the grid during high peak demands and in the other areas where, you know, the grid stress, you know they can use this as a resource to meet demand. It does reduce emissions from the building, CO2. And it does help modern buildings to be more resilient to wildfires and PSPS events, the public shutoff events that happens in the summertime, you know, when we may have wildfires.

We have may an attempt to clarify some of the exceptions that we've worked into the 2019 Standards. You know, subsequent to the adoption and implementation

of the standards, you know, we learned there was many questions came to the Commission and so we've tried to basically take advantage of those, and improve our language.

And again, one initiative we took was the introduction of this solar access roof area, or SARA, which clarifies what happens when this area, SARA, is greater than 80 square feet, but smaller than the area required by full NEM compliance. You know, the 2019 Standards is kind of silent on this issue that you may have areas on the roof that are more than 80 contiguous square feet, but it doesn't support the full NEM compliance PV size. So, it kind of left that silent.

Now, this change will basically clarify that if you have more than 80 square feet and less than the full NEM, you just put as much PV as possible within that solar access roof area.

There's a new exception for PV systems that are less than 1.9 kilowatt DC. These basically comes in increasingly smaller PV system and the cost goes up because you have certain fixed costs that basically are going to be there independent of the size.

This also addresses the ADU issues that came up, auxiliary dwelling units.

As a result of this enhancement, we're able to

remove three exceptions. Exception 2, which was an exception for Climate Zone 15. Climate Zone 15 is the desert, Palm Springs, very hot, very large PV system climate. Exception 2 was instituted to address certain spatial issues. We no longer need that with this introduction of the SARA concept.

We also removed Exception 3 for 2-story buildings and Exception 4 for 3-story buildings for the same reason.

We have a new Exception 3 for areas in high snow loads. Again, these are for Section 151(c)14. That's the low-rise residential building or single family in this case.

We clarified that occupied roofs, as specified in Title 24, Part 2, will not be considered as part of SARA. So, occupied roofs are flat roof areas typically used in multifamily buildings and certain nonresidential buildings, and they could have patio furniture, barbeques, and basically people use that to hang out, to enjoy the outdoor environment. And so, we make it clear that, you know, there's no PV requirements in those areas.

And it clarifies that for low slope roofs that even in the residential buildings if you have a flat roof, or low sloped roof, obstructions that are external

or internal to the building, including building design features, are not part of SARA.

And it also clarifies that the Exception 5 for self-shading, these are for buildings, you know, whose building plans were approved prior to January 1, 2020. They have different PV requirements. They can have a smaller PV system or no PV system at all, you know, if the roof is self-shaded.

So, I think this is my final slide. It kind of puts together the environmental or the emissions benefits of everything that we proposed this morning, which includes the heat pump baseline, and photovoltaic and battery storage system, and other measures in the Building Standards. Basically, our traditional energy efficiency measures, lighting, envelope, and every other improvement.

So, we have two tables here. The one that you see up here, it says that these are the savings for heat pump baseline and PV and battery storage systems. These are annual CO2e emissions. The units are metric tons per year.

And so, I looked at -- we looked at the three scenarios. This is the first year savings emissions, a third year emissions savings, and the full lifecycle 30-year emissions savings.

And so, what we have here is metric tons per year. But to kind of give it a little bit of perspective, we put an equivalent gas car taken off the road. Like, you know, to say this is meant to reduce the emissions by this amount how many gas cars do you have to take off the roads to be equivalent to that. So, that's the top table.

The bottom table is all 2022 standards, which includes the baselines, PV and battery storage system, and all the other measures that have been considered as part of the 2022 Standards.

So, for the baseline and the PV system, the first year, that's 2023 when the standards go into effect, the buildings that are impacted by this code cycle, we save about 106 million metric tons per year. That's equal to taking about 24,000 gas cars off the road.

And by the third year, I mean these numbers accumulated really fast, you know, that would be equivalent to about 319,000 cars taken -- I'm sorry, tons. Equal to about 71,000 cars taken off the road.

For the full 30 year that's about 2.6 million tons, and about 600,000 cars taken off the road because of the PV and the baselines.

When enrolling our other measures that was

considered as part of the 2022 Standards and that includes, you know, the lighting improvements, process loads, you know, improvements to the building envelope in various buildings, and alterations to existing buildings you can see the numbers actually jump very significantly. And the numbers, I know you can see it, it goes up to around 142,000 cars the first year, about 450,000 cars by the third year, and the full 30 years that's about 2 and a half million cars off the road. So --

COMMISSIONER MCALLISTER: Mazi, maybe you could be a little bit more specific about that car metric. You know, we will be moving towards electric cars, you know, obviously.

MR. SHIRAKH: Right.

COMMISSIONER MCALLISTER: So, emissions maybe aren't quite equivalent across the time. And then, also, just what are the units there, is that car years?

MR. SHIRAKH: Yes. So, this would be --

COMMISSIONER MCALLISTER: That's total car years.

MR. SHIRAKH: Yeah, that's basically what we took here was just to give a perspective of what, you know, how much this impact will be in terms of cars. So, we took an existing car that has, I think, an

average, and I need to look at the assumption, but about 20 miles per gallon roughly. That was basically the metric we used. And so, you know, even that metric --

COMMISSIONER MCALLISTER: That's fine just --

MR. SHIRAKH: Yeah, the fact that --

COMMISSIONER MCALLISTER: That's fine, no need to go into it in depth.

MR. SHIRAKH: Right.

COMMISSIONER MCALLISTER: But if people have questions about that metric just, you know --

MR. SHIRAKH: That's right, it's just how many average existing cars that's gas this would be equivalent to.

COMMISSIONER MCALLISTER: Right.

MR. SHIRAKH: Obviously, if you have electric cars, you know, you have much lower emissions, so there will be a -- so, the numbers will be far greater. So, but this is our average, basically, polluting car that, you know, somebody's driving. So, that's what that is.

MR. BOZORGCHAMI: Thank you, Mazi.

So, we're taking questions and comments now for this part of the discussion. And I have Mark Roest who has his hand raised, and he also has a question in the Q&A box. So, I'm going to unmute you, go ahead and ask both questions, sir.

MR. ROEST: Thank you. So, I'm Mark Roest with Sustainable Energy, Inc., in San Mateo, California. And we are developing batteries that will be 3 to 9 times the capacity of lithium and so they'll be twice the efficiency of what there is today.

The question I wrote so far is have you considered building integrated thin film PV? One, non-framed, flexible, conformable PV was announced this week. And we will be introducing a thin film printed directly on the building's sheathing materials, which converts efficiently at wide angles, and from reflected and scattered light, making it ideal for building walls as well as roof, which opens a path for high-rise buildings to be fully solar powered.

A 23 percent efficiency solar thin film was recently announced and we intend to produce thin film that is close to or equal to 48 percent efficient. That will initiate a revolution in solar production on buildings. The companion to the rooftop is solar canopies over parking, driveways, and wherever shade and/or rain/snow protection is desired.

The goal is that each building and canopies around it provides enough electricity to completely meet the building and all the vehicles associated with it, at least when the sun is shining, and then battery capacity

for when it's not. Looking at stationary batteries sufficient to charge the vehicles so that there's no need to --

COMMISSIONER MCALLISTER: I'm going to step in. I'm going to step in right here. Thanks for your comment. I do want to -- Payam, what's your -- I just wanted to just make sure that we continue to go on. And, you know, obviously we have to examine existing technologies that have a commercial space. And so, I want to just encourage us to focus on the proposal, specific to the proposal at hand.

MR. ROEST: Yeah, so there were two --

COMMISSIONER MCALLISTER: And Payam --

MR. ROEST: -- two existing, you know, at least one commercial existing one.

MR. STRAIT: The question isn't whether there's an existing installation. It's is this an off-the-shelf commercially viable product that builders can install at scale today?

MR. ROEST: I have the impression that one of the other two is ready and the other one was a prototype.

MR. SHIRAKH: I can answer the question.

COMMISSIONER MCALLISTER: So, thanks for -- hold on, just I want to just step in. Payam, what minute are

you using in --

MR. BOZORGCHAMI: I'm using one minute, sir.

COMMISSIONER MCALLISTER: Is it two minutes? One minute, okay.

MR. BOZORGCHAMI: So, we're using one minute.

COMMISSIONER MCALLISTER: So, we're at one minute. Okay, and just to try to be efficient about the answers to the question so we can kind of keep things moving on. I just want everybody to be looking at being parsimonious with their comments because we absolutely want to hear them, but also we have the written comment that people are absolutely welcome to put more extensive comments than they can get in verbally today. So, we encourage you to do both.

MR. ROEST: Thank you.

COMMISSIONER MCALLISTER: Thank you.

MR. SHIRAKH: So, I have a quick response to this. You know, our performance is a standard performance. So, you know, when we say a 3 kilowatt PV system for residential, we don't specify what technology. Basically, we establish the 3 kilowatt based on the load of the house, and then we establish a TDV budget for that building. And any technology that can meet those requirements can be used to basically comply with the standards.

And the choice is really up to the builders and the vendors. But, you know, any system that works for the batteries, too. You know, we're not talking about any specific technology. It could be lithium-ion, it could be anything. It could be flow batteries. As long as they meet the performance requirements of the standards they can comply. There's no limitations on that.

MR. BOZORGCHAMI: So, we're PV agnostic here, then.

MR. SHIRAKH: We're technology agnostic.

MR. BOZORGCHAMI: Technology. I'm sorry, yes. So, thank you, Mazi.

But yeah, one more raised hand then we'll go to the questions and answers. Bob Raymer, go ahead and state your name and affiliation.

MR. RAYMER: Yeah, thank you Payam. This is Bob Raymer, with the California Building Industry Association. And why we've got one concern would be community solar proposal. We certainly support what the CEC's doing in terms of fine tuning the rooftop solar provisions. We've had a kind of learning experience over the last 12 to 18 months, and so with that we've had a good back and forth with staff and we strongly support the changes you're making here. Thank you.

MR. BOZORGCHAMI: Thank you.

MR. SHIRAKH: Thank you, Bob, appreciate it.

MR. BOZORGCHAMI: Thank you. So, with that, Peter, go ahead and start the Q&A if you can, please.

MR. STRAIT: Sure, sure. We'll go through the written and then we'll get back to any raised hands afterwards.

MR. BOZORGCHAMI: Yes, please.

MR. STRAIT: First, Rob Lamendola asks: For Slide 33 can you please give some real life examples of what is meant by limit exports to 20 percent of PV?

MR. SHIRAKH: What slide number was that?

MR. STRAIT: Slide 33, they said.

MR. SHIRAKH: So, what we mean by the limit the exports to 20 percent, so we looked at the -- you know, our software has the capability to model load, and the PV, and the generation for every hour of the year for all the different building types, retail, office, anything considered.

And, you know, we can simulate the PV system and then figure how much of that PV system or the electrons that are generated, the electricity is used behind the meter versus what goes back to the grid. So, we basically chose the PV size that basically without battery storage did not export more than 20 percent.

So, roughly, you know, kind of rule of thumb, but that really changes by building types, is if you size your PV system to around 60 percent of the total load, so your generation is about 60 percent of the total annual building load, you end up with about 20 percent in exports.

And then, we added enough batteries to basically save those electrons in the middle of the day and make it available later in the day, to the point that the exports were at 10 percent for the load.

So, our performance software, CBECC, both Res and Com, will help people accommodate these goals and basically size the PV system, and the battery storage system, and see what the generation is in kWh, and TDV, and also they can see how this reduces CO2 emissions from the buildings.

MR. STRAIT: All right. Avani Goil (phonetic) asks a similar question of: How does the 45-day Code language limit the hourly exports?

And I think you explained that this --

MR. SHIRAKH: I think I just explained it.

MR. STRAIT: Yeah. Laura Petrillo-Groh asks: Does the solar area roof access -- I might have gotten that wrong -- calculation exclude roof area being used by mechanical equipment.

MR. SHIRAKH: Yes.

MR. STRAIT: Okay. Ted Tiffany asks: Can you explain the discrepancy between Slide 37 exception for 1.9 kilowatts and a previous slide that notes an exception of 4 kilowatts and below?

I think those are applying to two different situations.

MR. SHIRAKH: It's a different thing. The 4 is for commercial buildings, 1.9 is for single family.

MR. STRAIT: Dan Sharoni asks: How are solar farms compare in overall helping PV solar systems compared to the building roof?

MR. SHIRAKH: So, that's a -- I think the community solar concept he's talking about. And so, that is an alternative way of meeting our rooftop requirements. So far we have only one utility that has an approved community solar application, that's SMUD. So, in jurisdictions where community solar is approved, the builders have a choice of either using rooftop or community solar. And that's what SMUD is doing.

There are some limitations on that and I think Bill Pennington, my colleague, is going to talk about that after lunch.

MR. STRAIT: Dan Sharoni also asks: How desirable is it to build solar farms next to highways

with integrated EV charging stations?

I think that's outside the scope of what we're proposing for the Building Standards.

MR. SHIRAKH: I mean, you know, the proponents can put their PVs anywhere as long as they meet the Section 10-115 requirements that Bill Pennington's going to describe after lunch.

MR. BOZORGCHAMI: Peter, I want to interject. Ben Davis also has a raised hand. Should we -- let me do the raised hands so that we could handle both of his questions.

MR. STRAIT: Sure.

MR. BOZORGCHAMI: Okay, go ahead Ben. Go ahead and state your name and affiliation.

MR. DAVIS: Ben Davis, California Solar and Storage Association. I have a question in the chat, but I also wanted to give a comment which was just to thank the Commission staff and the Commissioners for your leadership on the PV and storage mandate for new commercial, and high-rise, multifamily.

The mandate, it will obviously result in more clean energy and all the associated benefits such as resiliency.

And I also wanted to point out that this is also an incredibly important step for reducing carbon

emissions because the impact will be felt outside buildings and outside California.

When we get to zero carbon, the mentality of society, I think, towards clean energy will need to be different. And requiring PV and storage in new construction pushes that mentality to where it needs to be. Right, when customers become producers of clean energy they become more invested in clean energy. When solar and storage become as standard as double-pane windows it makes a not necessarily tangible, but really important difference in how people see clean energy.

So, this is very exciting and we, the solar industry --

MR. BOZORGCHAMI: Thank you, Ben.

MR. SHIRAKH: I'll just follow up on what Ben said. The PV and battery storage do save a lot of emissions, reduce emissions because they impact the entire load of the building. That includes lighting, plug loads, which are very significant. So, that's why this is an exciting addition to the Code this cycle.

MR. STRAIT: Ben Davis has a question in chat, also, asking about the section in PV and multifamily buildings utility VNEM. Is there a certain square footage for spaces above which it is cost effective to have a solar system that's directly to the tenant's

meter? And if so, would the Commission consider restricting the exemption to tenant spaces beneath that square footage threshold?

MR. SHIRAKH: Yeah, I mean we can have an offline discussion.

MR. STRAIT: Yeah. If you have a --

MR. SHIRAKH: We came up with that exception when we actually talked to --

MR. STRAIT: Yeah. So, Ben, if you have information about what that square footage threshold should be, like if you have some cost effectiveness data that you could submit, please do so.

Rob Lamendola is asking: When we say PV size is less than 4 kilowatt for the exception, can we clarify if this is 4 kilowatts DC, at the solar panels, or 4 kilowatts AC as the inverter backs output.

MR. SHIRAKH: DC. All of our PV sizes are in DC. Sometimes we mention that and sometimes we don't. But we're always talking about the kW DC.

MR. STRAIT: Mike Hodgkin (phonetic) asks: What single family starts did we use for the carbon emissions calculations, noting that the case study released early last week, in their opinion overestimating single family starts by a factor of two?

MR. SHIRAKH: What was the question? What

single --

MR. STRAIT: What single family starts did we use for our carbon emission calculations?

MR. SHIRAKH: Oh. We used basically the CEC's forecast that we've always been using. You know, that's the (indiscernible) data. And it's been -- that's what we've been using. I didn't realize there was a discrepancy or an issue, but that's what we're using is the CEC's forecast for new construction.

MR. STRAIT: Uh-hum. Barend Venter asks -- he has a series of a five questions. First, how do you manage the non-export on NEMV, which is all export as NGOM meter?

And these are all questions related to NEMV and NGOM.

MR. SHIRAKH: I think you need to submit this in writing. I mean I'm not --

MR. BOZORGCHAMI: Yeah, Barend, could you please submit this in comment? The acronyms are a little bit off what we know.

MR. SHIRAKH: Yeah, I mean I would hate to guess about data.

MR. STRAIT: Yeah, I think this is about virtual net metering, but we'll answer those comments in writing.

MR. SHIRAKH: Yeah, I think it would be best to have it in writing so we can give it the appropriate response.

MR. STRAIT: Thomas Paine asks: Requiring batteries presumes a market availability that has not been proven. What contingencies are in place if market shortages come to pass?

MR. SHIRAKH: You know, we had similar concerns about PVs the past code cycle and, you know, we talked to the manufacturers and CALSA, and they knew it was coming. They were prepared for it. And we didn't experience any shortages. And we expect this to be the same. This is not going to go into effect until 2023, so the manufacturers know they are coming and, hopefully, they'll be there to meet the demand.

And the same thing is true for heat pump water heaters, space heaters, you know we're hoping that a two and a half year lead is enough for the manufacturers and the supply chain to establish themselves.

MR. STRAIT: Tom Kabat asks: Can you compare the relative ease of retrofitting batteries and solar PV onto recently constructed buildings versus the relative difficulty of electrifying recently constructed buildings?

MR. SHIRAKH: Yeah, so I mean it is easier to

put PV on existing homes than retrofitting them, that's true. That's why I know we need to look at our retrofit cost effectiveness carefully. So, I'm not sure what the question is but, yeah, everyone knows that things are always more expensive when you do them as a retrofit. More so for some technologies, than others.

MR. STRAIT: Yeah, and I'd add that the cost of retrofit was the justification for including the electric readiness requirements we have now proposed for 2022.

MR. SHIRAKH: Yeah.

MR. STRAIT: Mark Rest has a long paragraph. I'll check the question, just a moment.

MR. BOZORGCHAMI: That's comments, not a question.

MR. STRAIT: Yeah. Mark, we would encourage you to submit that in writing to our docket. That's not a technical question that we'd be able to answer as a part of this presentation.

MR. BOZORGCHAMI: Yeah. So with that, Mazi, Brandon actually has his hand raised, and also does Rose Ann Witt. So, I'm going to open up first with Rose Ann, and then those are the last two. Then, we'll move on to Danny Tam talking about the energy storage system and electric ready.

MR. SHIRAKH: Okay.

MR. BOZORGCHAMI: Go ahead Rose, please state your name and affiliation, Please.

MS. WITT: Rose Ann Witt with the Conejo Climate Coalition. The International Energy Agency warns we must stop new fossil fuel investment this year to limit global temperature rise to 1.5 C. Doing so will create 30 million jobs, prevent 2.5 million deaths yearly, and add 4.5 percent to annual global GDP.

CEC's 2022 draft fails to protect our climate, health and economy. Your draft increases gas infrastructure investment, ensuring stranded assets and costly retrofits during statewide housing construction mandates.

Burning fossil bas indoors creates health-destroying pollution inside our homes. Children with gas stoves have a 42 percent higher asthma risk, especially minority kids living in small, crowded spaces without quality arrangements.

Please require all electric new buildings now. We can't wait three more years. Thank you.

MR. BOZORGCHAMI: Thank you, Rose Ann.

Next we'll have -- Brandon, please -- I'm going to unmute you. Please state your name and affiliation. I apologize, I don't have your last name.

MR. VITNER: Yes, can you hear me?

MR. STRAIT: Yes.

MR. VITNER: This is Barend Venter from Blue Sky Utility. We are a developer and holder of multi (indiscernible) solar and storage systems.

I first want to thank the CEC and all these efforts. I think this is the way to go. I think you're making amazing progress here.

My question is, I don't want to go too deep into it, but just, you know, being part of VNEM and all these programs over the last five years, you know, we've run into some series wind and series contests with all the utilities, trying to work them to make this work.

So, I'll just ask that as we go through this we just verify the technicalities about this, so that you can say we -- it's non-export, and a VNEM is actually connected as an export meter. That is recognizable as non-export and even connecting a battery to that meter that that's recognized as non-export. Or, even connecting batteries to participating accounts.

So, there's some technicalities in here that we just need to work on. And then, installed to date, most of the utilities does not work together. They basically don't allocate the demand credits. So, whatever demand or whatever arbitrage grid (phonetic) which is

contemplated in this presentation currently is not realizing monetary value.

MR. BOZORGCHAMI: Barend, I apologize.

MR. VENTER: Yeah, yeah.

MR. BOZORGCHAMI: I'm going to have to stop you and have you --

MR. VENTER: Okay, fine.

MR. BOZORGCHAMI: It's a very good conversation, please submit it in writing.

MR. VENTER: Of course. Thank you so much for the opportunity.

MR. SHIRAKH: Yeah, thank you. Yeah, and please submit it in writing.

MR. BOZORGCHAMI: So, with that, that's the last of it on this topic. So, Danny, do you want to take over?

MR. TAM: Mazi, can you keep driving? I'm sorry, I have a few slides.

MR. BOZORGCHAMI: Yes, exactly.

MR. TAM: So, now we're going to go over the proposed mandatory measures for energy source ready and electric ready.

First, we're proposing to add a new mandatory section in 150.0(s) to help facilitate future installation of battery storage systems in single

family. These requirements should be beneficial not only for battery source system, but it should be for backup generator as well, which will be useful for homeowners in dealing with future PSPS events.

The first part of the requirement is either having a subpanel with a main service panel of at least 224 -- 225 amp or having an ESS ready interconnection equipment with minimum 60 amp backup capacity.

The second part is to ID and collocate at least 4 branch circuits for emergency use. This allows future battery storage for backup generator to supply power to these circuits in case of blackouts.

Finally, space needs to be reserved to install a system isolation device or a transfer switch within 3 feet of the main panel.

The next slide, please. Okay, moving on to the all electric ready proposals. For single family we have some existing requirements for heat pump water heater ready in 150.0(n). We're proposing to expand on them by adding a designated space requirement of 2 and a half by 2 and a half and by 7 feet.

If this designated space is more than 3 feet from the water heater being installed, then there are some additional requirements such as a dedicated 30 amp circuit, some additional plumbing configuration and

accountancy line. This is to ensure a future heat pump water heater can be installed in that designated space without too much modification.

The next slide, please. So, we're still in single family. We're proposing three new electricity ready sections. These requirements would be applicable when a gas furnace, cooktop, or clothes dryer is being installed. The language are very similar in that sense.

The requirements for installation of a dedicated circuit that terminates close to the equipment, with a reserve breaker space in a main panel.

For space heating we're proposing a 30 amp circuit. For cooktop 50 amp. And for clothes dryer location, a 30 amp circuit.

Okay, the next slide. Okay, moving on to multifamily, we're proposing a new 160.9 electric ready section. These requirements are basically identical to the single family measures we just went over. And it would be applicable when a gas furnace, cooktop, or clothes dryer's installed in the dwelling.

Okay, next slide. Okay, finally for clothes dryer to serve common areas in multifamily buildings, we're proposing to add a requirement for either the actual conductors or raceway that's sized to one of the following: Either a 24 amp for clothes dryer, or 2.6

kVA per 10,000 Btu per hour of gas input, or the responsible person or the designer can provide the calculation of the power required to get the equivalent functionality of the gas system.

And the next slide. That's all our battery storage ready and electric ready proposals. Now, we're going to open it up for questions on these sections.

MR. STRAIT: The one question we have is from Laura Petrillo-Groh, who asks: Do the 150.0(s) requirements for the 225 amp panel apply to additions and alterations or to new construction?

MR. TAM: These requirements are strictly newly constructed buildings.

MR. STRAIT: Okay, that's the only question that I have in the text box.

MR. BOZORGCHAMI: And there's no raised hand. So -- oh, spoke too soon, I've got two. I'm going to let Jacob Cassady go ahead and I'm going to unmute you. State your name and affiliation.

MR. CASSADY: Good morning.

MR. BOZORGCHAMI: Oh, I'm sorry. Go ahead, I apologize. Do that one more time.

MR. CASSADY: All right, take two. Hi, Jacob Cassady with the Association of Home Appliance Manufacturers. Really appreciate all the work you guys

have put in this. And I know I'm between one commenter and lunch. But just wanted to make sure that, you know, we aren't over-disincentivizing gas and gas cooking. It's important, people are passionate about it. And, you know, to an extent it's been politicized and we really shouldn't disadvantage one product over another. This is -- we've got to make sure that the consumers have the choice that they are looking for. So, thank you.

MR. BOZORGCHAMI: Thank you, Jacob, for the comment.

So, next we've got David Freedman. I'm going to unmute you. Go ahead, sir, and state your name and affiliation.

MR. FREEDMAN: Thank you. David Freedman, Palm Springs Sustainability Commission.

MR. BOZORGCHAMI: I'm not sure what's going on. I apologize, hold on one second. Here we go.

MR. FREEDMAN: Okay, can you hear me now?

MR. BOZORGCHAMI: Yes, please. Sorry about that.

MR. FREEDMAN: Thank you. David Freedman. I'm a member of the Palm Springs Sustainability Commission and I'm actively following the proposal and the potential reach code for Palm Springs for 2023

effectiveness.

And just a quick question on electric ready for cooktop. Does that also include ovens or just the actual burner, i.e., induction burner in case the one, the burner might be located in a different location than the oven. So, you just perhaps could clarify how that requirement would work for electric ready for kitchens?

MR. BOZORGCHAMI: I believe the language is ready just for the burner. You know, most likely if you're putting in an induction stovetop, you'd probably do the oven as well. But the language itself, it's just the burner.

MR. FREEDMAN: Okay, thank you.

MR. SHIRAKH: Our understanding is that ovens that are separate, currently, almost the vast majority of them are electric anyways, even when they have a gas cooktop the oven is electric already.

MR. FREEDMAN: Okay, thanks for the clarification.

MR. SHIRAKH: Sure.

MR. BOZORGCHAMI: Okay, next is Josie Gaillard.

MS. GAILLARD: Yes, thank you. Jose Gaillard with the Menlo Park Environmental Quality Commission. Can you hear me?

MR. BOZORGCHAMI: Yes.

MS. GAILLARD: Okay. I'm speaking for myself, personally, not the Commission. So, my concern is that the proposed code doesn't go far enough. It directly -- from my perspective, it directly conflicts with the state's goal of becoming carbon neutral by 2045. Why? Because gas furnaces and boilers can easily last 30 years or more. I've seen 40 and 50 year old boilers, it's fairly common.

So, that means we already have 2.4 million gas devices that will have been installed since 2015. Which, if you back it out, is 30 years before 2045. So, those will all be stranded gas assets. So, that's what we have today.

So, this code allows even more assets to be installed which will become stranded. So, how does this -- my question is how does the state plan to compensate building owners who comply with the code and install these long-life gas devices now, and then have to retire them early because the state's climate goals require that gas distribution be pruned back, if not completely eliminated by 2045?

And has the state evaluated the legal liability it incurs if it continues to allow people to install gas now, and then forces the gas appliances to be uninstalled later?

MR. SHIRAKH: You know, we're going to respond to all these comments in writing.

MR. BOZORGCHAMI: Yeah.

MR. SHIRAKH: Along with the others, the similar comments. So, we're going to look at all of them really well and prepare a response.

MR. BOZORGCHAMI: Next we have Ben Davis. Go ahead, Ben.

MR. TAM: Commissioner McAllister is --

COMMISSIONER MCALLISTER: Can I just -- can I just chime in real quick?

MR. BOZORGCHAMI: Yes, sur.

COMMISSIONER MCALLISTER: So, I want to encourage people to tune into the EIR discussion. So, you know, today is strictly about the Building Code provisions in the regulatory language, and so I just want to keep reminding people of that. But there is an EIR that's been -- that's now public, that you can have a look at, and those broader issues. You know, allowing a -- so, you know, the difference between allowing and requiring is relatively important.

So, but I would encourage that discussion and, you know, more broader, longer-term environmental impacts to be -- that discussion to take place in the EIR context. So, thanks.

MR. BOZORGCHAMI: Thank you, Commissioner.

David, I think, I'm not sure if you have your hand raised again or was it by accident?

MR. FREEDMAN: Thank you. Let me take my hand off. Thank you, though. I just lowered it. Thank you.

MR. BOZORGCHAMI: Sure. Al, I'm going to unmute you. Go ahead and state your name and affiliation.

MR. SATTLER: Okay. Al Sattler, myself. A question about the -- you know, the isolation capability and which would be related, perhaps, to the self-generation. Is there any thought about having that be part of rebuilding? I would think especially in areas that might well be subject to repeated PSPS that that could be a very desirable feature together with self-generation? Thank you.

MR. SHIRAKH: Oh, this requirement's applied to any newly constructed buildings anywhere in the state. But it does not apply to existing buildings in those areas. So, I mean if a jurisdiction wants to have that capability in areas with a high likelihood of PSPS events, you know, they have to do it at the jurisdiction level. But the Code only is for newly constructed buildings at this point.

It is a great idea to have them there. You know, we just don't have the authority to do that.

MR. BOZORGCHAMI: Thanks for the clarification, Mazi.

Ben, I'm going to unmute you. Go ahead and state your name and affiliation.

MR. DAVIS: Ben Davis, California Solar and Storage Association, in strong support of the battery ready homes requirements. The Commission staff, you know, gave this a lot of thought and we are not the only stakeholders who were part of the conversation. And I, you know, just hats off to the staff for doing a great job balancing the different needs from different stakeholders.

The battery ready homes requirement, it will be able to reduce the cost of batteries by up to $2,500 which will, obviously, allow more homes to install batteries. So, overall this is quite the accomplishment and we are excited to see this in the 45-day language. Thank you.

MR. BOZORGCHAMI: Thank you, Ben.

MR. SHIRAKH: Ben, there was a question, I think it was Tom, about the likelihood of availability of batteries when the code rolls around in 2023. Can you comment on that?

MR. DAVIS: Yeah, this is on the radar for the battery manufacturers and January 2023 is more than

plenty of time to make sure there's adequate supply. The Energy Commission, you folks came out with an estimate of the megawatt and megawatt hours that is required, and there are already the discussions happening in the industry to make sure the supply is ready.

MR. SHIRAKH: Thank you.

MR. BOZORGCHAMI: Thank you for the clarification, Ben, appreciate that.

I'm going back to Peter one more time. We're going to shut down the raised hand option. And we have two, I think two questions and answers.

MR. STRAIT: Yes. Thyme Phillips is asking: How are lifecycle analysis consider a rapidly changing climate?

MR. SHIRAKH: So, when we updated the TDVs and we added the source energy as numeric, we also updated our weather files. And the weather files do reflect the long term patterns, weather patterns as we currently understand them. So, it does assume that most climate zones are getting warmer and so that is part of our simulation basis. And so, that's what was there when we were evaluating all these options.

MR. STRAIT: Yeah, and so that's answers also their question about how it impacts the sizing of

battery and PV systems. The battery and PV system sizes were determined based on that modeling that included increasing temperature over time.

MR. SHIRAKH: Yes.

MR. STRAIT: And then, there's a question of: What opportunities can Title 24 capture to make our buildings climate ready, which is more rhetorical. It's not a question, it's not a technical question on the contents of the presentation.

MR. SHIRAKH: I mean building resiliency, building envelope resiliency is an important consideration for us. Which, you know, we think that protects the building against the changing, the warming climate. So, that is one of our priorities.

MR. STRAIT: Laura Petrillo-Groh asks: In 150.0(n), would you please explain why the hot and cold water lines need to pass through the designated space for heat pump water heating before the installed gas water heater?

MR. TAM: Yes, so you don't have to reroute the plumbing. So, if it's not -- if that space is not where your -- you know, the new water heater is being installed, you can just remove it. Since the plumbing passed through that designated location you can just, you know, disconnect it and install it there. That's

the idea.

MR. STRAIT: Okay.

MR. BOZORGCHAMI: Peter, is that all?

MR. STRAIT: Laura clarifies: As opposed to extended to a designated space. But otherwise, that appears to be all.

MR. BOZORGCHAMI: Okay. So, I think that's all the questions we have for this morning's presentations and we're over by 11 minutes, which it's a record. It's a record so far, it's been good.

And if you feel that you did not get your answer -- or your questions or your answers provided, you can always submit your comments or your questions in our docket and we will address those at that point.

But for now, I think I'm going to break for lunch. We should be back here by 12:40. And the first thing on the agenda would be the community solar, where Bill Pennington will be presenting.

And I'm going to -- I will not be able to take any more comments right now because I'm going to put the recording on pause until 12:40. Thank you.

(Off the record at 12:12 p.m.)

(On the record at 12:40 p.m.)

COMMISSIONER MCALLISTER: This is Commissioner McAllister. I hope everybody had a good lunch break,

long enough. And it looks like we have a few fewer people than we had this morning but, hopefully, that's just interest in the particulars of the topic. And, hopefully, people have not had any trouble logging on.

It turns out that about half of Davis, where I know some people on staff live, is actually out of power right now apparently for some reason. I'm not sure why. So, anyway, hopefully that does not affect me and it also, hopefully, doesn't affect the flow of the presentation or access from stakeholders.

So, with that, yeah, thanks for joining back in this afternoon. And I'll pass it off to Bill Pennington to talk about the community solar part of the standards update.

MR. PENNINGTON: Okay, thank you very much. So, the community solar effort here has got started in 2017, maybe late 2016. And I've been actively involved in it since that time, trying to shepherd it along in the development, and so forth, in the 2019 Standards.

A very important activity related to community solar was with the application that SMUD submitted for getting approval for community solar. And the proceeding that reviewed that application was a very active proceeding with a lot of commenters, and a lot of comments raising concerns that the provisions in the

regulations themselves did not cover some topics that were of importance to stakeholders.

And so, we got into a great deal of conversation and discussion about those topics. And, basically, the application that SMUD made was revised to respond to those substantial comments from stakeholders.

And coming away from that was kind of a sense on the Commissioners' part that -- the Commission's part, I should say, full Commission, was that we needed to take another look at the issues that came up in that proceeding for updating of the community solar regulations in the 2022 Building Standards. So, that's an important backdrop to what we're proposing to do in 45-day language.

Another major activity that I've been involved with was a -- around community solar was a major effort with a number of industry groups, CBIA, CALSA, the Coalition for Community Solar Access, CCSA, the PUC, the IOUs, and solar developers that are engaged in trying to develop the Emerging Community Resources Program, the ECR Program through the PUC, for IOUs, where -- I should say Enhanced Community Renewables Program, which sets aside, you know, an important activity for solar developers to work with communities to develop community solar programs that are administered pretty much

independently of the IOUs as a community resource.

And so, one of the things that -- we think that's a great program. There's aspects of the rules of that program that don't facilitate the use of that program for qualifying as a Community Shared Solar Compliance Program. And so, we've been entertaining for some time, two years, three years of dialogue to see what could be done about those issues. And so, that's also a backdrop to what we're proposing here.

We don't want to introduce requirements into these updated amendments that would make that even more difficult than it already is in terms of the ECR Program being able to be used in the future in the IOU service territory.

So, with that I think I'll just get right into talking about the draft amendments. Could you go to the next slide, Payam? Okay, thank you very much.

So, these requirements are located in Part 1, Section 10-115 and they have to do with what are the requirements that an applicant, who wants to run a Community Solar Program, would need to do to get that program approved for them to operate. And so, there's a number of requirements that are criteria that we're updating or maybe adding to in the proposed standards.

So, the first one is Section 10-115(a)3. And

there was a lot of concern in the SMUD application review process that people found this section to be hard to follow, thinking that it actually included requirements that it was not intended to require, and kind of being difficult for everyone to understand.

So, basically in this section what we've done is we're proposing to eliminate the language that was confusing to people and just come back to what the basics of the requirement would be. That a Community Solar Program needs to have -- needs to deliver dollar benefits, usually in the form of energy bill credits or something like that, it could be other benefits. But the dollar benefit should be delivered to the participating house that exceed the participant costs.

So, basically in terms of a cost effectiveness concept, you would need to have a benefit cost ratio of 1.0. The benefits would need to be in excess of, but not greatly in excess of the costs.

The next section that was changed in the proposed 45-day language was Section 10-115(a)4, and that was the section on durability. But in the conversation, again in the SMUD Community Solar application process, there was a discussion that this durability requirement which would require essentially participation of the home in whatever program is

approved by the Commission for 20 years. And there was a concern that people should have the option to opt out of that program if they were going to go ahead and install rooftop solar that was equivalent to what would have been required by the standards if those homes had never gone to the Community Solar Program.

And so, this is an option that we proposed, staff proposed in the SMUD deliberation. And SMUD in particular found that the language about durability was binding on them and that they thought that building opt-out wasn't allowed given the, you know, perceived binding obligation related to durability.

And so, staff didn't totally agree with that position, but the Commission ultimately approved SMUD's application without a building opt-out provision even though most of the stakeholders in the discussion thought a building opt-out was a really smart thing to do.

So, the standards, the proposed standards that we have here they do include, in this durability section, language about -- that call for allowing a homeowner maybe ten years in, or whatever of ownership, deciding they want to put on on-site PVs and they don't want to participate in the program anymore, to give them the option to opt out at that point.

And so, one of the things that has been brought up about this particular provision is somebody has to keep track of what would the on-site PV requirement have been for that home at the time that the building was built. And so, that must be determined up front, the compliance software determines it and then figures out what an equivalent number of shares would be of the Community Solar Program to be equivalent to what would have been the on-site PV requirement.

So, the on-site PV requirement is a first step in figuring out what the shares is, so we know at that point in time for that house what is needed.

So, another thing that the SMUD proposal included was giving buyers of newly-constructed homes notice that they were going to have to meet this durability requirement. And so, SMUD developed CC&Rs that would get filed with the title of the building, of the property that would have the obligation that that durability requirement needs to be met.

So, the opt-out is actually an option to that. And so, that language in the CC&Rs would need to be adjusted to provide, you know, what the obligation would be, what the opt-out procedures would be.

And so, that would be a perfect time to include in those CC&Rs what is the onsite size that would be

necessary to meet the -- you know, to be what people would have to install if they wanted to opt out of the program. So, that would be a vehicle that could overcome this issue. And so, that is an idea that we're talking about for 15-day language.

The next section, Section 10-115(a) was an additionality section. And there was a lot of discussion about additionality. And the PUC, also, in developing their GTSR Program and ECR Program have addressed additionality more thoroughly than what the standards do.

So, there's some added language in the proposed 45-day language that would talk about what is meant by additionality, really. And so, one point is that at the outset of a Community Solar Program there needs to be a PV nest developed expressly for and to serve the participants in the Community Solar Program.

And so, that essentially is a new resource at the time that -- you know, at the time the development, it's pointing to use for the Community Solar Program. So, that would be normal.

There could be a gap in time between when the program wants to launch and when the resource goes online, that new resource. And so, there could be a gap at the front end of the program.

There also could be -- so, normally resources are procured for -- through a Power Purchase Agreement that would have a 20-year term. That's what happens in the ECR Program at the PUC. But that's 20 years from the first day that that resource is generating. And you may have -- the users of that, the demand for that might be in a subdivision, for example, that gets built out over time. So, maybe it takes five years to build out. And maybe there's some magic and the first home matches perfectly with the first day of that 20-year PPA for the resource. But you have homes built after that and so the one that's built five years later, now there's only 15 years left in the PPA. And so, there can be a gap where you don't -- a PPA has expired by the time you get to the 15th year of a home and that home is due five more years.

And, you know, it may be the case that it's not economically desirable or there's other issues for building a new resource there just to cover that five years left for that home. And so, there could be a gap both at the front end of the program and there could be a time gap at the back end, where you're going to need to have other resources that would be dedicated to serving all the homes that are participating.

And so, what's proposed in the draft 45-day

language is that the obligation -- you would have to dedicate another resource and that resource would have to be retired for the sole purpose of service to the homes. And you would need to have bundled RECs that would be associated with that resource. So, that would be the provision for maintaining additionality for that gap at the end of the time period.

So, another issue that came up in the SMUD conversation was a matter of location. There was quite a bit of discussion about where should these resources be located that are serving communities through Community Solar.

And a proposal, actually by the Coalition of Community Solar for Community Solar Access, was that the resource should be on the distribution system of the utility or other load-serving entity, and that's how you should define location. So, that is in the proposal for 45-day language.

The next slide. So, another provision that was added here came also from the SMUD proceeding, where there should be a maximum size put on resources that are used for Community Solar access. And so, you know, a lot of people recommended pretty small resources, extremely close to the community. And, you know, the Commission ultimately decided to match what is the

maximum for the Enhanced Community Renewables Program of 20 megawatts or less. The resource that SMUD built at Wildflower was a 13-megawatt resource.

And so, this size provision, in combination with the location being on the distribution, it is dialing in to, you know, a resource that's suited for the community that's -- the communities that are being served, and also matches the Enhanced Community Renewables Program. So, if that program works out its difficulties it could align with the standards for compliance.

The next section, 10-115(a)8, is also a new provision. Again, in the SMUD discussion there was a lot of concern raised that consumers should have choice at that original purchase. And they should have the option to either put on onsite PVs or choose to participate in the Community Solar Program. And so, there's a provision in the proposed language that would call for that.

In 10-115(a)9 there was a fairly minor change there in the accountability and recordkeeping obligations that the Community Solar Program administrator has to maintain records and demonstrate that they're complying with the requirements of the Building Standards throughout the life of all participating buildings, so at least 20 years. And they

keep recordkeeping and so forth.

There's an interest for sure in having annual reporting to the Energy Commission so that the Energy Commission can stay tuned to how that build out is working for the Community Solar Program. And so, an annual reporting provision was added in the proposed 45-day language.

In 10-115(b)3, this Section 10-115(b) covers the application requirements, what you have to do in bringing an application to the Commission. And there was a concern that particularly public entities that have a constituency, you know, such as a publicly owned utility, or maybe if it was a local government that was sponsoring the Community Solar Program for example, that that public entity should hold a public review meeting to discuss what they intended to bring to the Energy Commission as an application, and take comment from that constituency. So, this is added as well.

And then, in 10-115(c), the section on executive director approval on applications. So, in terms of revised applications there may be some need to revise applications. One example would be if the resource that was being used for the program at the outset became fully subscribed and in order to continue to serve additional homes then there would need to be new

resources added. And the whole determination of the shares that are necessary for a particular home is dependent on the technical characteristics of the resource that you're talking about.

So, if you bring in another resource and add that in, that comes with a different set of performance characteristics and would need to, you know, adjust the compliance software to take that into account. There might be other reasons why the resource is a little bit of a different beast than the original one. So, a revised application at that point would be desirable.

Also, if there's a modification of the regulations that affect, you know, particularly the administration of the program, then that also may be a reason for there needing to be a revised application.

So, that was made explicit in the 45-day proposed language. And also, the sense that these revised applications could be a fairly administerial action that could be delegated to the executive director and not require a full Energy Commission consideration of them. If the executive director wasn't satisfied that it was that case, they would always have the option to bring it to the full Commission for a decision, if that was what happened. But this would be allowing a possibility of maybe a more expedited processing of the

revised application.

So, those are the proposed changes for 45-day language and very anxious to hear your comment today and in writing. I would say I've been at the Commission for a very long time and the Commission has an ethic of being extremely responsive to comments and reviewing comments, and would take those into account, whether oral or written, in whatever we put out as 15-day language. And so, you know, we definitely will consider your comments. Thank you.

MR. BOZORGCHAMI: Thank you, Bill.

Let's start with the raised hand participants. I have Bob Raymer. Bob, go ahead and state your name and affiliation.

MR. RAYMER: Yeah, this is Bob Raymer with the California Building Industry Association. And thank you for your presentation, Bill.

CBIA, with one exception CBIA supports all of the changes that you're proposing here including the modification to Item Number 4, the inclusion of the opt-out language. We think that's an important addition given the proceedings that went on a year, a year and a half ago.

Where we do have concern is with the new Number 8. As you've known with some previous conversations,

we're concerned about first off the precedence this sets where, you know, unlike electric ready or PV ready, you're now basically telling, particularly a production builder, that they will need to wait until the end of the line to figure out what the final house is going to be looking like. And that goes seriously against a long-standing practice.

Also, we're concerned about what this is going to do to the cost of the rooftop PV system in this case, particularly when you're waiting to put it on late in the game. Obviously, like a lot of other options, the longer you wait the higher that price goes up.

But most importantly, we're concerned about what this could do to the economic viability of a small or a medium size community solar offering. You know, something the size, the utility scale size like the SMUD program, they can weather issues like this. But with particularly the small or medium size community solar farm it's going to be very difficult for them, particularly if they need to go to a bank or whatever for loans, to basically say, look, some people may decide not to use this. And when you've got a tight number of units to deal with that's going to be a problem.

So, once again, we support everything except

Item Number 8, but we'll be putting all of this into writing for you. And once again, thank you for your presentation, Bill.

MR. PENNINGTON: Thank you very much, Bob. Could I ask a question, Payam, of Bob?

MR. BOZORGCHAMI: Please do.

MR. PENNINGTON: So, Bob I think you're thinking also -- I don't want to put words in your mouth, but I'm curious if you could address this, that maybe having the option at the original purchaser time would be less necessary or maybe not necessary if there was a opt-out afterwards. That, you know, after the homeowner moves in or whatever they decide, no, they'd rather have PVs, onsite PVs, and would rather not be part of the Community Solar Program.

So, did I understand you correctly. Maybe you could --

MR. RAYMER: Sure. We're fine with having the homeowner with the ability to modify their home after they take possession of that. They just simply have to follow the CEC rules. And there may well be a case, you know, once again I have no idea how the NEM proceeding, or how the IOU rate proceeding's going to go, but let's say down the road that a homeowner wants to add a couple of batteries to the garage and another 4 or 5 kilowatts

to the roof. We want them to be able to do that in they're in like the SMUD area.

The problem here is, depending on the market, you know right now the market's hot. You know, if you have a house, it's going to sell. But what if you've got, you know, 20 or 30 homes, you've already got them built and they're energized and at that point in time you still don't have a buyer on hand, so how are you going to implement this? You know, the building official is, of course, want to know all the approvals with the solar as is. And so, it's just you're stepping into an area that the Building Code's never done and that is effectively mandating a rather significant design option. And, you know, given how a project goes that may or may not be doable.

But once again, our biggest concern is what this could do to the small scale Community Solar Program. You know, such as when a builder, a solar provider, and a local jurisdiction kind of enter into a small deal for some unbuildable land, but maybe it's good for solar. So, that's our current concern.

But we're fine with, you know, somebody six months, a year, or two years down the road after they've moved in and they're getting community solar, are basically saying we're going to augment the solar or

we're going to go to rooftop only. That's fine.

MR. PENNINGTON: Okay, thank you.

MR. BOZORGCHAMI: Thanks Bob.

Peter, that was all the raised hands I have. And I know you have --

MR. STRAIT: Yes. We've got four things in the typed questions.

First Nehemiah asks: Would the requirement for the Community Solar System be located on an LSE system preclude isolated microgrids?

MR. PENNINGTON: I don't know why it would. I mean, maybe you should amplify your concern in writing and we can take a look at that.

MR. STRAIT: Charles Kim, representing SCE, asks: Is a forecasting or a projected dollar benefit exceeding participant costs acceptable to CEC?

MR. PENNINGTON: So, the answer is no to that. Basically, the expectation is that you shall deliver that. So, the benefit cost ratio doesn't have to be very large. It could be in fact quite minimal, and there was quite a bit of controversy in the SMUD application about how minimal it could be. So, it's not a super difficult expectation in terms of quantity of benefit in excess of cost.

But there does need to be a -- it does need to

be accomplished. And so, it would not be satisfactory to have it be based on a forecast that may or may not be accomplished.

MR. STRAIT: Ben Davis asks: The opt-out/unenrollment language states at the time of interconnection of that onsite solar electric generation system all costs associated within the community shared solar and/or battery storage system shall cease.

Does this provision prevent Community Solar Program administrators from charging properties high unenrollment fees?

MR. PENNINGTON: The intention is that it does not. So, I guess I'd like to have, maybe ask for more clarity about what you might see as the kinds of charges that you think is going to be in violation. And, you know, I'd like to hear some thoughts from people with different views on this, frankly, about --

MR. BOZORGCHAMI: So, Bill I'm going to jump in real quick. Ben just raised his hand.

MR. PENNINGTON: Okay.

MR. BOZORGCHAMI: He wants to have a quick dialogue, so I'm going to unmute him. Okay.

MR. PENNINGTON: Okay.

MR. BOZORGCHAMI: And go ahead and state your name and affiliation.

MR. DAVIS: I'm Ben Davis, California Solar and Storage Association. When Bill asked for folks with different options, he probably wasn't asking for mine.

MR. PENNINGTON: Sure I am.

MR. DAVIS: But I think we're just slightly concerned that a utility could say, yes, you can unenroll but we're going to charge you -- you know, we're going to charge you a fee equivalent to all of the projected lost revenue from going solar.

So, you know, I think if there could be language figured out to prevent egregious fees, that might be something very worthwhile.

But overall we are -- you know, we appreciative for updating the Community Solar requirements. And there's a number of new requirements that we support. We think there's probably a couple of areas the language could be strengthened or clarified, and we'll submit comments, and we'll continue to work with the Energy Commission.

MR. PENNINGTON: Okay, thanks Ben.

MR. STRAIT: Someone had asked if we are going to the other raised hands after these questions, and the answer is ye.

MR. BOZORGCHAMI: Yes, we are.

MR. STRAIT: Dan Sharoni asks: What is roughly

the size in kilowatts of additional solar farm serving a community shared solar service? Who's the business entity that can provide a solar farm?

MR. PENNINGTON: So, the last question first. Any entity can apply to be an administrator for a Community Solar Program.

That said, in most cases, maybe all, but maybe there are some exceptions, the resource would need to be using the utility grid for wheeling. And so, normally the utility would be involved in making a Community Solar Program possible. And so, it may be necessary to have some kind of involvement with the utility with the applicant. But certainly, utilities are not the only people that could be applicants.

Let's see, what was the first question?

MR. STRAIT: The first part was minimum size. Roughly the size in kilowatts of an additional solar farm serving a community shared solar service?

MR. PENNINGTON: So, there is no minimum size for the community solar farm. That would be dependent on zoning that you get for the resources, and a bunch of land use kinds of constraints that might be on it.

We could talk a little bit about the sizing of the share for each house, but that doesn't sound like that's the question you'd asked, so I'll stop.

MR. STRAIT: And that's what I have in the question box.

MR. BOZORGCHAMI: Thank you, Peter.

So, we have a raised hand by Marissa O'Connor. Go ahead and state your name and affiliation for the record, please.

MS. O'CONNOR: Hi, can you hear me okay?

MR. BOZORGCHAMI: Thank you, yes.

MS. O'CONNOR: Hi, this is Marissa O'Connor. I'm with SMUD. And thank you for the opportunity to comment and for the thoughtful presentations today, as well as the revisions to the Code.

And as Bill mentioned, SMUD's currently the only approved administrator of a Title 24 Community Solar Program in California. So, we're in a unique position to comment today. And we do so in the spirit of ensuring the regulations will support other new market participants, who also wish to become administrators.

And we really do want community solar to be a viable option for all Californians. And in that spirit, there are two revisions we'd like to highlight.

First the opt-out. We said we do not oppose an opt-out. As a large utility, I think as Bob said, we can kind of weather the storm, we can balance the resources, mitigate the risk of stranding new community

solar assets. But not every future administrator will or should be a large utility. I think Bill mentioned, you know, utilities aren't the only entities that can be applicants.

And new community solar facilities and programs, speaking from experience, require a significant investment, and contracts protect investments. So, allowing a customer to simply cancel a contract or to opt out could really discourage new solar developers and administrators, especially smaller, non-utility ones from entering the market.

So, again, at SMUD we want to see this industry thrive and we don't oppose the opt out. But we do caution that it's inclusion could cut others out of the market. And so, we'd encourage staff to consider options that continue to ensure customer choice. Like at SMUD, we allow our customers to participate in Solar Shares and have on-site PVs.

Second, and I will make this quick, and thank you. The proposed provisions would allow a participant to opt out if they install a compliant onsite PV facility, as Bill mentioned. But the regulation currently doesn't specify who would be responsible for ensuring compliance prior to installation.

SMUD strongly recommends that staff clarify that

the local enforcement agencies and not administrators would be responsible for enforcements. So, LEAs, like building departments, have jurisdiction over code enforcement and they have the expertise, and the processes that have been in place for decades. Utilities do not. And, you know, again, we'd encourage staff to think about future non-utility administrators, which could include private parties who'd be even less at a disadvantage with compliance obligations and code enforcement.

So, again, strongly recommend that the Commission clarify the LEAs and not administrators will be responsible for compliance and enforcement. And we really look forward to working with staff to help develop regs that help support a viable program that doesn't effectively dissuade or prohibit new community solar installations in California. Thank you so much.

MR. BOZORGCHAMI: Thank you, Marissa.

Rick, I'm going to unmute you. Go ahead and state your name and affiliation. I'm actually implementing a 2-minute rule versus a 1-minute rule on this topic.

MR. UMOFF: Great. Can you hear me okay?

MR. BOZORGCHAMI: Yes.

MR. UMOFF: Great, thank you. I think I'll be

under two minutes.

This is Rick Umoff with the Solar Energy Industries Association. First of all, I just want to say thank you for previewing the updated code section here. We do think it is, you know, responsive to stakeholder feedback that the Commission has received over the last couple of years, and do support the general direction of the updates. And we continue to support the Community Solar compliance pathway for the Title 24 Building Codes.

We also are concerned in ensuring customers have sufficient ability to opt in and out of Community Solar Projects, and to install solar onsite as well, as intended by the code. So, we'll be taking a look at that section and providing written comment. We want to make sure, you know, that language is designed to allow that kind of flexibility that would assume to kind of undercut the intent of that language if there were fees that were allowed that were so sort of onerous on customers that effectively they couldn't opt out. That would seem counter to the intention. So, that's just something that we wanted to flag.

Another thing I'll just flag quickly is, you know, within the Community Solar market generally, nationally, we are seeing a move towards sort of the

ability to kind of solicit solar as a service and the ability to opt in and out pretty easily. And so, that is the trend of the market in the industries. So, solar developers, you know, a lot of them are kind of moving in that direction. So, we'd be happy to put some information or comments on that point.

But beyond that thanks for everything here and we look forward to putting further thoughts down in our comments.

MR. BOZORGCHAMI: Thank you, Rick, that was great. Thank you so much.

Nehemiah, go ahead and state your name and affiliation.

MR. STONE: This is Nehemiah Stone.

MR. BOZORGCHAMI: Nehemiah, you're not coming in too well. Do you want to try it one more time?

MR. STONE: Can you hear me now?

MR. BOZORGCHAMI: Not so well, but go ahead.

MR. STONE: Nehemiah Stone, Stone Energy Associates. So, the question I was trying to get at earlier, Bill, was if it is required that the system be tied into the transmission and/or distribution grid, then does that mean that if a builder wants to build a subdivision and provide the community solar for that subdivision and have it not linked, have it be isolated

from the rest of the grid that that's not acceptable?

MR. PENNINGTON: So, like I said there may be an exception to the rule here that I'm not completely familiar with. But in general, utilities are wheeling this power. In cases where that was not necessary then, sure, I see that.

I don't know, if you see or other people listening see a clear way to define that situation, perhaps that's something we could include in the regulation.

MR. STONE: Okay. And the reason I ask is because there's been -- after the fires there's been talk among environmentalists about having isolated microgrids that would just serve a local community and not be dependent upon, you know, the larger grid. So that, you know, a public safety power shutoff would not affect them, and then they could get back up quicker.

But, you know, I don't know if anybody has tried doing that yet, but I know there's been a lot of talk about that. Thank you.

MR. PENNINGTON: Okay, thank you.

MR. BOZORGCHAMI: Thank you, Nehemiah.

Hey, Bill, we have one question that came in, in the Q&A, and that was from Dan Sharoni. How would you define microgrid, any special hardware/software is

required?

Do you want to explain that a little bit?

MR. PENNINGTON: Maybe Nehemiah should do that. So, we did not have that in the 45-day language.

MR. BOZORGCHAMI: Okay.

MR. PENNINGTON: Perhaps some sort of criteria would be needed. I don't know, this is a new consideration.

MR. BOZORGCHAMI: Okay. Thank you. With that, I don't see any more comments in the question and answer, or in the raised hand. So, with that I thank you, Bill.

And we're going to go on to the mandatory requirements for covered processes, Subchapter 3. And Ronald Balneg is going to be presenting on that. Ronald.

MR. BALNEG: Yes. Let me get my screen here. I think I see my screen.

MR. BOZORGCHAMI: Yes.

MR. BALNEG: Okay, good. Okay, so hello everyone. My name is Ronald Balneg. I'm a Mechanical Engineer, here in the Building Standards Office. I'll be going over Subchapter 3, nonresidential, Hotel/Motel Occupancies, and Covered Processes.

So, starting here with Section 120.1,

ventilation and indoor air quality. 120.1(b) has requirements for high-rise residential ventilation and indoor air quality, which has moved to the new multifamily section.

Air filtration language has been clarified with explicit language removing the reference of a requirement to high-rise residential. And the mechanical ventilation section was revised to better align with the California Building Code and to remove any potential conflicts between code requirements.

And for Section 120.1(d)5, the occupancy sensor section was revised to clarify the expected interaction between ventilation and occupancy sensors. This change will allow additional time to signal unoccupancy and additional time for ventilation to respond to that signal.

Continuing this section, design and control for quantities of outdoor air was revised to clarify the term airflow refers to design airflow rates.

Made some changes in the air classification and recirculation limitation where we've added language from ASHRAE 62.1 to be better aligned.

Ventilation only mechanical systems section was revised to clarify that ventilation only systems are required to comply with 120.1(f), which is the design

and controls for quantities of outdoor air.

And Table 120.1-A, minimum ventilation rate tables, had some changes to the tables to clarify that the outdoor air rate is the total outdoor air flow rate and that the demand control ventilation rates are minimum values.

Section 120.2, required controls for space conditioning systems. Section 120.2(e), occupancy sensing zone controls were revised to align with ventilation requirements in 120.1 and in 120.1(d)5.

There are also some clarifications made to the section of the expected operation of the controls.

In Section 120.2(i), economizer fault detection and diagnostics threshold has been expanded to include mechanical cooling capacities from 33,000 Btu hours and greater.

So, we're skipping to 120.4. There were no substantive changes in 120.3, other than removing high-rise residential as mentioned previously, which is throughout this whole section.

So, 120.4, mandatory requirements for air distribution systems and plenums. So, there are new mandatory requirements in 120.4(b), which will require Seal Class A for ductwork, which is required by the California Mechanical Code and the underlying ASHRAE

90.1.

Section 140.4(l), prescriptive requirements for duct sealing has been moved to the mandatory section in 120.4(g). An additional requirement has been added for duct testing in accordance with the California Mechanical Code, Section 603.10.1, for those systems that do not fall under the existing requirements.

Section 120.5, required nonresidential mechanical system acceptance. So, in Section (a)3A and B, it has some updates to reference the new duct leakage requirements that were previously mentioned.

Section 120.6, mandatory requirements for covered processes. So, in 120.6(a) and (b) there are new requirements for transcritical CO2 systems installed in refrigerated warehouses,, or spaces served by the same refrigeration system greater than or equal to 3,000 square feet; or for retail food or beverage stores greater than or equal to 8,000 square feet.

So, the changes included air-cooled gas cooler restriction, gas cooling sizing, specific efficiency, supercritical optimized head pressure control, subcritical ambient temperature reset control strategies, minimum saturated condensing temperature setpoint of 60 degrees Fahrenheit, and heat recovery.

In the last little subsection there, in (a)9,

120.6(a)9, there are new requirements for automatic door closures for refrigerated spaces greater than or equal to 3,000 square feet.

So, continuing on 120.6, process boilers have been updated to reduce the excess oxygen concentration requirement for boilers between 5 to 10 million Btu hours.

Compressed air systems will have new requirements, which will include monitoring, leak testing, pipe sizing requirements, and it clarifies language for trim compressors, storage, and controls requirements.

So, 120.6(h) are mandatory requirements for controlled environment horticulture. This section will add new requirements, which will include dehumidification, lighting, electrical power distribution systems, and conditioned greenhouses.

In the first Subsection 1 here, the requirements include minimum integrated energy factors based on the volume, heat recovery requirements for integrated HVAC systems, and chilled water systems with onsite heat recovery. And the use of a solid or liquid desiccant dehumidification system for systems designed -- for system designs that require less than or equal to 50 degree Fahrenheit dewpoint.

Subsection 2 of the same section has new requirements for horticulture lightening -- lighting, sorry, with more than 40 kilowatts. These include photosynthetic photon efficacy of 1.9 micromoles per joule for lamps with removable lamps. And 1.9 micromoles per joule for luminaires with nonremovable lamps.

Subsection 3 requires power distribution systems to be capable of monitoring usage from a measurement device.

The Subsection 4, conditioned greenhouses, building envelops will have its own requirements for skylights and windows with an U-factor of 0.7 or less.

Subsection 6, greenhouse, horticulture lighting has similar requirements to the indoor growing, but the photosynthetic photon efficacy is lower at a 1.7 micromoles per joule.

So, moving on to 120.6(i), steam traps will have new mandatory requirements, which include fault detection, diagnostics monitoring, strainer installation, blow-off valve equipment, and acceptance requirements.

120.6(j) will have new mandatory requirements for computer rooms which include reheat, humidification and fan controls.

There are no substantive changes in 120.7, 8 and 9, but there is a new Section 120.10 which are the mandatory requirements for fans. So, this is a fan energy index requirement for each fan or fan array, with the combined motor nameplate greater than 1.0 horsepower or 0.89 kilowatts with a combined fanned nameplate electric input power. So, FEI must be greater than or equal to 1.00 at design conditions, unless the fan is a variable air volume in which the FEI shall be greater than or equal to 0.95.

And with that, this concludes my section of the mandatory requirements. And do we have any questions?

MR. STRAIT: I do have one question in the -- oh, two questions, now, in the Q&A box. Since I don't see any raised hands, I'll address those first.

First, Dan Johnson asks: Do the ventilation requirements in 120.x supersede the California Mechanical Code completely, or do designers calculate the air flow for each code, then use the air flow rate that is the greater of the two codes, that is the more stringent?

MR. BALNEG: I believe it's always whichever is a little bit more stringent.

MR. STRAIT: Let's just --

MR. OAQUNDAH: If I could interject?

MR. STRAIT: Okay.

MR. OAQUNDAH: Sorry, this is James Oaqundah. If that comment could be submitted to the docket, I would appreciate that. We can just look at that a little more closely.

MR. STRAIT: Okay, yeah. I'm aware there's a redirection to the Energy Code in one portion of the Mechanical Code. So, for buildings that are covered by the Energy Code, under that redirect they would not be covered by -- they would not be subject separately to the California Mechanical Code requirements.

But there are some areas where there may be some overlap. We will look into that and provide a more detailed answer, because I don't think we can provide complete detail on some of those kind of corner cases on this call.

Dan Detmer asks: In Section 100.1, definitions and rules in construction, the definition of controlled environmental horticulture includes not saying greenhouse and/or growing are types of CEH. The definitions for greenhouse and conditioned greenhouse in the proposed Section 100.1 of the case report, controlled environmental report is not carried forward to this document. Since Section 120.6(h) mandatory requirements 4 through 6 deal with greenhouses, could

the definition be added or clarified or is greenhouse simply a CEH that does not meet the definition of indoor growing?

MR. BOZORGCHAMI: Peter, I think we need to look at that and I think we could maybe provide clarification in our definitions, in Section 100.1. Let me look at that one more and we'll see what we could do for the 15-day.

MR. STRAIT: Yeah. And I think, you know, it depends on how it's used, also, in controlled environment horticulture. If what we're saying is that irrespective of the definition of greenhouse because greenhouse, I believe, is also defined in Part 2, we're saying those would be under the umbrella of controlled environment horticulture. Then it might not -- like there might be a definition there that will work, that's already present.

But we can dig into that comment with a little more detail.

MR. BOZORGCHAMI: Yeah. And we should. And this is the first time we're looking at controlled environment horticultures, and we will try to do the best we can to align everything and provide clarification.

I don't see any other raised hand or any

questions in the comment and answer -- Q&A. So, I think thank you, Ronald.

MR. BALNEG: Great.

MR. BOZORGCHAMI: And if anybody has further comments on this subject, please go ahead and submit it to this docket right here and we'll try to address them as we get the comments coming through our docket.

So, next is going to be the nonresidential hotel/motel electrical systems -- lighting systems, excuse me, and equipments. And Simon Lee will be presenting on that. Simon.

MR. LEE: Thank you, Payam.

MR. BOZORGCHAMI: Simon, you need to share your screen.

MR. LEE: Oh, I see. Okay. Okay, thank you, Payam. Good afternoon, everyone. This is Simon Lee with the Buildings Standards Office. I will be going through the revisions in Subchapter 4, on a high level. Subchapter 4 are all about mandatory requirements for nonresidential lighting systems and electrical power distribution systems.

For 2022, the requirements in Subchapter 4 related to multifamily buildings are moved to the new multifamily chapters.

And the next slide. Section 130.0, lighting

systems and equipment, and electrical power distribution. As mentioned earlier about the 2022 Code, lighting requirements for high-rise residential dwelling units, dormitory dwellings, and senior housing dwellings are moved to the new multifamily chapter.

Moving on to Section 130.1(a), manual area controls. Several provisions are added in this section so that the requirements are more feasible for compliance.

First, the readily accessible requirement. A provision is added for areas of the building intended for access or use by the public. In such an area, they may use a manual control not accessible to unauthorized personnel.

Second, Section 130.1(a)3. In this section we have added a provision for scene controllers to meet the requirements of separate control of different types of lighting.

Also to mention is an exception for egress lighting. The egress lighting power value is revised so that the egress lighting power provided are the same in manual area controls section and shutoff controls section.

Section 130.1(b), multilevel lighting controls requirements. There are editorial changes to break down

the requirements into Item 1 and Item 2, so that it is easier to read and following. In the 15-day language, staff is considering to add an exception for classrooms so that classrooms with connected lighting load not exceeding 0.5 watts per square feet can be exempt from the multilevel lighting controls requirement.

Next is Section 130.1(c) for shut-off controls. A new exception to shut-off control is added for stairways designated for means of egress. In the 15-day language, staff is considering an added so that it is an exception to 130.1(c), instead of exception to 130.1(c)1.

And the next slide. Section 130.1(c)6 -- okay. Yeah, okay, this is the one. Section 130.1(c)6. Two changes I would like to mention here. First, the heading of the subsection for partial off occupant sensing controls for office shall be greater than 250 square feet.

And second, a new 130.1(c)6D is added for the multi-zone occupancy sensing controls for general lighting in offices larger than 250 square feet.

Lastly, the changes occurs to both Section 130.1(c)6 and 7. General lighting is required for occupant sensing controls instead of all lighting.

Section 130.1(c), automatic daylighting

controls. We have a measure for automatic daylighting controls for dimming to 10 percent, and also to move the previously prescriptive requirements of secondary sidelit daylit zones from the prescriptive section to this section, 130.1(d).

And there are some changes to the exception. Exception 3 is clarify. Also, Exception 4, 5 and 6 are added for the trigger thresholds that include secondary sidelit daylit zones.

Lastly, in Section 130.1(d)2 we have added a clarification for linear LED and other solid-state lighting light source so they can be treated in increments of 4 feet segments or smaller.

Section 130.1. We have added items number 9, or Section 130.1(f)9, which is related to lighting occupancy sensing controls requirements and occupied-standby mode requirements.

All right, moving on to Section 130 -- apologize. Yeah, okay, the last one here. For the 15-day language we are considering to add a pointer, Section 130.1(3)6 and 7 in the language so that it is clear the section applicable for this control interaction requirement.

And then, moving on to the next slide. Oh, we already talk about this, yeah.

Okay, Section 130.2, outdoor lighting controls and equipment.

In Section 130.2(b) some of the terms and requirements are revised to align with the industry use of terminologies, such as shielding, and the IES document TM-15-20.

In Section 130.2(c)2 for automatic scheduling controls, we have made editorial revisions to improve readability. And also, to delete redundant language about the acceptance test.

In Section 130.2(c)3 about motion sensing controls we have added an exception for parking lot luminaires. Luminaires with a maximum rated wattage of 78 watts each are not required to have motion sensing controls. And this would align with the 2021 IECC Code.

Section 130.4, lighting control acceptance and installation certificate requirements.

In Section 130.4(a) we have made changes to the subsections, and these are editorial changes to help clarify the requirements.

In Section 130.4(a)8 we have added demand responsive controlled receptacles to be tested for meeting the acceptance, or the acceptance requirements.

Section 130.5, electrical power distribution systems. In Section 130.5(e), demand responsive

controls and equipment we have added controlled receptacles to the demand responsive controls requirements.

And this concludes my presentation of Subchapter 4. And do we have any questions?

MR. STRAIT: We do have one question in the comment box. Since I don't see any raised hands, we'll get to that one.

Laura Petrillo-Groh says: The implementation of the 2022 Energy Code is estimated to eliminate 6,868 jobs and create 681. Form 389 attributes all jobs eliminated to be the result of a single measure that reduce indoor nonessential lighting power requirements. However, Section 2241, creation of or elimination of jobs around the CASE Report states the statewide CASE team does not anticipate the measures proposed for the 2022 Code cycle regulation would lead to the creation of new types of jobs or the elimination of existing types of jobs. In other words, the statewide CASE team's proposed change would not result in economic disruption to any sector of the California economy. Rather, the estimates of economic impacts discussed in Section 224 would lead to modest change in employment of existing jobs.

Can CEC staff speak to this disconnect between

the Form 389 and the CASE Report?

MR. LEE: Yes. Staff has talked to the CASE team about this aspect of the economic analysis. And my understanding is subsequent to the CASE -- to the release of the CASE Report they have conducted further analysis and they -- the findings of the later analysis indicates that actually there are job gains when they are affecting to everything. So.

MR. STRAIT: Do we know what the original source, how that original 6,868 was calculated? Or, is that a question we'd have to go back to the proposal authors for?

MR. BOZORGCHAMI: Is that something Jon McHugh can answer or Adrian?

MR. OWNBY: Yeah, I might be able to address this, briefly. So, I think the --

MR. BOZORGCHAMI: Adrian, state your name, please.

MR. OWNBY: Oh, sorry. Adrian Ownby with the California Energy Commission.

So, I think the confusion here might be that we're talking about types of jobs. That is the CASE Report talks about types of jobs that are created. But we're not interested in changes of types of jobs, we're interested in purely the number of jobs that will be

impacted based on changes in the regulation, regardless of the type of job.

And the numbers that we used or were derived from the same template that was used to estimate increases of job creation. So, using the same standards that they used to estimate job creation, we found job losses associated with that.

And I believe that particular measure really results in an enormous lifecycle savings in terms of costs associated with lighting installations because of the lowered density requirements.

MR. STRAIT: Yeah, and if memory serves, and I may need to provide a correct -- a more correct response in writing later, but if memory serves what this is, is because the total amount of lighting that is -- the cap on it from an energy budget stand point has decreased to some level that means that overall there's going to be some percent fewer or less lighting purchased and installed. And that industry wide, that if we were to quantify those dollars, they'd be equivalent to roughly that number of jobs. And that's throughout the entire lighting industry, rather than a single sector. But I'm not certain. But I think that's the origin of the numbers that it comes from, a calculation of if we're reducing lighting power by this much then presumably

some quantity of fewer fixtures could be installed.

MR. OWNBY: Yes, I believe that's a pretty accurate description, actually.

MR. STRAIT: And I think it terms of additional analysis, I do believe that on a whole the proposed amendments to the California Energy Code cause an overall increase in jobs. But we will conduct -- we'll see if there's additional analysis we can site as additional documents relied upon, and we'll see if there's a more accurate answer we can provide in addition to this answer.

MR. BOZORGCHAMI: Thanks Adrian. Thanks Peter.

Anymore comments? I don't see any raised hands. I don't see any comments or questions in the question and answer box. So, thank you.

We'll go from here next to Haile Bucaneg, where he will present on the nonresidential, hotel/motel proposals. There's three sections that he's going to be presenting. Actually, I take it back. There's only two sections he's going to be presenting, the nonresidential hotel/motel performance and prescriptive compliance path, and the additions and alteration path, Subchapters 4 and -- excuse me, Subchapters 5 and Subchapter 6.

MR. BUCANEG: So, good afternoon everyone. My name is Haile Bucaneg and I'm a Senior Mechanical

Engineer with the Building Standards Office.

This afternoon I will be presenting changes to Subchapter 5, Section 140. I will be going through this chapter and the proposed changes in chronological order, but note that I will not be discussing changes to Section 140.4(a)2, 140.5, and 140.10. These sections were discussed this morning, during this morning's section.

Also, there are quite a few technologies and proposals that we're going to be going through, so this is going to be a pretty high level review of these changes.

MR. BOZORGCHAMI: Haile, I'm going to jump in real quick. Right after you're done with Subchapter 5 can we take a 5-minute break real quick?

MR. BUCANEG: Sure, no problem.

MR. BOZORGCHAMI: Okay, thank you.

MR. BUCANEG: So, one of the bigger changes is the removal of the high-rise residential building types from Section 140. These are now covered under Sections 160 and 170.

In Section 140.1(a) and 140.1(b), the language regarding photovoltaic and battery storage systems was added to the building, so the standard building design and to the proposed design building.

Additionally, an exception was provided for community shared renewable electric generation and battery storage system. And this exception references Section 10-115, which was discussed earlier this afternoon by Bill.

So, requirements for steep-sloped roofs were revised in Section 140.3(a)1A. This applies to Climate Zones 2 and 4 through 16. The revisions here are also included in Tables 140.3(b).

There was a minor change to Table 140.3, the tradeoffs for age solar reflectance for wood-framed and other roofs, and ceilings for Climate Zones 7 and 8 were revised here.

Section 140.3(a)5 includes revisions to requirements for vertical exterior windows. And exceptions for conditioned greenhouses, school buildings less than 25,000 square feet, and three stories or less were also added.

The relative solar heat gain coefficient equation and application were also updated for vertical fenestration.

In regards to skylights, in Section 140.3(a)6, there are now exceptions for conditioned greenhouse gases -- or greenhouses. It should be noted that 120.6(h)4, which was discussed earlier includes these

requirements for greenhouses.

There was a minor change to 140.3(a)7 in the definition for glazed doors. Doors that have more than one-quarter area in glass area are now considered glazed doors.

Section 140.3(a)9 includes revisions for air barrier requirements. Here changes were made for clarity and verification requirements were also added. Also, air barrier boundaries, interconnections, and penetrations, and associated area calculation information needs to be included in construction documents.

In Table 140.3-B, the maximum U-factor for metal-framed walls was revised. Also, the maximum U-factor and relative solar heat gain coefficient for fixed window and curtainwall, or storefronts was broken down by climate zones. And there were some revisions made to these U-factors and relative solar heat gain coefficients.

In Table 140.3-B and 140.3-C, the requirements for air barriers were included where applicable.

As mentioned, there were changes in Section 140.4(a). However, these were discussed during this morning's session, and we're not going to discuss that at this time.

The fan systems requirements in Section 140.4(c) include a number of proposed changes. First, the existing fan power limitation process was revised to a fan power budget process. This applies to fan arrays with an electrical input power of 1 kilowatt or greater. And also applies to healthcare facilities, now.

The process for calculating the fan power budget and the fan system electrical input power are described in this section, and Tables 140.4-A through 140.4-D were added to support these calculations.

Moving on to space conditioning zone controls in Section 140.4(d), the consideration for 20 percent of peak primary airflow for deadband operation was removed. This leaves a single consideration of designed zone outdoor airflow rate as specified by Section 120.1(c)3.

There were several revisions to economizer requirements in Section 140.4(e)1. Requirements for economizers now cover cooling air handlers that have a cooling capacity of 33,000 Btus per hour, or greater.

There are also exceptions for air handlers less than 54,000 Btus per hour that use a dedicated outside air system and where air economizers use would affect carbon dioxide enrichments systems in controlled environments, so horticulture spaces.

It should be noted that there are some additional changes that are being considered regarding exhaust air heat and minimum ventilation airflow rate requirements. These are currently included in Section 140.4(p), but there's some consideration about moving these into 140.4(e)1 as exceptions.

In Table 140.4-D there were some additions and clarification language added. This one was pretty minor.

In Section 140.4(k)8 there are several requirements for hydronic systems of high capacity space heating gas boiler systems. This includes system efficiency requirements and design requirements for the temperature of water entering the boiler.

Prescriptive requirements originally in Section 140.4(l) were moved as these are now going to be mandatory requirements.

Currently in Section 140.4(p), 2 configurations for DOAS are identified. And there are several new prescriptive requirements of dedicated outdoor air systems. This includes fan efficacy requirements for DOAS unit fan systems, supply air delivery requirements, supply and exhaust fan multispeed requirements, and heating and reheating -- for heating and reheating equipment.

Also, when a zone is not calling for heating or cooling equipment serving that zone, it should be turned off, or should be shut off.

We are expecting to make several changes to make this section a little bit clearer, 140.4(p). This includes applying requirements in 140.4 to all DOAS systems, not just specific configurations. This would involve removing the current A and B configurations identified in 140.4()1, and moving and consolidating various requirements and exceptions.

In Section 140.4(q) there are new prescriptive requirements for exhaust air heat recovery, which are similar to requirements in ASHRE 90.1. Look up tables were added to determine if requirements are applicable and these requirements apply to non-critical healthcare facilities, as well.

Since this section is reliant on Section 140.4(p), we will be making some additional changes here to reflect expected changes in Section 140.4(p).

Additionally, footnotes in Table 140.4-H and 140.4-G will be revised to require full design supply air flow to be the total airflow of only the DOAS unit.

Section 140.5 was discussed during this morning's section, so I will not be going over everything here.

However, in 140.5(c), minimum efficiencies for high capacity service water heating systems are identified. There are exceptions here for specific systems that use solar energy or site-recovered energy that cover 25 percent of annual service water water-heating, and for water heaters installed in individual dwelling units. And again, this was discussed earlier this morning by Danny.

Power adjustment factors for demand responsive lighting controls were revised in Section 140.6(a)2K. This includes clarification that lighting adjustment or power adjustment factors qualifying for -- or, lighting qualifying for power adjustment factors are not within the scope of Section 110.12(c).

And updates for requirements for demand responsive lighting control requirements to qualify for power adjustment factors.

In Section 140.6(c)3 there were updates made to terminology used in this section in terms of ornamental and decorative lighting. And updates to the additional allowed power for very valuable display case lighting was also adjusted.

In indoor lighting, in Section 140.6(a)4B, the luminaire classification and power adjustments, the small aperture tunable luminaires lighting power

adjustment factors were updated. And the physical dimension-qualifying criteria for small aperture tunable luminaires were clarified.

There are a number of updates in Tables 140.6A, 140.6B, 140.6C, 140.6D, and 140.6G. These updates pertain to adding and removing applicable areas and adjusting lighting power adjustment factors and lighting power density values used in these tables.

Some additional updates were made in Tables 140.7A and 140.7B for outdoor power allowances. This includes providing one set of lighting power allowance values for parking facilities with asphalt or concrete services, new lighting power allowances for general hardscape lighting applications with security cameras, and revising terminology.

Prescriptive space conditioning requirements for reheat, humidification and fan controls were removed from this section, and moved to mandatory requirements. And this was discussed during an earlier section, as well.

In Section 140.9(a)1, the prescriptive requirements for full economizing for economizers serving computer rooms were revised. This includes revised temperature thresholds for full economizing for air economizers and water economizers, and adding

temperature thresholds for refrigerant economizers.

Also pertaining computer rooms, air containment requirements in Section 140.9(a)3 were revised to apply to computer rooms with an information technology equipment design load of 10 kilowatts or more.

This will apply air containment to more facilities and reduce mixing of colder supply air with warmer return air.

And finally, in Section 140.9(a)4, uninterruptible power supply efficiency requirements were added. This will pertain to specific alternating current-output uninterruptible power supply serving computer rooms.

So, moving away from computer rooms in Section 140.9(c)3C, adjustments were made to laboratory and factory exhaust fan system power consumptions. This was in regards to requirements for measure flow rates.

It is proposed that at least one sonic anemometer or at least two anemometers of other types be used. Fault management systems must log errors and the time when the error occurs. And also, two processes for checking anemometer failures were added.

And finally, Section 140.10 was discussed during this morning's session, so we will not be going over or revisiting these changes at this time.

But those were the updates Subchapter 5, the Section 140s. So, if you have any questions on the sections that we went over here, we can take those now.

MR. STRAIT: I'm seeing some questions in the Q&A box. I'm not seeing any hands raised, so I'll start with the Q&A box questions.

First, from Meg Walton: Has the CEC analyzed the difference in energy savings between the fan requirements proposed in the 45-day languages and the levels proposed in the CASE Report?

MR. BALNEG: Yeah, hi, this is Ronald Balneg, when I had presented on the Section 120s.

So, the CASE Report originally had these levels and so the energy savings were analyzed previously. And we had originally wanted to keep the FEI at 1 to make everything a little more simpler, but we got some push back so we decided to go back to the original CASE report, which is what's aligned with ASHRE.

MR. STRAIT: Thank you.

David Freedman asks: Is there a reason why aged solar reflectants for steep-sloped roofs was upgraded to 0.25 for nonresidential climate zones, other than 1 and 3, but kept at 0.2 for residential hotel/motel guest rooms in most climate zones?

MR. BOZORGCHAMI: This is Payam, I can probably

answer that. A lot of it had to do with us running out of time, and so we were really able to look at nonresidential buildings. And at the same time there was the whole discussion on photovoltaic was happening, so we decided for this code cycle that we will not pursue the residential section and hotel/motels, and just predominantly look at nonresidential buildings.

MR. STRAIT: Pierre Harfouche asks: Basically, I logged in a little bit late. Are there any planned 15-day changes to Section 120.6(h)?

Presumably we would have either -- did we mention anything specific to our section?

MR. BALNEG: No. So, I think 120.6(h) was the horticulture stuff and I don't think there are any planned 15-day changes as of right now.

MR. STRAIT: Yeah. As of now, no, there isn't. Yeah, we don't have any specific changes planned. But obviously, I would expect language throughout the code to change based on the public comments that we receive. So, we certainly do plan to make some changes at some point in the future based on those public comments, but we don't know what those are going to be, yet.

MR. BOZORGCHAMI: Yeah, right now, as of right now -- this is Payam. As of right now what we're going to be looking at is the definition of the greenhouse.

Greenhouse and how it pertains to horticulture.

MR. STRAIT: Dan Detmers asks: 140.4(e) requires the use of an air or a water economizer on cooling air handlers about 33,000 Btu per hour, but Exemption 7 exempts it with the words where the use of an air economizer and controlled environment horticulture spaces will affect carbon dioxide enrichment systems.

Are CEH spaces that use CO2 enrichment systems at any point completely exempt from the air and water economizer requirements or only exempt when they are running the CO2 enrichment system.

I believe I can answer that, but I can also leave it to the SMEs.

MR. BOZORGCHAMI: Peter, go ahead and answer it.

MR. STRAIT: Sure. So, these, the building -- sorry, the Energy Code is a set of building design requirements. So, if the building design incorporates a CO2 enrichment system, then that design is not required to incorporate the air/water economizer. So, that's the function of that exemption. So, if that's part of the -- that means it's not that they're only exempt from using the economizer when the CO2 enrichment system is being used. They're saying, if a CO2 enrichment system is installed, then an economizer does not to be

parallel, does not need to also be installed.

Laura Petrillo-Groh asks: Would we please explain the contemplated changes related to dedicated outdoor air systems in 140.4(p)? Specifically, she's interested in the proposed removal of the A and B configurations.

Let's see, so she's -- and she's mentioning two specific systems. A potential difference between 120.1(c) or DOAS under 140.4(p)1B.

MR. BALNEG: Yeah, so I can kind of explain that a little bit. So, we received some comments and we were getting a little bit of confusion of how this section was written. So, most of the changes to this section are more removing duplications and simplifying the code language.

So, there are two parts in the -- I think it was in the path B. One of them ended up being duplicative and the other two we had moved that up into the exception for economizers, where economizers was originally referencing that pathway. And so, that's helping the code be a little bit more simpler, but the intent is still the same.

And I don't know if -- I think we have Tim on the line, if he wanted to go a little bit further into that or if you have any more questions, Laura.

MR. BOZORGCHAMI: Tim, would you like to go a little bit deeper in that discussion? I'm not sure if he's muted or what?

MR. BALNEG: Tim. Yeah, he might be muted. I see you unmuted on the Zoom, though.

MR. MINEZAKI: Sorry. Yeah, this is Tim Minezaki. Yeah, I'm happy to talk in more detail, although maybe it's easiest if I connect with Laura offline. There's a couple different considerations.

MR. BOZORGCHAMI: Okay. Okay, thank you.

We have one raised hand and that is from Hillary. Go ahead, I'm going to unmute you, and go ahead and state your name and affiliation, please.

MS. WEITZE: Hi, thanks. This is Hillary Weitze, Red Car Analytics, part of the statewide CASE team. This comment is regarding the refrigerant economizer temperature threshold addition to 140.9.

I guess our review of the analysis indicated that there was -- in order to show sort of energy equivalence with the current economizer efficiency, or energy efficiency requirements that the refrigerant economizer system needed to operate at a elevated COP something, an efficiency that's above the DOE minimums.

And so our concern, I guess, is as the code language is currently proposed in the 45-day language

there isn't -- there isn't anything written about sort of the minimum efficiency or anything that kind of would ensure that the refrigerant economizer system is energy equivalent to the current standards.

So, we can provide a more detailed write-up of that, but just wanted to express that concern. Thank you.

MR. BOZORGCHAMI: Thank you, Hillary. That was good, thank you. Yes, and please provide that write-up, that would be great. It could apply to the statement of reasonings.

Anymore comments, questions? If not, I'm going to ask for a 10-minute break real quick, Commissioner, if that's okay. We need to do some minor technical stuff with -- the court reporter has to change out the disks and be ready for the second set of Haile's presentation.

COMMISSIONER MCALLISTER: Yeah, that's fine with me. Thanks a lot, Payam.

MR. BOZORGCHAMI: All right. So, we'll -- how about if we reconvene again at 2:30.

COMMISSIONER MCALLISTER: Sounds good. Thanks everyone.

MR. BOZORGCHAMI: All righty, thank you.

COMMISSIONER MCALLISTER: We appreciate your

attention. All right, see you then.

(Off the record at 2:19 p.m.)

(On the record at 2:30 p.m.)

MR. BOZORGCHAMI: Okay. Hello again. Haile, before we go on to the nonresidential additions and alterations questions, there was another question that came through the Q&A. And I was wondering if Hillary Weitze would be able to answer that question. If not, that table I need to look for in the case sheet, I don't have it right in front of me, but I could forward it to you, if needed. Or, would Hillary be able to respond to that?

MS. WEITZE: Sorry, are you referring to the Meg Waltner's question about Table 140.4?

MR. BOZORGCHAMI: Yes. Yes.

MS. WEITZE: Oh, sorry, I --

MR. BOZORGCHAMI: It didn't work on that one. That's okay.

MS. WEITZE: Yeah, that is not my -- yeah, sorry.

MR. BOZORGCHAMI: Okay, okay.

MR. BOYCE: This is Bryan Boyce. Can you hear me on the webinar?

MR. BOZORGCHAMI: Yes.

MR. BOYCE: Yeah, so we have done some analysis,

not energy building modeling, but spreadsheet analysis. So, Meg, maybe it would be best for me to connect with you and go over the changes. So, yes, there has been some analysis done.

MR. BOZORGCHAMI: Okay. Okay, that would be great, Bryan.

And then, we just want to be cognizant that one of the subject matter staff from the Energy Commission is on that call, too.

So, thank you Bryan. Thank you, Meg.

With that, Haile, the rest of the afternoon is yours. Take it away.

MR. BUCANEG: Don't worry, it will be short. So, we'll be moving on to the proposed changes to Subchapter 6, which will cover Section 141. And this is going to be shorter than the previous subchapter. But again, we're going to be going these sections -- the section chronologically for these changes.

Okay. So, starting with Section 141.0, we have a general change in that the high-rise residential building types are not covered in Section 141 anymore. Additionally, there was some language regarding moving of relocatable public school buildings. This was added in there for clarification.

Under Section 141.0(a)2 there are added

exceptions for gas water boilers and gas service water heaters. This allows for exceptions to 140.4(k)8 and 140.5(c) under certain scenarios in this additional language.

In Section 141.0(b)1D, new fan systems serving an existing building shall meet the requirements of Section 120.10.

And revisions to requirements for existing roofs of nonresidential or hotel/motel buildings were revised in Section 141.0(b)2B. This includes referencing roofing product requirements in Section 140.3(a)1A, referencing roofing or ceiling insulation requirements in Table 141.0-C, and adding exceptions for specific conditions for roof recovers, roof replacements or drains.

In Table 141.0-B, the roof/ceiling -- roof or ceiling insulation tradeoff for low-sloped roofs aged solar reflectances where this was updated.

And the insulation requirements for roof alterations were revised in Table 141.0-C.

New and revised requirements for new or replacement space condition systems are included in Section 141.0(b)2C. This includes new additional fan power allowances outlined in Table 141.0-D.

Additionally, exceptions from new heat pump

baselines for new or replacement systems -- replacement space conditioning systems and economizer exemptions for single packaged air-cooled commercial unitary air conditions and heat pumps less than 54,000 Btu per hour were added.

In Section 141.0(b)2D, this section references requirements in Section 120.4(a) through (f) for new replacement ducts, and also revised duct system sealing and leakage testing requirements.

There were minor revisions to Section 141.0(b)3. This was done for clarification and, like I said, these were minor revisions to the code language.

In Section 141.1(b), requirements for newly installed computer room cooling systems and uninterruptible power supply systems were added. This includes referencing 120.6(j) for mandatory reheat, humidification and fan control requirements. And it's referencing 140.9(a)2 for fan power consumption requirements. And referencing 140.9(a)4 for uninterruptible power supply requirements.

Also in Section 141.1(b)1, full economizing requirements for economizers serving computer rooms are included. This identifies temperature thresholds for full economizing for air, water and refrigerant economizers. And these values are slightly different

than those in Section 140, so that's just kind of a heads up there.

And finally, in Section 141.1(c)1, this section includes requirements for equipment serving controlled environmental horticultural spaces. This references Section 120.6(h)1 and (h)2 for space-conditioning systems and dehumidification for indoor growing. Section 120.6(h)5 and (h) for greenhouse building envelope and space-conditioning systems. And provides requirements for indoor growing and greenhouse lighting systems.

And that would be it for Subchapter 6, Section 141. We can take questions at this time, questions and comments.

MR. STRAIT: I have two questions in the Q&A box. I'm not seeing any raised hands, so I'll start with the Q&A questions.

First, Jena Rhoda (phonetic) asks: What if the public school building used the compliance method allowed for only one climate zone and then it got moved to a different climate zone?

MR. BOZORGCHAMI: Haile, do you want to answer that question?

MR. BUCANEG: I think we're going to need to take a little bit more time to look at that question.

MR. BOZORGCHAMI: I think the answer to that one would be that if it's a portable classroom, it needs to meet the most stringent requirements in all the climate zones. And the reason is we don't really know where that classroom's going to end up. So, is it going to be in Climate 12 or Climate Zone 15.

MR. STRAIT: I think, actually, the answer here is, you know, the climate zone is specific to the project. And so, when you have a project and it applies for a building permit they're going to say this is in this climate zone and it has to meet these requirements. And so, the designs for whatever that project happens to be, the portables includes in that project will have to meet the associated climate zone requirements.

The only case you would be able to kind of get around it is if you're relocating a portable without taking any action that requires a building permit. And that can be done, but it would likely be fairly unusual for a portable to be transported far enough -- to be transported between campuses that might be subject to different requirements, and then installed in the new campus without any sort of permitting process.

So, theoretically that might happen, but I wouldn't assume it to be terribly common.

MR. OWNBY: So, this is Adrian. Just curious,

are we assuming that portables are all constructed in state and just moved in state, or are they like, you know, mobile homes --

MR. BOZORGCHAMI: In climate -- in climate zones.

MR. OWNBY: -- see, mobile homes are not subject to our regulations at all because they can cross state lines. And I'm wondering whether or not that might be the case for portable classrooms as well. I don't know, I'm just curious.

MR. STRAIT: Yeah, and Dan Johnson has put into the Q&A that portable classrooms are currently designed for compliance "in all climate zones".

MR. OWNBY: Yeah.

MR. STRAIT: It's one certification with DSA. So, I guess if they're built to the most stringent applicable requirements across all 16 climate zones, that may be true. We might have to -- like, I don't -- I'm not enough of an expert in Title 25 compliance to know exactly how something --

MR. BOZORGCHAMI: Yeah, this is a Title 24 requirement for portable classrooms, Peter. And I have to agree with Dan Johnson that we have -- portable classrooms has to be compliant in all climate zones. So, if you take it that direction, you have to look at

the most stringent climate zones.

MR. STRAIT: Oh, so that's what Jena Rhoda is clarification, she's asking about special application allowed for a one-climate-zone compliance. I must admit I'm not familiar with the special application process or what the criteria for approval of the application would be.

MR. BOZORGCHAMI: Yeah.

MR. PENNINGTON: Hi, this is Bill. I was actually around when these requirements were written into the code and there's quite a bit of conceptual approach to what was done. So, I think there needs to be a staff conversation about this.

MR. BOZORGCHAMI: Yeah, I agree with Bill. So, Jena, we'll get back to you on that answer.

MR. STRAIT: And I don't have any more questions in the Q&A box.

MR. BOZORGCHAMI: And there's no more raised hands. So, Haile, could you go to the next slide, please?

So -- oh, we have one raised hand now. Mark Roest, go ahead and I'm going to unmute you, and state your name and your affiliation, please.

MR. ROEST: My name is Mark Roest. I'm with Sustainable Energy, Inc. And I was just asking

something about the exceptions. I didn't -- I wasn't clear about the exceptions that had been mentioned on the slide, I think it was 140.1 or something that referred to roofs.

MR. BUCANEG: Sure. So, that's exceptions to 141.0(b)2BII. And these exceptions are for roof recovers, roof replacements and drains. And there's a little bit more specific language.

MR. ROEST: So, I do have a question about that, now that I understand the context. The thing that -- I did submit a docket question, as you asked, as somebody asked, and what I'm talking about is building integrated solar where if you're going to do a roof recover that is a perfect time, instead of putting shakes, or asphalt, or concrete shingles or whatever on it, that's a good time to put a thin film sheet, say hard anodized aluminum, or a composite sheet which has had solar PV printed on it, onto the roof. And that should last longer than most roofs. And it should provide between 36 and 48 percent efficiency once it's on the market, which should be by 2023.

MR. BOZORGCHAMI: So, we do have a requirement, we have an exception that says if you're installing an integrated PV on top of the roof, the roof does not need to be cool roofed.

The exception for the insulation is still there. Okay, so the only thing --

MR. ROEST: What is that? I'm not --

MR. BOZORGCHAMI: So, if I go down to the roof deck, and I still have to put a roof up, right. So, I'm down to the plywood, I still have to put a roof on.

The insulation is totally different than the solar effect thermal emittance of a cool roof. So, if I have an integrated PV panel, I'm exempted from the cool roof requirement for that area, but I still have to install the insulation requirement, or I still have to meet the insulation requirement.

MR. ROEST: Insulation under the roof?

MR. BOZORGCHAMI: Under the -- at the roof deck, yes. Because the majority of these buildings are low-slope roofs, they are either doing a PVC or a TPO, and the majority of these roofs do require -- or these type of systems do require some sort of an insulation.

So, with that we're requesting that the insulation value be a little bit higher than normal.

MR. ROEST: Oh, okay. Okay.

MR. BOZORGCHAMI: A couple things that does is also negates the moisture from the roof deck, but that only affects -- what you're asking is only effecting what we're doing for solar reflectants. There's an

exemption in there.

MR. ROEST: Well, we also have an interest in insulation as well. An ally company has an effective insulation. So, you're -- does the insulation go either above or below the roof?

MR. BOZORGCHAMI: We based it on a U factor. So, you can do an R value or a U factor. And U factor, we're silent on where the insulation goes.

MR. ROEST: Okay.

MR. BOZORGCHAMI: Okay.

MR. ROEST: All right, thank you very much.

MR. BOZORGCHAMI: Uh-hum. Sarah, I'm going to unmute you. Go ahead and state your name and affiliation. Sarah, you're going to have to unmute yourself first. Sarah, you're still muted. There you go.

MS. SCHNEIDER: Thanks Payam. I accidentally hit my hands, so ignore me.

MR. BOZORGCHAMI: Oh, okay.

MS. SCHNEIDER: Sorry.

MR. BOZORGCHAMI: No worries. You're good. I'll talk to you later.

Mark, go ahead and state your name and affiliation.

MR. ROEST: I'm the person you just talked to.

MR. BOZORGCHAMI: Oh, I'm sorry. Here we go.

MR. ROEST: No problem.

MR. BOZORGCHAMI: Laura, go ahead and state your name and affiliation.

MS. PETRILLO-GROH: Again, good evening or afternoon, depending on where you are. My name is Laura Petrillo-Groh. I'm with the Air Conditioning, Heating and Refrigeration Institute, or AHRI. AHRI represents more than 332 air conditioning, heating, and refrigeration equipment manufacturers.

Primarily, I just wanted to thank both CEC staff and the consultants for what I think what -- for early and often stakeholder engagement. This team has worked really hard to make sure that the proposals that started back, I think in 2018, have been very significantly revised and refined. Of course, we still do have some comments, which I'm happy to submit in writing. But I do appreciate all of the Commission staff and consultant efforts during this process.

I think the one question I was hoping to glean today out of this section is a little bit more about the -- just at a very high level the difference in requirements between the new construction and the renovations, or additions and alterations section regarding the (indiscernible) budget. Could you go over

maybe a little bit about equipment that might comply in an additions and alterations situation that would not comply in a new construction situation? Maybe a little bit of compare and contrast between those two?

MR. BALNEG: Oh, sorry. Yeah, this is Ronald Balneg. I mean so the main differences between the two is the credits for the additions and alterations, they should be still getting like the same amount of credits. And so, most of the changes are going to be under like the new construction. And so, the additional credits should be able to help the -- I don't know if I can come up with like a specific examples, because there's like the different changes and stuff.

Bryan, do you think you could answer this question? Sorry. Thanks.

MR. BOYCE: Can you hear me?

MR. BALNEG: Yes, go ahead Bryan.

MR. BOYCE: Yeah, so Laura, the additions and alterations get essentially what amounts to I think an additional 9/10ths of an inch of static pressure allowance. And so, you know, I think as you're stating that would allow additional product -- or it would just give additional leeway to sites with, you know, potentially existing ductwork and other limitations on the, you know, the system really to upgrade. So, that

is kind of what was added, really, for that installation type.

And so, I guess the focus, the way we thought about it was more on the system level, rather than the individual products themselves. And, you know, that was giving additional, you know, bandwidth for the existing systems.

Does that answer your question?

MS. PETRILLO-GROH: Yeah, it's helpful to understanding your frame of reference more. Appreciate the answer. Thank you so much.

MR. BALNEG: Thanks Bryan.

MR. BOZORGCHAMI: Thank you, Bryan. Thank you, Ronald.

I have one raised hand, it's a phone number, I'm not sure but I'm going to unmute you. Go ahead and state your name and affiliation. You're going to have to say it -- there you go.

BENNIE: Hey, Payam, this is Bennie with the Statewide CASE Team. Just wanted to add a little more context for the roof recovers and roof replacements.

MR. BOZORGCHAMI: Okay.

BENNIE: While there is the U factor option which allows for some insulation to be installed below deck, there is still a minimum requirement for R-10 to

be above deck.

MR. BOZORGCHAMI: Yeah. Yeah, and that R-10 is really there to prevent that moisture to build up under the --

BENNIE: Exactly.

MR. BOZORGCHAMI: -- at the roof deck, and it is actually -- what it does is gives you a continuous above the roof deck, which the value of that is much better than having insulation between the rafters.

So, if you have an R-10 above the roof deck, you may need a little bit more insulation between the rafters to be equivalent to the save savings or the same U factor, I should say.

BENNIE: Yep. Great, thank you.

MR. BOZORGCHAMI: Yeah, you're right Bennie, thank you.

Any -- Peter, do we have any more raised hands or -- I don't have any more raised hands, so do we have any more --

MR. STRAIT: Well, there's a call-in number with a hand raised.

MR. BOZORGCHAMI: He's going to lower his hand right now, that was Bennie.

MR. STRAIT: Then we do have one more question in the chat box. This is from Joe Kane. This is

asking, for built-in PV roof coverings, I guess that's built-in photovoltaics, that have power producing and non-power producing portions of the roof covering, can the exception to cool roof apply to the non-power producing portion of the roof to allow a static integration of both portions?

MR. BOZORGCHAMI: No. No. That, you would have to go through the performance path. The whole purpose of it is to it provides an energy efficiency, and looks at the solar effects and the thermal emittance.

So, the energy has no -- that's not connected would have to meet the cool roof requirement.

I know of one company that's producing these roofing products and, unfortunately, they have to also -- they have to meet the cool roof requirement and also the insulation requirement.

And the reason is the savings is based on the solar reflectants and the thermal properties of that insulation. So. Any other --

MR. STRAIT: Not that I'm seeing. Mark Roest now has their hand raised. I don't know if that's a separate or a new question.

MR. BOZORGCHAMI: I think that might be a new question. Go ahead, Mark, state your name and affiliation.

MR. ROEST: Mark Roest, Sustainable Energy, Inc. And I -- when I thought through what you were saying about the insulation, and the deck, and the roof, and the rafters I remembered that there is a kind of roof that might be laid down without a separate deck.

MR. BOZORGCHAMI: Okay.

MR. ROEST: So, if the outer sheath of the building is the deck, there's not a separate roof on top of that, but it is waterproof and all that. If that were to happen, what would the rule be on the insulation?

MR. BOZORGCHAMI: Then the -- well, then, you've got two choices. You've got the insulation would become the deck or you put the insulation below the deck. And as Bennie alluded earlier, you're still required to put a minimum R-10. So, the deck would become that insulation.

MR. ROEST: Okay, so if we did a sandwich construction with, say, ultra light performance concrete on the outside, on both sides, and an insulation in between then that is --

MR. BOZORGCHAMI: That's the deck requirement. Yeah, that's the deck.

MR. ROEST: It would be the deck and it would have the R-10 inside it.

MR. BOZORGCHAMI: Yes.

MR. ROEST: But if we're -- I'm just wondering about if -- yeah, okay. So, if I had a single structure that was rigid enough to be a roof, and also had the thin film printed on it, then how would we put that together? We would --

MR. BOZORGCHAMI: So, I need to understand what the construction assembly is that you're talking about. I'm not picturing it, I'm sorry.

So, if I'm not mistaken, you're saying that you have some sort of a sandwich panel where you have some sort of a -- some sort of a microfiber roof deck, with insulation embedded in it, some sort of a polymer concrete.

MR. ROEST: Probably not polymer. I'm looking more at let's suppose that we -- there are two possibilities. One possibility would be a sandwich that has probably micro beads in it.

MR. BOZORGCHAMI: Okay.

MR. ROEST: Or some -- or a gel, an ultra lightweight gel.

MR. BOZORGCHAMI: Okay.

MR. ROEST: And another possibility is --

MR. BOZORGCHAMI: Now, this ultra light gel, is this insulation or what --

MR. ROEST: Yeah, insulation, you're right. Yeah.

MR. BOZORGCHAMI: Okay. Okay.

MR. ROEST: And the other possibility is a rigid, ultra light performance concrete panel --

MR. BOZORGCHAMI: Okay.

MR. ROEST: -- printed on one side, and then insulation up against underneath it.

MR. BOZORGCHAMI: Okay.

MR. ROEST: You know, so the solar is directly printed onto that panel.

MR. BOZORGCHAMI: Okay. So, that panel will be exempted from the cool roof because you have a PV. But that panel still has that built in insulation. So, you can use that --

MR. ROEST: Well, if it's not a sandwich then what you're saying --

MR. BOZORGCHAMI: But you're saying that there's a gel insulation underneath it.

MR. ROEST: That's one version. There's two versions I'm talking about here.

MR. BOZORGCHAMI: Okay.

MR. ROEST: One version is the sandwich version and that might be difficult to manufacture or expensive to manufacture. And another version might be just a

solid sheet, let's say it was 3/8ths of an inch thick, or something like that, and then insulation would be put up underneath that.

MR. BOZORGCHAMI: Okay.

MR. ROEST: Or is that not going to handle the moisture issue.

MR. BOZORGCHAMI: I'm not a hundred percent sure. So, how about you and I touch bases and discuss this a little bit?

MR. ROEST: Okay, how should we do that?

MR. BOZORGCHAMI: Your email shows up on our docket.

MR. ROEST: Yes.

MR. BOZORGCHAMI: So, we will -- I will reach out to you.

MR. ROEST: Wonderful, thank you.

MR. BOZORGCHAMI: Uh-hum.

So, with that we're at the end of the hearings today. Again, if you have comments, you have questions there is the link to our docket, the information. Please, for today's hearings, if you could submit your questions and comments sooner, within the week or week and a half, it will be very appreciated.

And we will be -- our next set of hearings are going to be on Thursday, the 27th and Friday, the 28th.

And now, I think we're going to open it up for everything that you've heard today. And if we don't, we're pretty much complete with today's hearings.

COMMISSIONER MCALLISTER: So, thanks Payam. This is Commissioner McAllister. Great job everyone today, I really want to commend the staff for the presentations and also everyone who asked questions. You know, it's a lot of information to absorb so, certainly, you know, on the going forward we want to make sure everybody understands the proposals. So, you know, a lot of that has happened today, but we can continue to help that happen.

Thursday and Friday very important as well, so we can get through the whole proposal during the course of the week.

And I just want to make sure that we do kind of a general public comment session here. I think you had that in mind, Payam, but just want to be clear with everyone now's the time for public comment about anything that you've heard today but, really, any comments folks in the public might want to make about the Building Code update.

So, yeah, once we do that and if there is any comment, then we'll adjourn for the day. But I want to make sure everyone has a chance to speak.

MR. BOZORGCHAMI: Commissioner, I'm not seeing any raised hands, or any questions or comments in the Q&A so --

COMMISSIONER MCALLISTER: Okay. Well, great. So, any wrap-up comments, additional ones that you want to make, Payam, or anyone on the CEC staff team?

MR. BOZORGCHAMI: No, I personally want to thank everybody who participated in today's hearings. This is very beneficial to us. And we'll take the comments and concerns back, and we'll try to do our best to develop the upcoming 15-day language.

Some folks, we will be reaching out to get more clarification on their questions and their comments. And thank you.

COMMISSIONER MCALLISTER: Great. Well, great. So, I just want to express my personal appreciation for everyone's commitment to this. And with the team on staff, much deeper than just the staff you saw today. Will Vicente, I want to just call him out as the Office Manager of the Buildings Standards Office, in which much of the heavy lifting happens. But, really, it's a vast team effort at the Commission. I think that comes across in what you saw today.

But all the stakeholders that have a keen interest in this update, I want to just also personally

thank you for your engagement. And I'm sure it will continue on Thursday and Friday, so thank you in advance for that.

So, I think with that we're adjourned for the day, and looking forward to seeing everyone again on Thursday. So, thanks a lot.

MR. BOZORGCHAMI: Commissioner, one more note, I apologize.

COMMISSIONER MCALLISTER: Okay.

MR. BOZORGCHAMI: We will be docketing the PowerPoint presentation tomorrow morning for everybody to have a copy of on our docket, 21-BSTD-01.

COMMISSIONER MCALLISTER: Great. Thanks for that. All right, we're done.

MR. BOZORGCHAMI: Thank you everyone.

COMMISSIONER MCALLISTER: Thanks everyone, bye-bye.

MR. BOZORGCHAMI: Bye-bye.

Haile, do you want to go to the last slide.

(Thereupon, the Workshop was adjourned at 3:30 p.m.)

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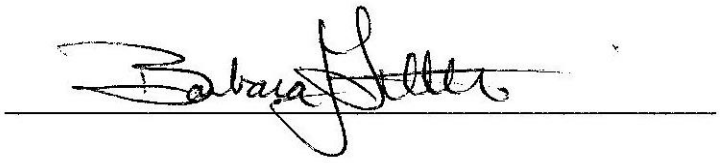

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