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CALIFORNIA ENERGY COMMISSION

PUBLIC WORKSHOP

In the Matter of:	)	Docket No. 19-DECARB-01
	)	
	)	
Commissioner Workshop on Building Decarbonization: Opportunities and Challenges of Buildings Sectors	)	REMOTE COMMISSIONER WORKSHOP RE: Building Decarbonization

CALIFORNIA ENERGY COMMISSION (CEC)

CALIFORNIA ENERGY COMMISSION

REMOTE

FRIDAY, MAY 22, 2020

9:30 A.M.

Reported by: E. Hicks

APPEARANCES

COMMISSIONERS PRESENT:

Commissioner David Hochschild, California Energy Commission
Commissioner Andrew McAllister, California Energy Commission

CEC STAFF PRESENT:

Jennifer Nelson
Dorothy Murimi, Public Advisor's Office
Eddie Rosales
Tiffany Mateo
Gabriel Taylor

PRESENTERS:

Aimee Gotway Bailey, Silicon Valley Clean Energy
Julia Hatton, Rising Sun
Meghan K. Dewey, PG&E
Panama Bartholomy, Building Decarbonization Coalition
Sirindhi Sampath Kumar, California Housing Partnership Corporation
Katie Wu, Gridworks
Leah Pertl, Sacramento Municipal Utility District (SMUD)
Cathy Higgins, New Buildings Institute
Chris Malotte Southern California Edison
Ryan Mazelli, Ygrene

PUBLIC COMMENT:

John Norwood, California Pool & Spa
Lauren Cullum
George Nesbitt
Jan Dietrick
Pierre Delforge
Charles Cormany
Tom Conlon
Becky Melton

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P R O C E E D I N G S

MAY 22, 2020 9:33 A.M.

MS. NELSON: Good morning and welcome. I am Jennifer Nelson, a manager in the California Energy Commission Efficiency Division.

Today, the California Energy Commission is holding a Commissioner Workshop on Opportunities and Challenges to Decarbonizing Residential, Multifamily, and Commercial Buildings. This workshop, including presentations, discussions, questions, and any comments will inform the Building Decarbonization Assessment.

Before we hear opening remarks from the commissioners, I want to cover a few housekeeping items.

And if you could go to the next slide, please.

Today's workshop on Building Decarbonization: Opportunities and Challenges of Building Sectors is being held remotely without a physical location for any participant, consistent with Executive Orders N-25-20 and N-29-20 and the recommendations from the California Department of Public Health to encourage social distancing in order to slow the spread of COVID-19.

The public may participate and/or observe the meeting consistent with the direction in these Executive Orders. Instructions for remote participation can be found in the notice for this meeting and as set forth on the schedule

posted to the CEC website. Links to both the notice and schedule have or will be shortly sent to all attendees via the chat feature.

Next slide.

We are using WebEx for today's web conferencing. Instructions for remote participation can be found in the notice for this meeting. On the screen are some key functions in WebEx. Please use these as needed. I want to bring your attention to two buttons. The mute/un-mute button is on the far left. Note that all attendees are muted by default. The Chair, Commissioner, and current panel speakers and moderator may mute and un-mute during the panel. Audio lines will be open during the public comment period this afternoon.

The chat button, the button that's looks like a thought bubble, will allow you to send chats to staff with questions and comments during the public comment period. We expect everything will run smoothly, but in case WebEx shuts down video, we will continue the meeting on the phone line. If you have called into the meeting or had WebEx call you for audio, you are connected by phone and should have no issues. If you are listening via your computer's audio, you may be disconnected. In this case, the phone number listed in the notice and on this, at the bottom of this slide will allow you to reconnect to the meeting.

PowerPoints have been posted to the docket for this proceeding to allow people to follow along and take notes. We will be taking public comments at two points during the day, at the end of each panel and again this afternoon after all panels have been heard. Comments pertaining to the panel discussion and topic may be submitted via the WebEx chat feature by emailing Dorothy Murimi from our Public Advisor's Office and/or emailing Heriberto Rosales, or by calling our Public Advisor's Office directly. They will relay the message to Dorothy for her to read aloud.

If we do not get to your questions or comments following the panel, we will save it for the public calling period. Later this afternoon, we have dedicated time for public comment. Comments may again be submitted via chat, e-mail, or calling the Public Advisor's Office for staff to read aloud. If you want to provide an oral comment, please use the raise hand function or send a chat or e-mail. Dorothy will identity your name or the last three digits of your phone number, and then mute your line. We ask speakers to limit their comments to three minutes or less, and one per organization. Comments may also be submitted in writing by June 8th, as described in the notice.

Please note we have a court reporter with us today to make an official record of this workshop. We are also recording this workshop and will post a file in the next week

or so. All presentations, questions, and comments will be a part of the public record and will be searchable.

Next slide.

Today's webinar will include panelist presentations and discussions on the challenges and opportunities to decarbonizing single-family and multifamily residential buildings and commercial buildings. The public comment period is tentatively scheduled to start around 2:30 p.m. this afternoon. We aim to meet the proposed schedule, but will also provide flexibility for panel discussion, questions, and comments.

With that, we are ready to move into opening comments from our Commissioner.

Commission McAllister or Chair Hochschild?

COMMISSIONER MCALLISTER: I'm not sure. Is Chair Hochschild on? If not, I'll go ahead. This is Commissioner McAllister.

UNKNOWN SPEAKER: Chair Hochschild should be on.

COMMISSIONER MCALLISTER: Oh, I see David. I see Chair Hochschild on. Maybe I'll just go ahead. Okay, I'll just kick it off and then the Chair can chime in.

So this is Andrew McAllister, Lead Commissioner on efficiency issues, including AB 3232. Very excited to have this be kicked off. I want to first of all thank the staff. Let me ask, actually -- folks who are not speaking to mute

their phones so we don't get some feedback and background noise, which can be kind of distracting. So I really appreciate you all doing that.

I want to thank staff really, Jen and Eddie and all the folks who are participating today in helping shepherd this work. This work is critical, really. I want to just make some opening comments. Usually I say brief opening comments, and hopefully they'll be relatively brief. But I think there are a number of important points to make here, given the importance of this topic. You know, we're now working in earnest. Staff has really been rolling up their sleeves and working hard to assemble and deepen the conversation on this topic and prepare drafts and really vet their report fully so that we can get it out by the end of the year, as the deadline and statute asked us to do.

This is a bi-divisional effort. You know, the Efficiency Division and the Energy Assessments Division are working hand in glove on this topic, and that's notable, I think, and it's really illustrative or emblematic of the approach we're taking. You know, buildings are not only -- for many of the reasons we'll talk about today, buildings are incredibly important for California, for Californians, for our residents and citizens, for our economy, jobs landscape, many, many things that we'll touch on today. But they're also supremely important and increasingly important for our

energy systems as a whole -- for reliability on the grid, for services that they can provide, for flexibility that they can provide.

And that bleeds over into many different areas, including the forecast and much of the analytical work that we're doing around the energy system more broadly. And so it makes all the sense in the world for both of our key divisions in these respects to be collaborating on this. Some of you've seen that in the modeling tool that we're working on, fuel substitution, along those lines as well, to understand the impact across the energy sector, you know, at an increasingly, well, at a localized level, at a temporal level, and then also at different levels of aggregation with the system. So that's really important.

You know, I also want to present a little bit of context and think about this in a broader way. And AB 3232, I think, presents us with a great opportunity to link up multiple themes, some of which I just mentioned, but there are specific efforts that I'll just list. And you know, just at the Energy Commission, there are at least seven efforts that are interrelated and we all, we need to be making sure to keep those linkages active and live. So obviously, this Assembly Bill 3232 Building Decarbonization work.

We also have Senate Bill 49, which is new authority for the Energy Commission to incorporate load flexibility

into our appliances work. So that's actually really important. It actually -- and obviously dovetails well, or should dovetail well with the building decarbonization work, if we can incorporate demand responsiveness, load flexibility and bidirectional communication into many of the devices that go into our building.

We have SB 1477, which is looking at promoting decarbonized heating, largely, heat pumps in both new construction and the marketplace more broadly.

The Title 24 2022 Buildings Standards update. That's a place where all of these things are also incredibly relevant. And so again, we need to make sure that those linkages are being maintained and emphasized and strengthened.

I mentioned the forecasting work. There's a lot of analytical work that's seeking to characterize how loads behave going forward, and they're going to behave in new and interesting ways and they're going to be technology enabled to do that and so that policy can encourage that. So as we seek keeping with electrification and different decarbonization approaches, we're going to need to quantify that. So the forecasting and all the analytical work in Energy Assessments Division is really key. So that's five.

And then we have load management standards that we're working hard on at the Commission to encourage, you know,

kind of all of the above, in terms of load flexibility in different ways. That is based on authority that we have at the Energy Commission. And so that's a, I think, a foundational effort as well, together with the CPUC, to try to produce the system benefits from our buildings.

And then finally, you know, R&D. We've done a lot of R&D in these areas and will continue to so do, do more of it increasingly, from microgrids to different targeted technologies and decarbonization. There's a lot of excitement there now and I think that'll also ramp up. Decarbonization, you know, is a focus of -- and load flexibility, specifically, will be a continued focus and enhanced focuses of the R&D effort at the Commission.

So that's seven, just right off the top of my head. That's seven initiatives that are all interrelated and it's important that they try to rely on similar conversations, similar narratives, similar standards where applicable and key coordinated.

So that's, if you think of those as trains moving down kind of roughly parallel tracks, that switchyard could get kind of crowded. And so it really needs good management and traffic control to make sure that everything's coordinated and, you know, and is boxed up, and so that we have a smooth operation going forward for the next couple or few years, if we developed all of these initiatives in

parallel.

So, you know, I think, and then if we layer on the new relatively related conversations that are coming in maybe from slightly further fields, like indoor air quality and the job and recovery of COVID, all of these things, you know, I think are related in a way that we need to keep in mind. And you know, the lesson being that close communication across all of these forms is critical.

So, you know, I think, high level we just, we need to think of buildings as a platform. I've said this before, but I think it's really, it remains relevant as sort of an organizing principle. They're a plat -- buildings are a platform for decarbonization. Most of the technologies that we're talking about are located in buildings, and that's where most of us spend most of our time. Certainly, these days we're all spending a lot of time at home, and so our -- I think we can appreciate in a more visceral way how buildings really do nurture our quality of life.

And even the last couple of days, the Energy Commission, Commissioner Monahan, posted a series a webinars on transportation issues. And, you know, even the EV, the chargers and many of them are located at buildings and need to be planned alongside upgrades to buildings. And while that's not strictly part of this work, AB 3232, again, buildings are our focus and platform for many of the

decisions, the investment decisions, that need to be made for decarbonization. The locational and temporal and all these types of considerations are intertwined.

So, you know, I think to wrap up, I wanted to remind people actually to have a look, but really to note that there's quite a bit of continuity here over time and we really are headed in a forthright way down this decarbonization road.

Remember, the California Energy Efficiency Action Plan, you know, the update that we approved last year. Seems like a long time ago since a lot has happened with COVID and kind of our economy, the shock to our economy and our kind of normal daily routines. But that was, you know, the last update of the action plan was reorganized to focus on three topics, three large broad topics. Doubling of energy efficiency, which still applies -- I could have added that maybe as number eight, that's a, you know, big effort under SB 350.

Low income -- you know, equity has to be a focus of this effort in an integral way, so focusing on low income and our disadvantaged communities across the state really needs to be the primary focus of much of our public investment. If we don't bring along the 35 percent of our population that just can't do much of what we're asking, or what's needed in our existing buildings, then we're not going to succeed. And

so that has to be a central focus.

And then the third focus of the action plan is building decarbonization, and obviously that's why we're here today. So I think, you know, keeping this long-term momentum accelerating and really going is what we can do here today. All of you who are in the room, it's great to see so much participation on this webinar. I really want to thank the panelists and the staff, and the panelists for really giving us their time and best energy and best effort. And all the participants and stakeholders and folks who I know are going to comment and really provide the best ideas to how we can get there with our, with our implementation of not just this report, but really making sure that our, that our efforts are well coordinated and as effective as they possibly can be across the whole state.

So thank you very much. I'm going to leave it there. I see that Chair Hochschild is now on and invite -- pass the virtual mic to him for some opening comments as well. So thanks a lot everybody, and really looking forward to a productive day.

CHAIR HOCHSCHILD: Great. Thank you, Commissioner McAllister, not just for leading this conversation, but for your entire career being a champion on this issue.

You know, the -- add to what you laid out is where we're out right now in California is where are emissions

coming from our building sector, and come from our entire fleet of gas power plants in the state, and that imbalance is going to grow over time as we've been cleaning up the grid.

Recently, I announced we'd hit -- this new milestone is 63 percent carbon-free electricity on the grid today in California, which is a remarkable feat, we're almost two-thirds of our retail sales. We're clean and that's, you know, very good news as the reach of the electric grid expands further into buildings because water heaters and (indiscernible).

But I remember a few years ago when SB 350 was adopted in the legislature, and the debate, you know, when they rolled that out, it was 50 percent clean energy by 2030, 50 percent reduction in petroleum use, and 50 percent increase in energy efficiency. And, you know, there was, you know, some believe were contests going at the Energy Commission level, which of those challenges would be hardest. And I think the buildings sector actually is the hardest of those to achieve, but it's absolutely possible, certainly helped by a lot of the innovation we're seeing in recent years of these technologies getting cheaper and more accessible than ever.

But I just wanted to highlight what Commissioner McAllister laid out about the goal of the building sector being able to support the electric grid. Really, things --

so I recently, you know, swapped out my gas water heater and put in an electric heat pump two years ago. It's working great. Those kind of devices where you have some flexibility in the demand grid, that is very valuable to the grid and gives us more levers, ultimately, to get the intelligent protocols in place to help support grid reliability.

All of us need to be good citizens of the grid because this is really the sort of spine of our clean energy structure in California. Our climate solutions really are flowing largely through the grid, not entirely, but largely. And of the, you know, California, we get 53 percent of the venture capital that's deployed in the United States comes to our state, and most of that is going into the clean -- clean tech venture capital, most of that's going into -- into connected to electric grid in one fashion or another. So this is a really important element of the building decarbonization strategy, and I think it can have a lot of benefits for grid reliability, as well as job creation.

As Commissioner McAllister noted, our buildings are more important than ever. Our homes are more important because we're all working from home. And with the way this virus has rolled out, there's, you know, you can see scenarios well maybe it will loosen up as a state and then it might, you know, get worse and we're suddenly back to work at home. So it's not at all clear how this will unfold, but I

think the prospect of much more work from home is very likely. Frankly, even when we get to other side of this virus, you know, I think they'll be some permanent changes in terms of work from home, making decarbonizing homes more important now.

So my thanks as well to the staff and all the stakeholders and I look forward to the discussion.

MS. NELSON: Great. Thank you, Chair. Thank you, Commissioner McAllister.

So Eddie, if you can go to the next slide.

So before we move to our first panel, I want to briefly offer some context as to why we are here today and the status of Building Decarbonization Assessment as required by Assembly Bill 3232 of 2018.

As we all know, California has long-term climate goals to reduce GHG emissions 40 percent below 1990's level by 2030 and to be carbon neutral by 2045. There is no single solution to achieve our long-term climate goals. It will take a coordinated portfolio of activities. This includes working to double energy efficiency in existing buildings by 2030, providing 100 percent renewable and clean energy by 2045, getting 5 million ZEVs on California highways by 2030, managing our natural lands to increase carbon storage, reducing short-lived climate pollutants, and adapting our state's infrastructure and industry's climate change. The

state is also committed to identifying opportunities for our most vulnerable communities to have increased benefits and access to clean energy resources.

Building decarbonization is a combination of energy efficiency, demand flexibility, strategies to reduce carbon intensity of end use equipment and appliances, and deployment of behind the need or clean energy resources is a key strategy to reducing GHG emissions and achieving our clean energy goals. Electrification of end uses in buildings is one part of this equation.

In 2018, the legislature passed and Governor Brown signed Assembly Bill 3232. This bill directed the CEC to assess the potential to reduce GHG emissions in residential and commercial buildings 40 percent by 2030. Technical feasibility, scenarios, potential strategies, challenges and opportunities, and costs will be included in this assessment.

Since our February 27th workshop on the Field Substitution Scenario Analysis Tool, staff has been gathering information in data studies and evaluations, evaluating scenarios and sensitivities, developing fuel substitution strategies, coordinating with our sister agencies, and aligning with our other decarbonization efforts. This includes SB 100, the Load Management Rulemaking, SB 49, SB 1477, the Integrated Energy Policy Reports, and ongoing CEC research and demonstration efforts.

I want to extend my appreciation to the staff of the Public Utilities Commission, the Air Resources Board, and the Independent System Operator for working with us as we develop this assessment. The dialog, coordination, and relationship is a key factor in offering a quality document.

To show where we are going over the next year, the project timeline is on the screen. We plan to hold two workshops in June to share results from the Field Substitution Scenario Analysis. The June 9th workshop will focus on aggregate results. The June 26th workshop will focus on cost effectiveness and technology specific results.

We also plan to post a draft report this summer, which will be followed with a workshop, as well as bring the proposed assessment to the CEC for reviewing vote in December. We will continue our work and provide an update on the assessment in the 2021 IEPR.

Public comment periods will be associated with every workshop and with the draft release. If you have comments not in line with the specific workshop topic, I encourage you to still submit your comments.

With that, I will move on to the next panel, unless the commissioners have any additional comments.

Hearing none, I will pass it over to Heriberto Rosales.

MR. SAMUELSON: As a reminder, the panelists need to

unmute themselves.

MR. ROSALES: Good morning. Brian, can you hear me? Just doing a quick mic check.

MR. SAMUELSON: I can hear you now. I just unmuted you. So I wanted to make sure that they mute or unmute when they're ready.

MR. ROSALES: Good morning everyone. My name is Eddie Rosales. I'm a staff energy specialist here at the Energy Commission and I work with Jennifer in the Existing Buildings Office.

And today, for part of the workshop, this is the first panel, first expert panel of three that we're going to have today. And we're going to get started with the Single-Family Building Sector Panel.

We have four specialists -- field experts and specialist here that are going to describe their experience and work under building decarbonization and/or clean energy. Let me introduce them by name and title first, and then I -- when they get started with their presentation, I'll offer more background on their work and some of the work that they're doing related to building decarbonization.

Again, its building decarbonization specific to the single-family building sector. So this is our first panel.

The four panelists we have today on the line are Aimee Gotway Bailey, director of Decarbonization and Grid

Innovation with Silicon Valley Clean Energy, aka, SVCE.

Second panelist will be Julie Hatton. She's CEO and president of Rising Sun.

Third panelist is Meghan K. Dewey, manager of Income-Qualified Programs with PG&E.

And our final panelist for -- this panel will be Panama Bartholomy. He's the director for Building Director Coalition.

Aimee, good morning. Can you hear me?

MS. BAILEY: Yes. Can you hear me okay?

MR. ROSALES: Yeah. Let me pull up your slides. One second. Can you see your slides, Aimee?

MS. BAILEY: Yes, thank you.

MR. ROSALES: Great.

MS. BAILEY: All right. Shall I go ahead?

MR. ROSALES: One second.

MS. BAILEY: Okay.

MR. ROSALES: Actually, let me give you the proper intro to start. Just --

MS. BAILEY: Okay, sorry.

MR. ROSALES: So I'm going to be the slides for Aimee today, but Aimee will be presenting on her information. So let me give a more formal introduction for Aimee.

So Aimee Gotway Bailey -- thank you for joining us today, Aimee -- is the director for Decarbonization and Grid

Innovation at Silicon Valley Clean Energy, SVCE. Her work centers around identifying and managing technical, economic, and regulatory barriers, and opportunities to achieve deep decarbonization.

Aimee has led the development, adoption, and now the implementation of SVCE's Decarbonization Strategy and Programs Roadmap that sets community-side emissions reduction targets and the strategies and programs for achieving them. In specific, SVCE's key building decarbonization initiatives from 2019 including, includes supporting SVCE's 13-member agencies in adopting all-electric reach codes, providing small branch to showcase all-electric properties across SVCE communities through the All-Electric Showcase Awards Program, and launching a pilot co-funded by the Bay Area Air Quality Management District, provide rebates for switching from natural gas to heat pump water heaters.

Currently, Aimee is aiding the development of a building decarbonization joint action plan between SVCE and our member -- and their member agencies to help set priorities for 2020 and onward.

Thank you, Aimee. With that, you may get started.

MS. BAILEY: Great. Thank you very much for the opportunity to be here and to speak on SVCE's activities in the building decarb space.

But first, I wanted to give a very brief introduction

for those of you who aren't familiar with SVCE. We are a community energy agency, formed and governed by these 13 cities in the Bay Area. So we serve the heart of Silicon Valley. And our cities formed us to take bold action on climate change, and that's baked right into our mission statement, which is to reduce dependence on fossil fuels by providing carbon-free affordable and reliable electricity and innovative programs for our community.

SVCE started serving customers in 2017, and at the end of 2018, as Eddie had mentioned, our board adopted the Decarb Strategy and Programs Roadmap, which really set our communitywide emissions reductions targets and our priorities and outlines and approach in strategies for how we're going to achieve those emissions reductions.

So the activities that I'll be speaking about today are really guided by that policy document. The overarching approach, in a nutshell, extremely simplified, is to procure clean electricity, electrify buildings and cars to then use that clean electricity and promote energy efficiency and successful grid integration.

Next slide, please.

So to provide some context on the built environment at least an SVCE service territory, here is a so-called Sankey diagram of emissions in buildings. So on the left, it shows the emissions by fuel source, and this is as measured

at the meter. Then it's filtered by sector in the middle, and then down to end use on the right. So as you can see on the left, natural gas is responsible for the majority of emissions in our buildings. The commercial and residential building sectors are nearly equally responsible. But single-family homes in specific are really the largest single sector. And the emissions are primarily going towards space and water heating, as you can see on the very right. So hopefully this is a helpful of high level snapshot.

Next slide, please.

Following our decarbonization approach -- and since this panel's focused on single-family homes, we did want to share the way in which we depict a home that's ready for the future, and we call it the so-called FutureFit Home. So this graphic illustrates the various components. First, it's all-electric, then there are a variety of different appliances called out in the graphic, such as induction cooking, heat pump heating and cooling, electric dryer, heat pump water heater, and EV charging, not to mention solar and battery storage. And all of it’s tied together through intelligent controls.

So we found that consumers often think of the ‘70s when they think of electric appliances, the coil stove, electric resistance furnace or water heater, et cetera. So in the education and marketing outreach materials that we've

developed, we really try to combat that preconception by depicting what it is, which is a modern home, an all-electric modern home, and distinguishing between these old-timey appliance types and the modern technologies that we're talking about.

Next slide, please.

So that's the kind of vision that we're working toward on the single-family front. I'll cover briefly those three building decarb programs that we've been working on since last year to provide some context, but then the last slide is really focused on the lessons learned from deploying these programs.

So in 2019, our primary focus has been on new construction as the most cost-effective and really sensible time to choose to electrify. So we sponsored the development of model building codes, or reach codes, to move towards all-electric buildings, and also more EV charging infrastructure. So in our service territory, 9 of the 13 member cities have adopted reach codes, and actually three more are in the process still of consideration.

There is some variation in specific reach codes that have been adopted. Some ban natural gas, for instance, in certain buildings types. Others limit it by end use, and some focuses more -- some focus on encouragement of limiting natural gas use. But they're all moving in the same

direction towards all-electric new construction.

And so in this graphic, in this map, the cities with the asterisks are the ones that have already approved reach codes. So some of the big ones, for instance, are Cupertino, Mountain View, Milpitas.

Next slide, please.

So although our primary focus has been on new construction as we've started spinning up our program's portfolio, we also started to pilot programs to help decarbonize existing buildings. In SVCE service territory, we are very built out. There isn't a lot of greenfield development happening, so we have to address existing buildings to meet our climate targets.

To start out, we launched a pilot to provide rebates to replace natural gas water heaters with heat pump water heaters and this was a pilot co-funded by the Air District, and I just wanted to highlight a few features of that program. In addition to the equipment rebate for the appliance, we also added an additional incentive to cover part of an electric service panel upgrade, in recognition that this was a significant barrier for existing buildings in switching to electric.

And although I forgot to mention that on the slide, I apologize, we also had a carve out of this program specifically 10 percent of the systems are reserved for low-

income customers. And there is also an additional rebate amount specifically for heat pump water heaters that incorporate smart technology, such that we can aggregate them into a virtual power plant to help with grid integration purposes. So we're currently extending this program through the end of the year.

Next slide, please.

And I realize this is a very brief presentation, but the last program that we wanted to highlight is specifically what we're doing in response to COVID. So in response to COVID, SVCE's board approved 10 million dollars in Customer Relief and Community Resilience Programs. Part of that is specifically funding this program, a virtual workforce development program. So we're working with partners to develop approximately six hours of web-based training and content for contractors. And when that's complete, when a contractor completes the training, then they're eligible for $500 in compensation.

We're also, on top of that, offering up to 3,000 in rebate funds if a contractor installs one of the approved decarbonization technologies at their own home or in the workplace. And I would just, you know, say one thing. There are a lot of technical trainings out there, amazing technical trainings out there from the manufacturers, organized labor, community colleges, other organizations. However, what we

had found is that although they do an amazing job at addressing the how, like, how do you install these systems, they don't necessarily address the why. So the focus of this content is a lot more on that why, like, what are the underlying drivers for why the market is heading in this direction? What are the health and safety and economic benefits? Why are customers asking them for these technologies? And so that's the key focus here. And then there's the practical opportunity to get hands-on training.

Next slide, please.

So to finish up, we've included here a consolidated list of lessons learned, and it's by no means exhaustive. And for many of the folks attending this workshop, there's probably nothing on here that's surprising or new. I'll just walk through a few of them, though.

One of the primary barriers that we've experienced very much on the single-family side, but also spanning other sectors is that contractor and consumer education and awareness of all-electric buildings and heat pump technologies and building decarbonization pathways, that's a big barrier. There is this very persistent belief that gas appliances are the most efficient and even the most environmentally beneficial, and that is a closed case. So combating those outdated beliefs has been a struggle.

We also have a lot of existing buildings in our

service territory that will need panel upgrades and result in upgrades to their distribution system service. So those are significant barriers that need to be addressed as well. Although we have this heat pump water heater pilot that offers the panel upgrade incentive, we are not in a position to do that for every single customer that's going to need one. So there have to be smarter and more efficient approaches and policies to help tackle that issue.

Resilience has also come up as a concern very regularly during public meetings evaluating reach codes. And many of those council meetings, at least for our member agencies, happened to be happening last fall during the public safety power shutoff events. And there are some, you know, misconceptions out there about all-electric being less resilient, that navigating that nuanced conversation and the emotional response has been challenging.

And I would say, just generally speaking, there's a growing sense from a policy design perspective that we can't really compartmentalize climate change mitigation measures, such as electrification from climate change adaptation measures that will support resilience. So kind of the current thinking is that concerns about resilience have to be addressed and communicated from the design stage in order to continue to make progress on the decarbonization front.

And nearly all of these things have a direct

relationship to cost, specifically increasing it, which is a big barrier for -- especially for retro fits in our service territory. So for instance, for the customers that have reserved a heat pump water heater program rebate and later did not complete a project, the number one reason was because of cost.

Although there are significant barriers, there are certainly opportunities. As has already been mentioned by the Commissioners, health and safety benefits of all-electric buildings, they resonate with folks, especially now as we're spending more time in our homes, and as the virus is a respiratory-related disease.

We've also seen through the reach code effort that there is an opportunity to create the demand signal that's needed to give contractors in the private sector greater certainty, that there's a market for decarbonized buildings, and that pursuing all-electric will make good business sense for them.

So maybe I'll stop there. I think I'm already past time. But thank you very much for the opportunity to speak, and happy to answer any questions.

MR. ROSALES: Thank you, Aimee. That was a good presentation.

Julia, can you hear me? Can you give me a thumbs up? Yay. I learned that trick from my kids' elementary school

teacher.

Aimee, we will come back to you with questions. We'll get through, and just a reminder to all the participants on the line, we're going to do is we're going to go through the presentations with all our panelists, and then we'll pause for Q&A session. And so there will be opportunity for everyone to submit and field questions to both panelists and also the CEC staff.

Our next presenter is Julia Hatton. Julia Hatton is a chief executive office at Rising Sun Center for Opportunity, a greater Bay Area nonprofit working at the intersection of the economy, environment, and equity, with a focus on job training and workforce development.

Julia joined Rising Sun in 2012 and directed Rising Sun programs for over five years before taking on the organization's policy and strategy work around equity, climate, and workforce in 2018. Julia acted as one of the Rising Sun's interim co-executives for six months before assuming the role of CEO. Congratulations.

Over the past 15 years, Julia has worked across the public, private, and nonprofit sectors focusing on workforce and economic development and environmental justice. Immediately prior to Rising Sun, she designed and implemented a Connecticut Efficiency Healthy Homes Initiative, which provided energy, health, and safety upgrades to low-income

families statewide, while creating green jobs.

Julia grew up in Chicago, is an alumni of Coro Fellowship in Public Affairs. Today, Julia lives with her family in the East Bay.

Welcome Julia, good morning.

MS. HATTON: Morning. It's great to see so many folks participating and I'm really excited to be here. Are people able to see my screen?

MR. ROSALES: We can see it Julia, yeah.

MS. HATTON: Okay, great. And so I'm going to start by saying that I'm not specifically an electrification or building electrification expert. But what Rising Sun does do is focus on job training and workforce development, and community engagement in people. And I would encourage everyone, if they haven't already, to read through the report that Greenlining and Energy Efficiency ofr All (EEFA) put out last year on equitable building electrification and the framework there.

And something that really stood out for me from that particular report is that to really, you know, build equity into this conversation from the beginning, the goal that we should all hold is to focus on building the health and resilience of people and communities, rather than the goal of decarbonizing our building stocks. So that's not to say that, you know, obviously this conversation's about

decarbonizing the building stock, but starting with people first and their needs will lead to more equitable outcomes.

So I'm going to share a little bit about Rising Sun and what we do. I'll move my slides forward. Rising sun has a mission, we're nonprofit, to empower individuals to achieve economic and environmental sustainability for themselves and their communities.

I mentioned a little bit about our expertise earlier. We focus on equity and the idea that economic, environmental, and social opportunities should be accessible to everyone. We -- what we do on a day-to-day basis is workforce development, specifically for low-income adults and youth, and focusing on preparing them for careers in the clean economy and construction, the building trades, energy efficiency, and really making sure that those are high road opportunities that can lift people out of poverty. We do a lot of community outreach and engagement, focusing on hard to reach and hard to serve communities, and disadvantaged communities as well.

We have two primary programs that we run on a daily basis. Opportunity Build is a workforce development program that we've been operating since 2009. Opportunity Build is a pre-apprenticeship, so it prepares individuals for union apprenticeships and careers in the building trade specifically. Rising Sun's emphasis is to not just provide

that hands-on construction training in math and those harder, more technical skills, but really to provide a whole person approach that includes supportive services, case management, mental health support, substance abuse counseling, so that we're really offering a pathway out of poverty and working on barrier removal and things like that.

We offer one of the only all-women pre-apprenticeship training programs in the country. So we serve both men and women, but about 55 percent of our participants are women, and we have one cohort that's just for women, and we work a lot with the reentry population as well. Folks are coming home from having been incarcerated.

Our other program that's been running since 2000 is a social enterprise where we employ local youth to provide residential energy efficiency services to local communities. We do that in ten different counties throughout the Bay Area and Central Valley, and our objective there is give 150 young people their first green job or just their first job period every year. And then also simultaneously help over 3,000 residents save energy. All of the youth in our program come from low-income families, and the services we offer are free and are focused on underserved low-income and disadvantaged communities.

This is a picture of our women building the Bay cohort from last year. A lot of these women are now in the

sheet metal workers, carpenters union, and things like that. And this is a picture of one of our youth summer programs.

Rising Sun also engages in some policy work. Focus areas are job quality and job access for disadvantaged workers, equitable energy and climate program access in making sure that the benefits are distributed equitably, and ensuring that environment and social justice communities are prioritized in climate investments.

So for the purposes of this specific conversation, I'm going to talk about two things, job quality and taking that into consideration when thinking about decarbonization. And the second thing I'm going to talk about is community outreach and engagement.

There's a lot here and I'm happy to answer more questions about it, but these are the types of things on this slide that Rising Sun talks about when we get asked, what is a good job, right, and how do you ensure that jobs are quality jobs. We do focus a lot on the building trades and unions because all of these things are already built in, but there are also other high road employers and industries offering quality employment opportunities for disadvantaged workers and entry-level folks.

So the first thing here always is to start with equity -- equity in, equity out. We talk about family sustaining wages. We talk about employer provided benefits,

career pathways and advancement opportunities, workplace safety, worker voice. All of those things are the things we look for first when we're placing someone into a job after a training. The idea is to break the cycle of poverty, not put someone in a job that is just going to keep them in poverty. Historically, I think there's been some disconnect or some challenges with making sure that green jobs are quality jobs. And no one, you know, should have to choose between a good job and a clean job. So we're really interested in making sure that these opportunities are high road.

There are things that you can do to build in this kind of job quality. So setting hiring targets, so hiring a certain number of folks from low-income households, disadvantaged communities, focusing on workers who have barriers to employment. Funding, training, and supportive services, and case management is essential to making sure that these opportunities are accessible. Project Labor Agreements are another thing we talk a lot about, Community Benefit Agreements, Community Workforce Agreements, things that have labor standards and targeted and local hire language built in. And then you need accountability, right. So metrics in tracking are essential in these types of program design as well.

And I just have a bullet here, too, about a just transition rate. We need to make sure that we respect and,

you know, take care of existing fossil fuel workers and recognize that the wages offered in that industry have been historically much higher than those offered in the green -- green economy. So we need to make that competitive and we need to provide training and transition support. And we also have to support folks who have been historically excluded from those opportunities and help them get into these new clean economy jobs.

And then the next piece is community engagement. And I think, you know, the San Joaquin Valley pilots our good example of how this really works on the ground. But from Rising Sun's experience reaching out to residents for energy efficiency services, these are the types of things that we've tried to incorporate into our work to make sure that our programs are reaching the people that we want to, who need the services most, who are hit first and worst by climate change, and who bear a higher energy burden. Again, start with equity.

Participatory design and community-led decision making is essential. And I think particularly when you're talking about building decarbonization and electrification, it's important to consider community and individuals' rights to self-determination.

Trust is essential, so community-based organizations can provide that trust and partnership. ESJ is Environmental

and Social Justice Communities, so prioritizing those communities and targeting your outreach to those communities is crucial. In-language outreach and services is another way. And then it's really important to make it easy to participate, right. It's really, you know, we go into thousands of homes every year -- not this year, obviously -- and it's really remarkable how difficult it is to offer even a free service, right. So you have to make it as easy as possible for people to participate.

Offering programs and services that are no- and low-cost, minimizing the paperwork and documentation that's required, and then coordinating and leveraging other programs. There's a lot of confusion in the market about all these different programs and they don't always fit together nicely.

This is where you can find Rising Sun, our headquarters. We have a building in Oakland and an office in Stockton. We operate primarily in the nine Bay Area counties and San Joaquin County. And if anyone has any follow-up questions, this is where you can find us.

MR. ROSALES: Thank you, Julia. Is that the end of your presentation?

MS. HATTON: Yes.

MR. ROSALES: Great. Thank you. Thank you. And we really appreciate your points. I think they go to

Commissioner McAllister's remarks about the challenge in front of us for decarbonizing California's buildings across the state. Obviously, it's a large state. We got millions and millions of residential buildings to consider. Both existing, and new, and obviously a big portion of the state throughout the entire state -- throughout all of the counties are low-income -- there's going to be low-income barriers in every county.

So thank you for -- for sort of giving us insight in how difficult and some of the considerations we need to take when you're considering working with those communities.

We're going to go -- we're going to proceed with our third panelist.

Meghan, are you on the line? Can you hear me? I think you're muted. Can you unmute yourself? You're -- I don't think your audio is on yet. There you go. Now you need to get --

MS. DEWEY: Can you hear me?

MR. ROSALES: I can hear you. Yeah, you came on. Thank you.

MS. DEWEY: Okay. I called in from my phone because when I originally called in from my computer, I think there was an echo.

MR. ROSALES: Okay.

MS. DEWEY: Is there an echo now?

MR. ROSALES: A little bit, but it's okay.

MS. DEWEY: Oh, okay. I'm sorry, guys.

MR. ROSALES: It's okay.

MS. DEWEY: When I switched to my phone, I don't think it translated to my name. So I figured I would have technical difficulties.

So Eddie, I'm going to let you run my slides, so I don't mess that up.

MR. ROSALES: One second. Sure.

MS. DEWEY: If you don't mind.

MR. ROSALES: I don't mind.

MS. DEWEY: Thank you.

MR. ROSALES: Pulling them up. So let me -- let me introduce Meghan for the audience here.

So Meghan Dewey works at PG&E, has held numerous leadership positions focused on improving customer experience and meeting the demands of our -- of customers fast evolving energy.

Currently Meghan oversees PG&E's San Joaquin Valley disadvantaged community electrification pilots. In addition to leading the company's strategy and policy efforts for the Energy Savings and Assistance Program, ESAP, prior to this role, Meghan led PG&E's Energy Efficiency Program Portfolio and it is -- its EE Policy and Strategy -- and its EE Policy and Strategy and Issues. Excuse me.

Well good morning, Meghan. I will start slides. Let me --

MS. DEWEY: Thank you. While Eddie's getting those slides up, thanks again for having me. I'm really excited to be part of this esteemed panel. It will be a really interesting conversation.

And today I'm here to talk a little bit about both our -- I'll call our early adopters and market rate customers, as well as our -- some of the equity and low-income projects that we have going on. Really, and how our position has been formed over the last ten years by the research and studies and projects that we've supported to help us better understand the benefits of all-electric homes for all of our customers, as well as for our company.

MR. ROSALES: Hey, Meghan. This is Eddie. Can you see your slides?

MS. DEWEY: I cannot. Can anyone else?

MR. BARTHOLOMY: I'm not seeing the slides yet. Are you sharing your screen?

MS. DEWEY: Oh, I think it's starting. There we go. Okay. So you can move on to the next slide already.

So real quickly, as you all know, in July 2019, Berkeley became the first city in the nation to require that new buildings be built all-electric. And at that meeting, PG&E became the first dual-fuel utility in the nation to

support a local government's push towards all-electric new construction. So we're really proud of ourselves in that perspective.

Next slide.

So really since mid-2019, PG&E has stepped up our support for local jurisdictions pursuing Reach Codes and helping our customers and the state of California realize our climate and clean energy goals. And generally speaking, we certainly support our -- the decarbonization objectives, as we're talking about today.

And so while we continue to support, this move towards electrification, one of the things that we also are very conscious of is trying to avoid any new investments in our gas assets that might later be proved underutilized. And then we certainly want to ensure that we're mitigating cautious to those gas customers that remain.

But while our position on electrification may have seemed surprising or sudden to some, it really was a result of years, decades of experiences in demonstrating the feasibility and the cost effectiveness of all-electric new homes, and really those benefits to our customers.

Next slide.

So again, we've spent over a decade really studying this -- the opportunity that mostly electric and all-electric can offer our customers. And through these projects we've

really learned that all-electric homes can offer lower bills, certainly more -- better indoor air comfort, and better air quality for our customers and our communities.

And in particular, the DeYoung Property ZNE demonstration projects, this story is particularly compelling. This production builder embraced the idea of -- of mostly electric via ZNE early on. And they were really instrumental in showcasing that mostly all-electric was cost effective and feasible.

The focus now for us is to continue our support and research -- and research on what -- how do we really move to a truly all-electric home? And so part of this, we're testing and evaluating evolving high performance heat-pump technologies through a couple different venues, including our Central Valley Research Homes. Also at our Applied Technology Services, ATS, lab in San Ramon, among others. And so we think that these projects should really help us get to that next generation of all-electric homes.

Also, and this will be a feature of the conversation later today, multifamily buildings are really the next frontier for us. We see as large heat pump water heating systems emerge to support all-electric designs, we want to invest in performance testing at our lab that I mentioned and through other demonstrations including one at Davis actually, that focuses on load shifting.

Next slide.

So now we're pretty confident that builders are ready and willing to build all-electric. In fact, findings from my colleague's organization, the Building Decarbonation Coalition Stakeholder Assessment of All-electric Residential New Construction supports this. I believe that they found that 88 percent of builders are actually interested in building all-electric homes.

But much like my other colleague Aimee suggested, we're not fully there with customers yet. We funded, in 2018, an internal research project to explore our customer's perceptions with their electric and gas usage. And what we found were that -- was that generally our residential customers believed that electricity is safer and healthier, and it gives them actually more control over their energy use than gas. However, they're still really wedded to gas cooking and gas fireplaces. I don't think that's any surprise to any of us. You know, as sexy as induction cooking can, we sometimes think it is, most of them are not lured by that yet.

However, we did find that customers were less -- less resistant to how their water is heated and how their space is conditioned. And so I think that's promising, in particular, for some of that heat pump technology.

And so for us at PG&E, since we don't want to build

out mostly-electric homes if we're trying to avoid that new gas infrastructure, it's really in our best interest to figure out how to move our customers towards these all-electric choices for new construction. And I know SMUD, and SVCE (Silicon Valley Clean Energy), they've done some really great work in educating our customers on all-electric choices, in particular for induction cooking. And we of course have our ZNE demonstration home at the Stockton Training Center to help showcase all-electric opportunities for both our customers and builders.

I think we have more work to do. And my challenge for my behavioral scientist colleagues, I believe that Charlie Buck from Opower might be on the line. And if he is, he will remember my favorite thing to do is give people homework after workshops like this. And so my homework to you behavioral scientists and others out there is how do we get our customers to move towards these all-electric choices?

You know, if I reflect on the great work that Opower did from a behavioral perspective in energy efficiency with their home energy report, that almost revolutionized a lot of the things that we were doing in energy efficiency. And so again, my challenge is to you is how do you make that happen for our work here in decarbonization?

Next slide.

So now I'm going to transition to talking about two

real life examples that are helping us learn about the opportunities and challenges for electrification for our residential customers. So the first I'll focus on is our Advanced Energy Rebuild. And that is a new construction program that's focused on what I'll -- what I'll call our market rate customers. And then the second one is the San Juaquin Disadvantaged Communities Electrification Pilots. And that's a retrofit pilot or program that's focused on our low-income customers.

So first, Advanced Energy Rebuild. This was a program that we collaborated with Sonoma Clean Power and the Bay Area Air Quality Management District to create this program. And it was designed to help homeowners after the devastating 2017 wildfires rebuild new, more efficient homes focused on reducing their GHG emissions.

The program officially launched in 2018 and it layered funding from those three organizations. And it provided incentives for both dual fuel and all-electric. And so the customers that chose the all-electric path were offered an incentive of 12,500. And then those who chose the dual-fuel option were offered 750 -- I'm sorry, 7,500.

The great news is that those customers who were presented with a choice, as of April 2020, 30 percent chose the all-electric path in a community coffee park that was formerly dual fuel or is dual fuel.

I would say the more challenging news is that only 30 percent of those customers chose that all-electric path. And for us, why we think Advance Energy Rebuild really represents that great opportunity to test electrification, because we consider these more of early adopters, and we want to get these numbers up. We believe these are the customers that are going to be able to help us really understand how to overcome those incremental costs that are likely required with these types of upgrades.

You know, because some of these technologies are newer technologies, they may be more finicky and prone to needed repairs. And these early adopters are likely going to be able to afford the cost of any required repairs.

So again, my shout out to my colleagues, Charlie if you're listening, how do we get these customers more excited about that all-electric path? This program does run until the end of 2020 and, unfortunately because of COVID, we likely have some delays, but we do have a couple of months left, so let's -- let's get on it.

All right. Next slides.

So transitioning to the San Joaquin Valley Disadvantaged Community's Pilot. So this pilot was designed to test the economic feasibility of replacing alternative fuels, propane and wood, appliances with all-electric appliances. And so I'm going to focus on the pilots in

PG&E's territory. PG&E, there's eight communities that we're going to serve. PG&E is the administrator for three, and then RHA is our administrator for the other five.

And so, as of today, the pilot seeks to retrofit just 1,260 homes. So not that many, but a really good sample size for us to test how we will -- how we can move forward from an equity perspective, this idea of decarb and electrification for -- for lower income customers.

So like many of our programs, there's been slight delays because of COVID. The outreach for this program in customer acquisition was supposed to start in April so of course with face-to-face communications, but we've had to pivot a little bit and so our Community Energy Navigator, as we call them, our CVO, is now pivoting to virtual outreach. And so they started that in May. So we do actually have a couple of applications in the pipeline. So that's exciting for us to be able to start. Once the shelter-in-places are lifted, we'll be able to start the home assessments and get these installations happening.

So while we don't have a lot of lessons learned yet from the pilot, we do have three preinstall learnings that I think are really important for this conversation. And so as Julia mentioned, for these kinds of communities, in particular communities that have been disenfranchised for many, many years, that idea of trust is critical. And so we

believe that bringing in a CVO or a group of CVOs who had these relationships with the customers were really the right tool to help us best engage these customers and ensure robust participation.

Secondly, service planning upgrades. As electrification adds loads, we are going to likely have to manage our infrastructure upgrades. And in some cases, this really could add additional cost to whole building electrification. Particularly costs associated with to the meter and behind-the-meter, and who pays for what. These are some of the challenges that we'll have to figure out as we move forward and scale these types of opportunities.

Household remediation could be a really big barrier to installations. And I recall, I believe Aimee was talking about in one of their incentive programs, they've added additional funds for the electrical panel upgrades. So that's also included in San Joaquin. The great news is that for us, that's actually included in the implementation budget. We do have a separate budget for remediation, but it's pretty limited to -- it is $5,000 per home. And it's limited to primarily what's needed for safety perspective and to be able to operate the appliances. But our hypothesis is that we likely are going to need, or the customers are going to need more remediation to really effectively operate these appliances. And today we don't have the funds to cover

those. And so that's the question of where do we get these additional funds to ensure that that customer has a really good experience with the all-electric choices they're making.

And then last but not least, you know, I think the question for these -- this, the low-income sector is, while we don't want to leave them behind, there still I think are questions around the costs of these technologies if they should break. And will these customers be able to cover any costs associated with needed repairs, you know, five years down the road when we're gone.

So those are the things that we're really interested in learning more about. And this is why this pilot, on so many levels, is very exciting for all of us as we continue to learn and understand, how do we electrify our disadvantaged communities and our low-income customers and communities?

Next slide. Doesn't really matter, it's just the ending slide.

I really appreciate being part of this conversation. We are thrilled to be part of the solution and we're really looking forward to all the learnings we learn through our pilots and our -- their demonstration projects and continuing this conversation with all of our colleagues.

So thank you very much.

MR. ROSALES: Thank you, Meghan. That was a really good presentation.

I think you were hitting on some really important points and we might come back to those in the Q&A session. In terms of just implementation, especially direct implementation with a community that have had long standing barriers, especially economic barriers. So thank you for sharing those insights with us.

I'm going to transition now, if that's okay, to Panama. Can you hear me?

MR. BARTHOLOMY: I can.

MR. ROSALES: Can you give me a thumbs up?

MR. BARTHOLOMY: Yep.

MR. ROSALES: There it is. All right.

Okay. Panama Bartholomy is our fourth panelist presenter. Panama is the Director of the Building Decarbonization Coalition, in multisector forum advocating for and creating solutions for our pollution intensive building stock. Very true.

Previously Panama was a European director of the Investor Confidence Project where he worked to unlock capital markets for energy efficiency project development. Panama was the advisor on Energy and Natural Resources to California Assembly Speaker John A. Perez. He has served as deputy director for the CEC Efficiency and Renewables Division, and advisor -- an advisor for Chairwoman Douglas. And, you're going to have to help me with that last name, Pfannenstiel?

MR. BARTHOLOMY: Pfannenstiel. Yep. That's love.

MR. ROSALES: He has -- he has worked for the California Conservation Corps on vocational environment -- environmental education and ran the sustainable schools program for the Division of the State Architects.

Panama served on the City of Sacramento Planning Commission, and the County of Sacramento Environmental Commission, and is a former board member on the U.S. Green Building Council, USGBC, and past president of the Northern California Chapter of the USGBC. He has worked on climate solutions in over 30 countries. Presented at, and collaborated on products from the United States, from the United Nations, the International Energy Agency, and the European Commission.

Wow. Thank you, Panama. Thank you for joining us today.

With that, I will turn over the dais to you, if you want to start your slides. There you are.

MR. BARTHOLOMY: Wonderful. Thank you. Am I required to say, can you hear me?

It is great to be back at the Energy Commission. Thank you so much for having us on this panel and for putting on this workshop. I'm very excited. Great panelists led up to this, and I'm really excited for the rest of the day as

well.

You know, the pandemic and our remote presentations now, I think there's a lot of downsize from the loss connection of in-person presentations and dialog, but I will say, it's allowing me to fulfill a lot of my dreams of, you know, finally being able to give presentations in jorts. So I'm real excited to be here and thank you for having the Coalition.

The Coalition, just briefly, is a cross sector collaborative of energy providers, utilities and CCAs, manufacturers of heating equipment, the design and construction community, local governments and nonprofits. And we are all working together in order to be able to eliminate emissions from the built environment by 2045, or sooner, through policy and market mechanisms.

We released a roadmap for California's buildings in January of 2019 that laid out in only 16 pages how we thought California should move forward in a way that could lead towards the total decarbonization on this building stock. And in there we put a series of numerical targets that we think California's going to need to meet in order to be able to achieve this. And this -- by eliminating emissions by 2045, it is right in line with the same path that we get out of AB 3232 of 40 percent below 1990 levels by 2030. And so you can see that we also took AB 3232 targets and put it into

our numerical targets there under the retrofits.

So we called for new buildings to meet a zero-emissions building code for residential buildings by 2025, if not sooner. And commercial by 2028. And then the implementation of policies that lead toward the overall reduction of greenhouse gas emissions from the built environment, so that we're stepping down. And then by 2045 or sooner, we're at zero emissions.

Complicit in that is going to be the success of sales of the critical technologies behind electrification, in particular, heat pumps. And so we called for a specific market share. Market share targets for heat pump water heaters and heat pumps for space conditioning as well, in order to be able to allow us to meet these numerical targets above it.

Underneath those numerical targets, we also identified five major principles that are going to have to be realized if we're going to have a chance of meeting those targets and decarbonizing our building stock. And as we are looking at policies, and the policy mix to be including in the AB 3232, and as we look at policy implementation at the Energy Commission and other Commissions, we feel like these five need to be underpinning our policy development. Because if we don't have any one of these, our policies will not be successful. It is only through the incorporation of all of

these that we're actually going to be able to one, decarbonize. Or two, come anywhere close to doing it at the speed at which we're trying to do it.

And so just briefly, the first goal is on awareness. You've heard a lot from the panelists before me about the need to raise awareness from both customers and installers, but also policymakers about the benefits of building electrification. The many benefits.

Customers need to receive a good value from adopting building decarbonization measures. If they're paying more on a monthly basis than they were when they were when they had the high carbon household or building, this is just not going to work. It will collapse under its own weight. And so through a combination of incentives, electrification rate reform, and financing programs, we need to make sure we're providing a good value for customers.

Third, the building decarbonization needs to provide the better value proposition to contractors and builders. Contractors and builders can't make less money building all-electric than they do building with gas. And so we need to be going through code based incentives, streamlining, and financial incentives to make sure that we are transitioning in a way we're allowing people to actually run viable businesses, and building up the types of markets that we want in California to allow them to make more money doing the

things that we want them to be doing instead of less.

And Goal Number 4 is making sure the supply chain is robust and we've gotten barriers out of the way. And so a big part of this is -- falls on policymakers of California to send a really clear message to the manufacturing community of this is where California is going, unequivocally, and here is the schedule and what it looks like, so then our supply chains can start to get ramped up and ready for it. And then we need get the barriers out of the way of the supply chains, like electrical panels.

And then lastly, we need to align our policies. We're not going to meet our climate goals or our clean energy goals if we're continuing to lay new fossil fuel infrastructure and relying upon it. And so we need to make sure that our -- our housing goals, our school construction goals are aligned with our climate goals and our clean air goals. And we're not using any of our policies out of alignment with the other ones. So those five major principles we'll need underpin any policy approaches.

So just quickly, going through new builds and retrofits. A new build, you know the issue here isn't so much one of cost. The California Building Industry Association, with Navigant, put out a report in 2018 looking at the impacts of residential appliance electrification. And just a couple, I think pertinent quotes coming from that

study up there on the screen is that electric appliances have a similar or lower cost than natural gas appliances for new construction. You know, usually the big discrepancy is Heat pump water heaters compared to a gas storage water heater, but for much of new build in California for single-family, we're using on demand. So it's a higher cost. It's the same or even higher than a heat pump water heater.

And then second, the total installed cost increase for electric appliances for a new single-family home, this report says that it'll add about 185 to 418 dollars for a new single-family home. And that this report did not include all of the savings from not putting in the gas infrastructure to the building, in the building, in the venting to get the pollutants out of the building.

And so a clear message from California's Building Industry Association that building all-electric many times can be cheaper once you're bringing in all those -- all those cost savings and the appliances are basically same. So the cost isn't so much the issue, although I don't want to minimize the fact that builders that are making the transition from historically building with gas, will have this transition period of needing to figure out how we're going to go -- be going all-electric into the future. And we need to be working with the building industry to really understand their concerns and to be able to help them

overcome it. So programs like Build are going to be critical in these early years to help do that.

And so one of the efforts along those lines that we did is we interviewed a series of home -- home builders across California in a all-electric residential new construction needs assessment. And we interviewed just under 30 builders and energy consultants. Building a market rate affordable multifamily, single, custom production, and all over California we interviewed some of these folks. And so definitely not a representative sample, but I think the answers we got were very representative.

You know, two-thirds of the builders that we interviewed had never built an electric home. And largely what they said is what you heard some of the other panelists say was, you know, cooking was the biggest problem, and this perception of how bad electric cooking is, and what are we going to do about it. And then a lack of familiarity with heat pump technology.

And what -- as Meghan mentioned, what came out of this was that upwards of 90 percent of builders we interviewed are very interested in building all-electric. But what they said is, you know, a lot of the barriers that we see to electric are perception issues. And we builders can't be responsible for changing the perception of people about what an all-electric cooking, in particular, looks

like. And so the main recommendation coming out of this report from builders was a large-scale consumer education program, really touting the benefits of building electrification.

On existing buildings, really our opportunity is here at stock turnover. In between now and 2045 when we're trying to reach carbon neutrality, and we are all, each of us going to replace our water heater, you know, two to three times. And our -- whatever we use for space heating will probably replace it at least once, if not twice.

And so this is a critical moment we have where an investment is already going to be made by a landlord or by a homeowner and we need to be able to put in place the programs and create the environment so that they're making the kind of choices we want them to make rather than staying with fossil fuels.

And this is the biggest issue in this space is that you never think about your water heater or your furnace until it's broken, or until it's not working. And this emergency nature of these replacements creates a real problem for this transition over to renewable energy in using clean electricity.

And this is -- this played out in our needs assessment of installers and contractors across California where we interviewed HVAC installers and water heating

installers. And -- and it very much came up of, you know, why would a plumber want to learn something about building electrification and installing heat pump water heater when he can put in his normal water heater he's always put in and get several done in the day if he wanted to.

And so this issue of a value proposition for an installer is critical. We need to make sure that we're implementing policies and programs in such a way that the installer is making more money off of installing the heat pump water heater, or the heat pump, than they are off of the gas unit. Particularly in these early years in the ramp up of our policies.

The other big part in the emergency problem for -- for existing buildings is as was mentioned by Meghan, panel upgrades and wiring. Panel upgrades are anywhere from 2500 to 4,000 dollars to do a panel upgrade, and then you need to run wiring in order to get to the heat pump technology. And depending on the size of the house and location, that can be anywhere from 3000 -- 300 to 1,000 dollars.

And this is the picture of my old electrical panel. It took me five weeks in order to be able to coordinate with the utility, with the city and the electrification, and the electrical worker to be able to get this upgraded. And when your hot water heater is broken and you want water -- hot

water back that night, five weeks just won't cut it in order to be able to get a heat pump water heater in. And so we're going to need to find ways to be replacing this infrastructure in homes so that they're electrification ready by the time that a heat-pump water heater is going to be installed.

So I'll just finish up with some recommendations. For new construction, along the lines of aligning policy, we need to stop state funding for gas infrastructure expansion. It doesn't make any sense for us to be fighting to meet climate goals, and then funding the development of housing and state buildings that are now laying in gas infrastructure that will last for 60 to 80 years and make it harder for us to meet our goals.

We need to be putting in code compliance incentives to be able to help builders along this path and help them in their first couple developments to be able to learn how to do this and get an advantage from doing this. And providing technical support to them. As the builders ask, a large-scale consumer campaign. And then moving towards an emissions-based code that gives us the type of buildings we're going to need in order to be able to meet our goals.

On existing buildings, we fundamentally need to change the value proposition for electrification technologies. And we think this needs to be done through a

Clean Heat Initiative that is providing a long-term incentive for heat pump technology that is able to provide a lower cost at the point of sale at a retailer or at a distributer for an installer or a homeowner to be able to make that immediate choice of the electrification technology is cheaper than what I'm seeing with the gas technology right next to it. And then something similar for clean cooking as well. And then induction technology.

We're going to need to make a major investment in building electric infrastructure modernization. Southern California Edison has done some behind-the-meter investments in electric vehicle charging infrastructure and it could be a model for us looking forward. But we're going to have to deal with the issue of electrical panels for existing buildings. And then a large-scale consumer campaign.

And then just some cross-cutting issues. You know, the biggest danger of our successes is that everybody that can afford to electrify begins to electrify, and we leave behind those communities that don't have the capital resources to electrify. And they're the ones paying the increased gas bill from having to maintain the system. And so instead what we should be doing is really working with our low-income weatherization programs to turn them into low-income electrification programs and have these communities at the front end of our policies and transitions,

rather than the back end.

We have the most successful building decarbonization program in the country in California. The Low-Income Weatherization Program, or LIWP, and we struggle every year to fund it. And we need to be able to make, not only fund it, but fund it at a much higher degree than we ever have. The rate reform and financing are going to be critical. And then making sure we're getting the technology in and starting a long-term proceeding to get off of gas.

So I'll end here with these last three slides. This is also out of our roadmap and it shows the market share of sales for water heating technology. Natural gas in blue and the high efficiency heat pumps in gray. And it shows that, you know, with a 15-year -- 12- to 15-year lifespan for an average water heater. And we're trying to get to carbon neutrality by 2045. We need to basically be phasing out, as for the sale of natural gas water heaters by around 2030. That's a steep decline between now and 2030, ten years dramatic change within the marketplace.

But California has a history of doing this. You know, we have taken challenges like this and we apply ourselves, we've been able to make it happen. And the California Solar Initiative is a perfect example of that. We looked at a technology and we said we want to be able to have this just as standard within our homes across California. We

need to make the investments, not only the financial investments but also the regulatory investments to be able to streamline this to make it possible. And through the California Solar Initiative, we completely, with the Germans and the Japanese, completely transformed the solar industry, and were able to bring down costs to the point where last year the Energy Commission was able to make this a standard requirement of homes in California. We need a program of this scale and of this vision for electrification technology as well.

And then lastly, what my members who are manufacturers tell me constantly is, we need a clear message from California. You know, you guys are doing great work. California's going to be rolling out $450 million of electrification incentives over the next nine months, from utilities and CCAs. And so we're starting to show that we're serious about this. But the manufacturers, if they're going to be making the investment in the manufacturing infrastructure in order to be able to provide the supply chains we need, they tell us we need some certainty from California. And it's going to be outreach like this from Commissioner Randolph that talks about the long-term gas proceeding that she's leading. And articulating it in a very clear way that this is California preparing to shift away from natural gas. And we need you to start the conversations

and the proceedings that you're going to outline how we're going to do this in the most equitable and quick way as possible.

So thank you for having me. We look forward to participating the rest of the day and participating as you develop the report further.

MR. ROSALES: Thank you, Panama. That was a great presentation. So I want to thank you Panama for that presentation.

Meghan, Julia, Aimee, thank you all for your presentations.

We will now transition into the question and answer session. Let me pull up, before we do that, I need to pull up. Great.

So, Commissioner McAllister, if you can hear me, I'm going to give you and --

COMMISSIONER MCALISTER: I can. Can you guys hear me and without static?

MR. ROSALES: I can hear you. You want to give me the Zoom thumbs up, even though we're on WebEx?

COMMISSIONER MCALLISTER: Yeah. I mean, you should be able to see me and hear me.

MR. ROSALES: We got you. We can hear you. So I think the Chair -- I think the Chair has signed off, but I'm turning over the first opportunity for questions to the

Commissioner and the Chair, if he's still on the line, for our panelists.

COMMISSIONER MCALLISTER: I appreciate that, Eddie. Thanks a lot. And thanks for moderating.

Thanks to all the panelists. This was really content heavy, and I don't want to monopolize the questions so I'm going to do my best not to do that.

So I guess I have a question for Julia, and then a question for Meghan, and then maybe a question for everyone to comment a little more broadly. So, you know, I want to -- I always try to keep it real, right. I mean, we've all given some examples of activities out there that you're doing that really are interfacing with customers, users, different places and economic situations. You know, and I want to invite everyone, everyone listening, but certainly you on the panel who are really in this day to day, you know, help us understand what scale looks like in your reality.

I want to start with Julia. You know, you talked about the community engagement piece of it, which I completely agree with you. It's critical. You know, people have to have trust. They have to have a familiar face. There needs -- there's a certain amount of, you know, it can be relatively high touch. But it takes this community building, really, to build a foundation.

I was a Peace Corp volunteer, you know, back in the

day. A long time ago. And it really strikes me as a similar activity. You've really got to like start with the community and listen. What do they need? How can it be really completely focused on -- on them?

So that -- that's a great principle that I think we should keep central. That also costs resources, you know. That takes resources. Somebody has to be able to walk the neighborhood and talk to people and have coffee and, you know, all that sort of stuff to gain the kind of forward momentum to start an initiative like this.

So -- and so I guess, you know, if we sort of try to back up and look at it in a little more detached way. You know, each family, each house, each community, if you do the numbers and the math, and you're talking about upgrading existing homes, that's a lot of resources. It's a lot of money and it's got to come from somewhere. And so I'm going to invite you first, and then perhaps Meghan, you know, around the Silicon Valley Project to give us a, kind of a ballpark, or help us imagine what scale, you know, in millions of relatively low-income, disadvantaged communities, and residents. What it will take over the next 10, 15, 20 years to get us there?

MS. HATTON: Thank you for that question. And yeah, thank you for recognizing that the community outreach does require resources. I think one pitfall, or one shortcoming,

is sort of assuming that community-based organizations are already out in the community, and already talking to people and don't need to be funded to do that work. And that has led to underinvestment in things like marketing, education, outreach.

You know, when we do our outreach for our Residential Energy Efficiency Program, we're talking attendance at hundreds of events. We start in February for programs that we run in June. We typically will -- we'll typically have to touch about three times as many people that we're aiming to actually provide services to, to get to that number. So there's about a 30 -- there's about a 30 percent drop-off rate from developing these wait lists and things like that.

So it does cost money. Sometimes people ask us, you know, what's our secret sauce for reaching so many people? And the answer is that we put -- we put the time and the resources into people -- having people on the ground. You know, that being said, when Rising Sun provides say energy efficiency services in one community. Let's say we hire 20 people. Let's say we serve about 250 to 300 homes. You know, that's about $160,000 investment for providing residential energy efficiency services, and outreach, and things like that.

So, you know, you could scale that out and do some quick back of the envelope math on that. I can certainly get

you more details if that would be helpful.

COMMISSIONER MCALLISTER: Great. Well thanks a lot for that. And maybe, Meghan, if you could give us some perspective on the Silicon Valley stuff. I was really excited that, you know, you said that 1,200 homes or so isn't that much, and it's not in the grand scheme of things. But it's still I think more than previous efforts and enough to really teach us quite a bit.

And, you know, I -- I actually built myself an all-electric, net positive actually still house. And we've been living in it for about a year. And, you know, I can vouch for the quality just of the indoor air and just health impacts, just the quiet. All the, you know, many, many co-benefits that don't even have anything to do with energy necessarily. You never have to dust, you know, things like that. Just the air is clean.

MS. DEWEY: That's great.

COMMISSIONER MCALLISTER: And so, you know, that helped me learn a lot about what it would take to do this from scale. And there is an incremental cost. But I think, you know, working with the builders. And I think Panama talked about some of those issues that we can, and need to get down, and go to scale. On the low-income and the existing buildings really is where I'm most concerned.

MS. DEWEY: Yeah.

COMMISSIONER MCALLISTER: And so I'm super interested in that -- in that how -- that Silicon Valley pilot in particular, but the other efforts as well.

You know, we want to -- well maybe I'll just let you comment on that and just sort of, you know. Have you extrapolated the cost? Like, if you really wanted to target all of your customers that, you know, could help make the transition, you know. What does that add up to? And have you thought about -- I have a follow up question, but maybe I'll just let you get that one.

MS. DEWEY: Sure. Well just one note. It's the San Joaquin Valley, not Silicon Valley.

COMMISSIONER MCALLISTER: Oh, I'm sorry. I'm sorry. San Joaquin Valley. I'm sorry.

MS. DEWEY: That's okay.

COMMISSIONER MCALLISTER: That would -- yeah.

MS. DEWEY: So I'm sure that we have, before my time on this -- on this project, and I'll ask phone a friend in a minute. But just to set some context. So in (indiscernible) these territories, I mentioned, there's eight communities, with two administrators totaling 1260 homes. The budget for that, in total, is around $35 million. So that's our all-in budget. And so frankly, that's not a lot, right, for that many homes. So this will be an expensive endeavor to scale.

And I -- one of the goals as part of the San Joaquin

Pilot is for our CVOs and our Community Energy Navigators to help us identify other funding sources. Because they're also -- not only are they great at building that trust, they also have inroads into so many different organizations and opportunities. And they're -- and because of that trust they, I think -- I mean, my hypothesis again is that they will able -- be able to help us expand the reach of our dollars and get more dollars collaboratively to build out these low-income electrification types of programs.

COMMISSIONER MCALLISTER: And then in terms of, sort of the extrapolation, I mean there's, you know, Panama mentioned the OAR over the PUC that's going to look at the future of natural gas. And you know, you highlighted your efforts at PG&E to support local governments, you know, to move in this direction. So certainly applaud those efforts.

You know, if you do extrapolate what, you know, unwinding the -- the -- picking apart the natural gas sort of investment profile going forward across your territory and looking at the families that you'd have to assist. You know, it would be good, not necessarily right now at the top of your head but it'd be good to understand how, you know, what that capital requirement is going to be.

MS. DEWEY: Yeah.

COMMISSIONER MCALLISTER: And we've got to unpack that in terms of the business model, you know, really because

as we all agree, I think, we can't expect every customer, you know, certainly the ones that can't afford it, which are multiple, which are many. You know what, so learning from San Joaquin Valley and understanding the profile of what that has to look like locally is super important. But we have to extrapolate that across your service territory and for their -- for their field.

MS. DEWEY: Yeah. And, you know, I will add what I think will be interesting -- I mean, the San Joaquin, it's going to provide us so many insights, and I think lots of us are very excited about this because as we built these pilots, and budgets, and so forth, there were a lot of unknowns.

And one of the things I mentioned were the infrastructure costs that while we estimated them, we don't really know what they're going to be. And that'll be interesting across California to really understand to the meter and behind-the-meter, those kinds of infrastructure costs. Not just the panel upgrades, but what are all those, you know, wire upgrade costs going to be. And is there anything we can do proactively to get ready for that?

COMMISSIONER MCALLISTER: Okay, great.

MS. HATTON: Yeah, and if I might add, you know, I think -- I think leverage is essential. I think that, you know, economies of scale happen when you start building out from pilots. But I think it's also important to consider

what is the cost of not doing this work? And not just financially, right, but from a health perspective, from a social perspective. Those are things that I think really need to be quantified as well.

COMMISSIONER MCALLISTER: Yeah, there's some great work happening on the health quantification. I think we could actually engage on our RND front to help figure out how we would look at a sample, work with a healthcare provider, you know, a large HMO or something to really gather some data and figure that out. Because I think we would see -- maybe - -there's a way to, you know, use the sample from the San Joaquin Project to see what the health income, what the access to healthcare, you know, the provision of healthcare, the demand for healthcare services. Maybe looks like if that's a big enough number.

MS. HATTON: That's interesting.

COMMISSIONER MCALLISTER: Just an idea. I was wondering also on the San Joaquin Valley, is there any load flexibility component to this that PG&E is looking at implementing or putting alongside --

MS. HATTON: I know --

COMMISSIONER MCALLISTER: -- you know, the Dual electric load could be manipulatable and help with grid resources and those sorts of things?

MS. HATTON: It's very true. I don't believe that we

considered that as part of the pilot. But it is an excellent idea, especially as we thinking -- as we're thinking about scale.

COMMISSIONER MCALLISTER: Okay. So I would encourage that, and happy to interact further on that.

MS. HATTON: Yeah.

COMMISSIONER MCALLISTER: And then maybe this is for everybody, and obviously should, you know, Aimee and Panama feel free to comment on any of the above. But, you know, the idea of leverage and sort of combining resources to fund these retrofit efforts you know, at scale. You've mentioned bits and pieces of this in different ways. But what are, you know, so I think it's the low-income, disadvantaged communities, you know, I think it's difficult to expect lots of it to be self-funded. You know, not much probably.

So where does that capital come from? You know, how do we engage capital markets? How do we sort of make the -- make a case and create fertile territory so that others come in and plant the seeds and do the work?

MR. BARTHOLOMY: I'll start, Commissioner. Thank you for those questions.

I think my answer is also going to relate to your previous comments about costs for existing buildings. And so, you know, I mentioned in my presentation this opportunity we have at stock turnover, and the regularity of that stock

turnover, and the frequency of it. And so I think that, you know, when your water heater breaks, you're already going to have to buy a water heater. And you're going to -- you want that hot water back.

And what we need to be thinking about is through a combination of incentives and regulations, how do we make sure that the nonpolluting option is the cheaper and better option? The easier option for people.

And so I don't believe that even in low-income situations that the state has to bear the responsibility of the whole project costs of electrification technology. But if we want it at the scale and the speed that we want it at, we do need to be able to make that easier and cheaper than the -- than the gas costs. So I think that's going to be the programmatic approaches.

And the critical thing that installers and manufacturers tell us really is, it's at that point of sale. And they need to be able to go in and when they're looking at a water heater next to a heat pump water heater, see that the heat pump water heater is cheaper. And so that's why midstream and upstream rebate approaches are going to be critical for existing buildings.

MS. BAILEY: This is Aimee. I might just add a couple more things. I think one thing that we're very interested in, and this is from work, actually from Panama

and the Building Decarb Coalition is the opportunity for tariffed on-bill financing. And there are people on this workshop call that know more about it than I do, but in that case, the financing would be tied actually to the meter as opposed to the customer. And so you can overcome a lot of barriers as it relates to kind of credit worthiness of the occupant itself.

So that's something that we're very interested in and looking forward to the final report from the Building Decarb Coalition on their recommendations from that.

I think another thing that we've been discussing with different stakeholders including, you know, in various conversations with PG&E and others, like is there potentially some opportunity for the policy to kind of shift as it relates to how much of the cost PG&E is allowed to rate based, as opposed to the customer taking on this cost when there are distribution system upgrades.

So that might be another lever that could be used that could be especially impactful for low-income customers and multi -- multifamily dwelling properties.

COMMISSIONER MCALLISTER: Thanks for those comments.

I will cede the dais, and let's see, let Eddie and Jen take it back and see if there are other questions for our panelists.

MR. ROSALES: Thank you, Commissioner.

Thank you, Panelists, for those responses. They're all very insightful. I think those are all important components of, you know, really getting the building decarbonization momentum started in California. Talking about outreach. Talking about financing options, and talking about assessing the sector through the different equipment that's out there and how we can do that. So thanks for those -- for those responses.

So we are slightly a few minutes past time, but we are going to take some questions that have come over on the chat box from some of the participants.

So Brian, can you -- Brian or Dorothy if you are on the line, if you can help me read one question at a time, we'll try to reserve a few minutes for this. And then if they're directed to a panelist, please let the panelist know. Or if they're a general question, we'll figure out the best approach.

So Brian, Dorothy, can you help me out with that?

MR. SAMUELSON: Yes. This is Brian. I'm going to go up to the -- the first one. We've got a lot of information in chat, so I need to scroll up and find the first one.

Okay. Thank you for waiting. The first one is for Aimee Bailey. This comes from Philip Escondido.

Is the production of electric energy a barrier? And he also asks production of electric -- or mentions production

of electricity may not be considered clean.

MS. BAILEY: Yeah. Thanks very much for the question.

I think it's -- if by that question you're referring to do we anticipate there will be enough renewable energy to meet the increase in demand through electrification. The answer is yes. For SVCE in specific, given we're a fairly new organization, a new CCA, we've -- we're still in the process of building up our supply portfolio. We've signed a half a dozen power purchase agreements for new renewable projects that are currently being built. And we actually have an RFO out for more. So shopping for more.

And so it certainly takes time to build those projects and for them to come online. But the entire state is -- is definitely moving in the direction of an extremely clean grid. And, at least from the statewide studies that I've seen from like through the Pathways Project and other entities, there isn't necessarily concern about there being electricity supply constraints for high electrification scenarios.

I hope that answered the question.

MR. BARTHOLOMOY: And I would -- I would just add that just about two weeks ago, the Sierra Club released a national study looking at the benefits of electrification. And what they found is, they looked at different grid mixes

across the entire United States. And what they found is because of the inherent high efficiency of heat pump technology, sometimes three to four hundred times more efficient than the best natural gas alternative, is that even in those grid mixes, that a high fossil fuel mix, it was still better from a greenhouse gas perspective to go all-electric than to rely on gas.

Even those areas like West Virginia that still have a high coal mix, because heat pumps are just so efficient, it still made more sense to go with the heat pump rather than go with the gas alternative. I'll post a link to that study in the chat.

MR. ROSALES: And I got to say, this is Eddie again.

There's been -- there was questions about the docketing of Panama's presentation. That presentation will be docketed either today or early next week. So I just want to make sure folks know that. Some folks were asking about that. But all other presentations have been docketed onto the proceeding webpage.

Brian, do you got a second question?

MR. SAMUELSON: Well, yes. There's a lot of questions. I'll move onto the second one. All right. This one is

by -- from Eric Law.

So he says: Instead of upgrading panels to 200 amps,

could there be an option to add a battery with a home solar system to handle these peak energy needs?

Then he follows up by saying: If we start upgrading large numbers of old homes to the 200 amp service, it will require utilities to upgrade their infrastructure to support these larger services.

MR. ROSALES: That's a good question. Maybe Meghan and Panama, do you want to provide some insight to responses to that one, it deals with some of the infrastructure and the panels on the buildings?

MS. DEWEY: Well, I can agree with the former, or the latter part of his comment that yes, that's one of the things that we hope to learn from the San Joaquin pilots is what are these infrastructure costs going to be? Both for the utility as well as potentially for the customer.

Now in San Joaquin we're covering the cost of the customers, but as we scale, you know, that may have to change just because of the kinds of costs we may incur. I'm not technical enough to speak on the battery topic, but potentially one of my colleagues is.

MR. ROSALES: Thank you. Panama, do you want to speak to the panels on the building?

MR. BARTHOLOMY: Sure. Yeah. It's a perfect opportunity. In particular because if you take the federal tax credit for solar, you're able to get the -- you're able

to include the costs of the panel in the tax credit. So you get a, you know, near 30 percent buy down on the cost, as well as access to a whole bunch of different financing streams through solar companies.

And so the combination of even a little bit of solar and electrification from a cost perspective for consumers in California is just a no-brainer. So it's a perfect -- a perfect way to deal with an electrical panel problem in a really creative and beneficial way.

MR. ROSALES: Thank you. Maybe we'll take one more, a third and final question.

Brian, do you got one last question?

MR. SAMUELSON: Yes. This one is from Felicia Smith. This is a question for Aimee.

How many people have participated in the Workforce Development Program thus far, and what was the feedback from the participants?

MS. BAILEY: Yeah. Thank you very much for the question.

So for that particular program, it's currently being launched. And so it's in response to COVID. We had board approval at their April board meeting for the $10 million in funding, but we had just brought back details of this program to our board in the May board meeting. And so they just approved it like last week.

But we've been concurrently already working on launching it. The plan is to launch it in very early June. The level of participation that we're kind of budgeting for is around a couple thousand and we also have some contingency funds. And so I'll be able to give more information about how that program is received within a couple months.

But right now we've been working with labor, community colleges, a variety of different building decarb experts on the development of the curriculum and, you know, teeing up communication on enrollment for that. So we have -- we're pretty optimistic about how that will go.

Thanks.

MR. ROSALES: Thank you, Aimee.

Well I'm going to wrap up there. I want to remind everyone that's on the --

COMMISSIONER MCALLISTER: Eddie, can I -- this is Andrew McAllister. I just want to jump in.

I guess, is there any plan for dealing with questions that we were not able to get to that people have sent in? In terms of, you know, getting them into the docket maybe, or getting some responses or facilitating some responses to that?

MR. ROSALES: Yes. All of the above, Commissioner. So we -- one, the WebEx is being recorded. Second, the WebEx is being transcribed. Third, we have a public comments and

question session that's a little bit longer at the end of the Webinar today. So, obviously we're not going to be able to field all the questions during the panels, especially depending on the volume of questions and the time we got. But we will get to all the questions, much more of the questions and hopefully all of them by the end of the Webinar today.

COMMISSIONER MCALLISTER: Great. Hopefully all of them and if we don't get to all of them, I'd like at least register them for the record that people who are participating and sending in questions. And that way it'll start the threads at that point.

MR. ROSALES: Duly noted.

COMMISSIONER MCALLISTER: Thanks a lot.

MR. ROSALES: So I got to remind everyone of that again that we do have a reserved public comment and that's also not only for comments, but also for questions at 2:30 and we have 45 minutes reserved there. So we will go back to questions that we weren't able to field during the panels or questions that you have at the end of the day. We will try to address them.

Some of our panelists might not be around for the full day. Keep that in mind if there are questions that are for a specific panelist. So we will -- we will do our best to try to facilitate getting those questions and answers.

Those questions over to the panelists and getting answers and responses back to everyone.

So with that, I'm going to start closing this panel. Again Aimee, Julia, Meghan, Panama, thank you for your time. Thank you for sharing your expertise and your program experience with everyone here today. Your comments and your insights are now part of the Building Decarbonization record and it's going to be very helpful to this assessment. So again, I really appreciate that.

Jennifer, if you are on the line, you -- we can pick up from here and then transition to the next panel.

Jennifer, you might be on mute. So I want to just queue up Jennifer and Tiffany, and the panelists for the Multifamily Building Sector Panel.

MS. NELSON: Great. Thank you. Thank you, Eddie.

I want to reiterate what Heriberto said. We did have a number of chat comments. We are unable to get to them right now, but we do have a public comment period later this afternoon. I encourage people who were not able to have their question asked to re-ask it at that time.

And with that, I will pass it over to Tiffany Mateo who will be moderating the next panel on Multifamily Buildings.

MS. MATEO: Hi. Good morning. I want to do a sound check. Can you all hear me?

MS. NELSON: Yes.

MS. MATEO: Okay. Hi. My name is Tiffany Mateo and I am part of the Benchmark and Equity Unit in the Efficiency Division at the California Energy Commission. I work with Eddie and Jen.

Today I'm pleased to be moderating the Multifamily Building Sector Panel. We have three panelists joining us today with experience in building decarbonization programs in the Multifamily Building Sector.

Srinidhi Sampath Kumar from the California Housing Partnership. Katie Wu from Gridworks. And Leah Pertl from the Sacramento Municipal Utility District, or SMUD.

So we'll hear presentations that were prepared by the panelists. I'll do a quick introduction on each of them before they do their presentation.

Srinidhi Sampath Kumar is a sustainable housing policy and program manager at the California Housing Partnership. She joined the California Housing Partnership in 2018. As a sustainable housing policy and program manager, she leads policy initiatives and helps design and implement clean energy programs that impact low-income Californians by engaging with affordable housing property owners and community-based organizations.

Along with Coalition partners, she advocates for equitable energy efficiency and building decarbonization

policies that will decrease the (indiscernible) incentive and improve resident health and comfort. She leads the partnership Green Rental Homes Energy Efficiency Network, or GREEN, comprising of affordable housing developers across California.

Prior to joining the partnership, Srinidhi worked with Marin Clean Energy in San Rafael, where she spearheaded the design, launch, and implementation of the Low-income Families and Tenants, or LIFT, pilot program. Srinidhi received her masters of City Planning from the University of California, Berkeley.

So now I'll pull up the slides for the presentation.

MS. KUMAR: Hi everyone. Thanks for the introduction, Tiffany.

I want to thank CEC for the opportunity to share some of our findings on this topic. I also wanted to thank this morning's panel, which was really exceptional, and I'll be acquiring some of those recommendations that were shared before.

Before I start, I want to quickly introduce the California Housing Partnership. We are a nonprofit with our mission to create and preserve affordable and sustainable homes for Californians with low incomes by providing financial and policy solutions to nonprofit and public partners. We also help implement the solar and multifamily

affordable housing, and Multifamily Low-income Weatherization Program, and are part of the California Energy Efficiency for All Coalition.

Next slide.

I want to start by providing a really high-level landscape of the district of Multifamily Affordable Housing in California. We do a lot of data research in our organization. And most of what I'm presenting today are from those data.

On the new construction side we need about 1.3 million affordable rental homes to meet pre-COVID-19 demand. And those figures we think will be increasing over the year.

Here in this slide we have data from our Affordable Housing Preservation database. Over 30,000 affordable rental homes are at risk of converting to market trade in the next ten years. Of these, about 9,000 homes, almost 28 percent are at risk of converting to market trade in the next year. And on the left we can see the historic loss of affordable rental homes by ownership type between '97 and 2019.

And in the graph, you can see that there is HUD and LIHTC. HUD is Housing and Urban Development, and LIHTC is the Low-Income Housing Tax Credit. And that's one of the significant source of funding for California rental homes.

We also did an analysis of the pandemic triggered reduction in tenant rent payments. And affects companies for

months without any address by the federal or state government. It will likely push around 3,500 developments into insolvency.

Next slide.

State tax credits go really quickly. Only about 40 properties get constructed every year, so production's already really low. And in this graph, we did an analysis and we saw that the Low-Income Housing Tax Credit production and preservation in California has declined by about 13 percent overall from 2016. And this is largely due to federal tax reforms.

The reason why this is really important is because these properties are subject to the highest form of regulation with severe protection on rent, rent increases and evictions. And so whenever we're planning for programs, it's easier to implement several of these in the address for affordable housing and seeing how that goes without severe rent restrictions.

On the preservation side alone, if done right, building decarbonization presents an exceptional opportunity to preserve this vast talk of affordable housing, lower operating expenses and also providing healthier and more sustainable housing for residents.

Next slide.

I wanted to share this quote which is actually from

an architect. So it was shared to the architect from a developer. And it says, I literally have no additional funds to improve energy efficiency or even to buy the solar equipment we show now. So if this results in any additional cost at all, it's not achievable. I'm sorry, but the focus of this project is 100 percent on first cost. And I really do not have the time or the bandwidth to try to change the funder's focus on first cost to savings over time.

This is on new construction, but this largely sums up most of the challenges that we've heard from developers and the other stakeholders. I will go into some of them a little more detail and offer some recommendations that could help potentially overcome them.

Next slide.

So the first challenge we're seeing is just around the developer's size and experience. Developer size influences their staff capacity, their experience navigating programs. Large developers usually have a more dedicated staff working on sustainability programs. So they have the staff who can navigate all these different programs. Coordinate with the timing and really just property manage the whole thing.

And they also have portfolio wide sustainability initiative. So around like zero net energy, zero net carbon goals come usually from those initiatives.

Next, it is easier to have a ZNE goal that is feasible for a low-rise property, than from a developer high-rise building. And this is something we've seen through data analysis. Like a lot of reports have shown this.

The next one is also largely true for new construction. Where developers with property more than one jurisdiction need to get -- navigate all these different requirements. There are so many new reach codes. That's really great, but these developers will have city -- projects in different cities need to navigate each of those reach codes, which are really different now. And they really do not have the assistance to help them navigate this.

Maintenance staff are also very new to this technology and have little to no experience managing these equipment. Often these decisions about going zero net energy or zero net carbon are made by the development team. It is almost twice removed from the actual property management staff who are maintaining these equipment and when something goes wrong or when a resident complains, they are the ones who actually need to troubleshoot the issue on the ground.

So often small developers hire third-party companies to manage their properties. So again, these staff -- these staff are also not really trained in maintaining these equipment. So when they're thinking about building decarbonization, just transition and work with staff

development, this is often a sector that's overlooked. And so there needs to be some priority in training these staff.

Again, this was highlighted before, but there are not many contractors who are familiar with this technology. From the housing side, some programs also have really strict bidding requirements so they may have to go after multiple bidding requirements. And sometimes they're just not able to produce that many bids.

The decision to decarbonize need to -- needs to be made very early and often designers and engineers are unwilling to move forward with this and are simply (indiscernible). Some engineers are also worried about the impact of tax credit timelines. And this is something that's come up before where the developers want to go ahead and do zero net energy work in the property but really are finding it hard pressed to convince their engineers. So developers sometimes need to pay a premium to hire third-party consultants who could then help the rest of the team to pursue this goal, which again, pushes up their project cost.

This was mentioned before, and I wonder (indiscernible) is just early adopters pay a premium and they're taking significant risk in terms of getting a team together and having these new systems involved -- sorry, installed. Most of these systems have not been on the market and so they do not really have a history. And all developers

are almost on a trial and error phase with this.

Next slide.

MR. ROSALES: Hi, this is Eddie.

Srinidhi, I just want to do a slide check. Are we -- can you see the slide? Are we on the right slide? We had comments that we might be behind on one slide.

MS. KUMAR: Yeah. This is the right -- yeah, this is the right slide.

MR. ROSALES: Okay. Thank you.

MS. KUMAR: Just continuing on the equipment challenges. Many developers highlight central domestic hot water and laundry systems as some of their biggest challenges when it comes to fuel switching. Although more recently most issues we are hearing about are associated with central domestic hot water heaters.

Resiliency. I know this came up in the morning again. And the conversation about storage really spurred after last year's public safety power shutoff. And it's really looming large with this fire season, which may actually coincide with this pandemic. Many affordable homes houses seniors, so the need for battery storage has been a huge concern. However, the cost associated with these systems have also been really significant. These are critical investments that are largely averted because they remain cost prohibitive. But also there's lesser technical

know-how. But just lack of physical space in terms of addressing this.

There are also issues around system sizing. And one thing that's often talked about in this context is also the cost of infrastructure updates and transformer upsizing. And, yeah, this is something most programs need to address as well. And one thing that hasn't really come up is that affordable housing developers who are trying to fuel switch existing properties still (indiscernible) and backup gas equipment. And that's mainly because of cost of having a backup electric equipment. And that's something most funding programs need to address as well. So what happens to backup equipment, and what -- how do we really think about that when we're talking about fuel switching existing buildings.

Next slide.

So on the recommendation side, I know this has come up several times, and this has been raised by many, and we really appreciate the CEC working on the issue of updating their modeling software. But I do want to provide more context as to why this is really relevant. Several housing programs like the Tax Credit Allocation Committee and the California Debt Limit Allocation Committee reward going a certain percent above Title 24, as a means to make their applications more competitive. So we've been hearing from a few developers who are trying to comply with this but are

finding it to be a real challenge. Many developers are also needing to pay a consultant to help them find workarounds and that, again, adds to their project cost.

This leads me to my next point on having CEC and many of these housing agencies coordinate so that these challenges could be addressed at a higher level, therefore not really impacting the developers who are actually trying to fuel switch. We are planning an Affordable Housing Decarbonization convening this fall, and one of our goals is to bring these agencies together through that convening. Since we're also seeing a stronger relationship between building decarbonization and positive health outcomes, there is -- there is a need to be really creative about this and tap into the sources of health agencies.

And I want to highlight MCA's LIFT pilot here because we were previously offering some health initiatives through the Green and Healthy Homes Initiative that addressed issues like mold in the property. And I know currently they're working with the County of Contra Costa Health Department to see how they can target a small prevention, and really target those households to prioritize energy efficiency investments.

On the funding side, there definitely needs to be more reliable and stable funding for programs that actually has a (indiscernible) for reducing GHG emissions. The existing Multifamily Loan Carbonization Program has provided

over 12,000 loans to renter households with comprehensive energy upgrades and has reduced bills by 30 percent on average. 68 percent of live or multifamily participants also received heat pumps. But the program currently has a wait list of 18,000 households and all of them are in disadvantaged communities.

Some existing and new programs that are being designed or developed should also have explicit (indiscernible) for affordable housing developments. We're already hearing from developers about how they have not been able to tap into the dollars provided by the (indiscernible) incentive program and will be talking that closely to see how that's been missed out.

I also wanted to highlight what Julia had mentioned this morning on community engagement and successful program implementation. It's really important to offer streamlined programs that are easy to access and to be able to participate in. We've highlighted upfront payments as a strategy that could spur these projects, even before the pandemic. And be happy to see CCAs likes some of our clean power, early integrate this into their program design framework.

The last two, I want to find out -- I understand there are several cost analyses studies that have already been conducted. But we'd specifically like pilot and

decarbonization for the sector in both new and existing buildings to really analyze what the real cost caps are. Because right now we are seeing multiple data points, both from the developer sites, and it's few and far between. Not many developers are actually doing -- have the data to show any lifecycle cost. But a lot of developers are interested in seeing that data for themselves to make those decisions. So there needs to be a mechanism for also cost information to be shared between developers.

And the last one. This was specifically proposed as part of the L.A. City decarbonization ordinance where affordable housing -- where they realized that affordable housing financing situation is really unique. So studying lifecycle costs associated with the sector will really help understand the feasibility.

Next slide.

Panama spoke in length about the need for consumer education and creating value proposition, and I really cannot stress the need for it enough. I want to focus on two of these.

One is the technical assistance to affordable housing providers to be decarb ready. This is something that the East Bay Clean Energy is offering along with the Association of Energy Affordability, and that's a really good model that we can all expand upon.

The other one is lender training. Lenders are really crucial to any affordable housing development and have a significant role to play in project development. Most lenders are either unaware or new to the technology so helping lenders really understand cost to savings over time is a very crucial part of this training and moving into building decarbonization strategies.

So I want to close up by saying just this pandemic has really exposed a lot of inequities. There is a lot of pressure on affordable housing developers to match cost. And there is definitely a stronger need to protect resident from unintended cost burdens. Building decarbonization policies must really empower affordable housing residents and providers. There's a need for more funding, flexibility, and a phased approach without compromising the end goal of decarbonizing affordable homes.

I want to quote Chair Hochschild and Julia Hatton put it this morning. It's important to ensure that low-income homes are healthy and comfortable now more than ever. And we need to start that work by putting people first through this process.

Thank you.

MS. MATEO: Okay. Thank you.

Next up we have Katie Wu who's the director of Gridworks.

Katie's experience of building decarbonization is rooted in a past life as an energy efficiency analyst and supervisor at the CPUC where she oversaw the development of energy efficiency savings value. Since joining Gridworks in 2018, Katie has collaborated with stakeholders to better understand the policy, technical, and market context for building decarbonization.

She worked at the Building Decarbonization Coalition. The research agenda to help guide - oh, I'm sorry. Katie facilitated the development of a roadmap to decarbonize California buildings. Her research agenda to help guide building decarbonization RND, and the Decoding Grid Integrated Buildings Report which helped to frame the potential impact of building decarbonization on local infrastructure.

Thank you, Katie.

MS. WU: Thanks very much for the introduction, Tiffany. I do just want to check that everyone can hear me okay.

MS. MATEO: Yes.

MS. WU: Okay. Great.

Thank you to the CEC and to all the panelists today for having me here. It's my pleasure to be presenting on technical challenges of decarbonization retrofits in multifamily buildings.

A little bit about Gridworks. Our mission is to convene, educate, and empower stakeholders working to decarbonize electricity grids. And we do that in four ways. First, by identifying high-value challenges to decarbonization. Second, by convening stakeholders in a neutral space and facilitating conversations to identify solutions. We then publish those solutions, and in some case support the implementation. And following those publications and successful solutions, we adapt those solutions to new markets.

And we're doing a lot of work in California. There are a few snapshots of some publications that we've done in partnerships with the Building Decarbonization Coalition, as well as Silicon Valley Clean Energy. We're also working in Oregon, Hawaii, and Colorado on these pressing issues.

Just a quick overview of who we are. Some of these faces may look familiar to everyone. We're led by Matthew Tisdale is our executive director, supported by senior fellows Mike Florio and Eric Martinot. Randy Sandoval is our new fellow out in Colorado. And Deborah Shields, our director of Operations and Communications. We have great project managers in Mac Roche and Rehana Aziz. And we're supported by Hector Tavera as a distribution grid analyst.

So the challenges for decarbonizing multifamily buildings have been touched on by a lot of the presenters

today so I'll try not to be too repetitive here. But I think given the number of stakeholders in multifamily buildings, there is greater complexity.

Srinidhi touched on some of the challenges for tenants, including lack of control over appliances. Uncertain bill impacts if you may not be on the most economic electricity rate. And potential for displacement from a retrofitted unit. If a property manager or a landlord does invest in upgrading a multifamily unit, there's potential that the rent will then increase and tenants may be displaced as a result.

For property managers, though, there is a lack of monetary benefit to decarbonize if they're not the ones paying the electric bills. So that balance of how to encourage decarbonization but also make it worthwhile for those property managers is a challenge for all of us to be considerate of.

As Srinidhi mentioned, there's a lack of high-demand, high-capacity dryers for shared laundry rooms. And decarbonization retrofits are complex projects. They require contractors to be in common spaces and in units. They can take a while to implement and become disruptive for both the property managers and the tenants. And as Sirindhi touched on, property managers have a wide variety of responsibilities so it can be really challenging to take on a complex project

in that space.

For contractors, each project is unique. Each multifamily building is different and so there's a lack of a simple, repeatable, retrofit project that contractors can implement to help support those high road jobs that Julia and others have talked about.

And as Panama talked about, the lack of availability of appliances in the marketplace can make it challenging as well. If someone is in an emergency replacement but they need to wait a couple of weeks in order to get the right equipment, it may be easier to go with incumbent technologies. So certainly shoring up the supply chain is critical to decarbonization.

And the last challenge that I'll mention and the one that my recommendations primarily focus on is this issue of impacts to electrical infrastructure and the grid, which several panelists had brought up this morning. The capacity and energy demand increases that can result if decarbonization is pursued through electrification can have a significant impact on, not just electrical panels but also transformers connecting the building and distribution system infrastructure in the area.

This figure is from a paper that Gridworks published in partnership with the Building Decarbonization Coalition on decoding grid integrated buildings. In the literature review

in preparing for that paper, I found that there is not a lot of research on multifamily buildings, and the panel conditions in those buildings. So we do identify that as a priority research need.

But there are some lessons learned from single-family buildings that we can apply to multifamily as well. Primarily that in older buildings that have not been retrofitted, it's more likely that a panel will need to be updated to accommodate increases in demand. Even if a panel has been upgraded, there may not be adequate capacity to accommodate electrification if that wasn't planned for in the initial panel upgrade. And even if the panel has adequate capacity and enough breaker space to accommodate electrification and solar, wiring within the building may need to be upgraded as well to serve those end uses. So there are a number of issues related to panels, and of course this feeds into impacts to transformers and distribution system as well.

So on to the recommendations. As Commissioner McAllister mentioned this morning, there are a number of policy areas and programs that overlap with decarbonization. And so there's a real opportunity to leverage existing programs, as well as new funding for pilots and incentives to make multifamily buildings electric ready. Along the lines of the Future Fit Program the SPEC is running to provide low

emissions and low amperage appliances to multifamily buildings.

Commissioner McAllister touched on these this morning, but the CEC is overseeing the Build Pilot as part of SB 1477 implementation. The CPUC's Energy Savings and Assistance program recognizes health, comfort, and safety benefits. And that may be able to be leveraged to incentivize fuel switching in multifamily buildings.

And the CPUC's Solar on Multifamily Affordable Housing Program has an opportunity to ensure that panels are the right size to accommodate potential future electrification as they're installing solar on multifamily buildings.

Several panelists have mentioned the need for customer support. And this recommendation is rooted in developing a customer centric platform to support building decarbonization. A one stop shop that customers can come to identify their project possibilities, better understand costs of this projects, potentially link them up with contractors as well.

The CEC and CPUC both have responsibilities in this area where the CEC can, through AB 3232, implementation develop that customer facing project guidance platform in consultation with contractors and labor representatives. And both agencies should be consulting with housing organizations

to better understand tenants' needs, and property managers' capabilities to install building decarbonization end uses. Srinidhi spoke to this as well, and I can't emphasize enough how partnerships are really going to be key to reaching our decarbonization goals.

And we talked a little bit about load management as well. The CEC does have its load management rulemaking, which may be able to consider use cases for multifamily buildings in leveraging those with grid integrated resources and implementing load management strategies to smooth the demand on the grid.

And the CEC and CPUC, in collaboration with stakeholders, should study and assign quantitative value to the reliability of virtual power plants to manage load. Gridworks does have a couple of publications on this in partnership with Silicon Valley Clean Energy. We developed an options analysis for virtual power plants which range from time of use rates to load shift product offerings. The CPUC has also had a working group on load shift which developed some options for how load can be managed from grid integrated buildings and technologies.

And recently, Gridworks facilitated a technical working group on behalf of SMUD to better understand the value of solar and storage. And within the report for that working group, there are recommendations on how to approach

this valuation exercise. So virtual power plants can be a real asset to managing load from increased electrification.

And this final recommendation is probably the wonkiest recommendation on updating load calculation approaches. As I understand the National Electrical Code drives safety standards for panel sizing. And the interpretation of the National Electrical Code and its application to the California Electrical Code is what local government, permitting offices, and building inspectors use to determine whether a panel is the correct size for a building.

And generally that's based on an arithmetic approach of just adding up the demand from each of the appliances within a building. But given load management technologies, given load flexibility opportunity, there may be an opportunity for the CEC to work with the California Building Standards Commission and local governments to identify other approaches to load calculation. And how the peak demand is not necessarily everything running at the same time. At the same time, the CPUC can work with load serving entities to clarify and update base load assumptions to ensure that efficiency standards are accurately considered.

And lastly, the CEC and CPUC can consult with the Governor's Office of Business and Economic Development. They put together a permitting guidebook for electric vehicles,

and a similar one can be developed for building decarbonization to clarify load calculation approaches that can be accepted by local government permitting offices, and provide project examples for developers and customers to better understand.

Thank you all very much for your time and attention today. Gridworks contact information and my contact information is included. And there are also a few resources that I mentioned today and that others have mentioned that can help us to better understand opportunities and challenges in multifamily buildings.

MS. MATEO: Thank you, Katie.

Next, we have Leah Pertl. She's the supervisor of commercial programs with SMUD. Leah manages, directs, and provides oversight for portfolios SMUD commercial intensive programs that supports energy efficiency, including transportation electrification measures for commercial customers class market segment.

Her team has been instrumental in working with commercial customers and industry stakeholders to support the short and long-term goals of those in decarbonization within the Sacramento region. She was development and implementation (indiscernible) and transportation electrification intensive across the portfolios while also providing utility resources that educate commercial consumer

on whole market segment electrification solutions incorporating grade timing resources that ultimately support their business goals.

And I will pull up the slides.

MS. PERTL: Thank you.

Quick sound check. Can you hear me?

MR. SAMUELSON: Yes, we can hear you.

MS. PERTL: Excellent. Okay. Thank you.

Let's see here. Yes, so I oversee a suite of energy efficiency and commercial electrification program that really go across market segments. Everything from small (indiscernible) customer segments to large industrial commercial customers for a variety of technology.

So as we move into building electrification and transportation electrification, we're actually able to embed those measures into many of our existing programs and launch new products that are primarily focused on electrification measures.

So today we'll talk a little about those electrification programs that SMUD is currently offering. I'm pleased to hear that many other things that we talked about earlier that were challenges that we had -- SMUD had looked at and recognized and were issues and needed to be embedded. We live in the program designed so we're all on the same path, that's pretty exciting to see.

Next slide.

Thank you. So a little bit about SMUD, although many of you know us. We are a not for profit utility. We've been serving in the Sacramento region since 1946 and we're now the sixth largest community owned not for profit utility within the country. So we're owned by our ratepayers so that means that we have a board. Right? And that means that they are very active in our community and it's likely as active as well.

So there isn't a day that goes by that we don't get a request from a customer about how we can help push the needle. So it's really important for us to continue doing that, especially as California has an ambitious environmental goal. And to achieve our electrification goals, we're really going to need to look at ways that we can electrify water heating, space heating, and cooking equipment as we expect that those measures will help us to reduce greenhouse gas emissions from residences by up to approximately 60 percent, not only giving our region environmental savings but also cost savings for our customers.

Next slide.

There we go. SMUD -- there we go. Thanks. SMUD does plan to transform the region. We are making bold investments over a 20-year time span for maximizing our local renewables as well electrification. But that's not just

building electrification but transportation. So we really have to look at it from a holistic perspective. And with that, our goal is to be -- net carbon zero by 2040. I mean, that's a huge goal.

To get there, though, we have two different paths. Right now we're currently offering two programs, our Smart Home program and our Multifamily program. And our Smart Home program I'll talk about briefly. It incentivizes builders to adopt all-electric construction practices. And it ensures that the home itself once constructed produces less carbon with time until it becomes a zero emission home by 2040.

Next slide.

Now what you're looking at here is really a grid that talks about why it's important to participate in carbon reduction. Our electric -- excuse me, our electricity supply emissions that serve our retail footprint is the top declining line there. Our attributable building transportation decarbonization reduces all of those emissions in those different segments down to zero. You can see the building decarbonization segment, the vehicle attribution as well, and then what the net is by 2040.

So we have a lot of work ahead of us to get there. We (indiscernible) about a quarter to a third of the total emission reduction over that 20-year period from all of the electrification efforts. Now is it all from Smart Home? No,

it's not. We really only expect to have a 15 percent market share over a three-year period where we'll have some impact but it's driven by a high incentive rate and we expect to trail our incentive rates down over time because at some point we expect code to have a requirement. And we know that's coming soon for new construction to be all-electric. So we're really trying to drive that needle forward sooner rather than later.

Next slide.

Now what you see here, and I know it's a busy slide so when you have a chance to read through it later, it'll be to your benefit. We offer two paths within the Smart Home program for customers. They just kind of -- you've all said and we all know that there are some significant barriers to get builders, developers on board. And so with the two pathways, we've actually found significant interests.

All-electric provides obviously the most maximum incentive. And right now, that current maximum incentive is up to $7,000. Now mind you, this program serves single-family and multifamily new construction. Really important to know.

For multifamily, the incentive is significantly less with up to $1750 per unit. And that includes a menu driven solution, heat pump HVAC, heat pump domestic hot water, induction cooktop. It also assumes that on the all-electric

that it is EV ready. Now on the multifamily side, we don't have a requirement for EV ready, just have to comply with code which means that it has to be indicated on the site plans or the civil plans. It's more they anticipate their EV to be in the future, if they're not planning to do it immediately. Although we do have opportunities within this program to leverage electric vehicle charging installation and incentive for that as well.

So we actually have many opportunities to help them with EV charging, heat pump (indiscernible), electric dryers, HVAC, and so on. So there's a lot of opportunity to customize the program design with each builder and it meets the needs of their customer base. So people that are buying their homes. So that's really important to know. As well within the market segment that they're -- they're trying to serve within our community.

Next slide.

Now part of this means education, right? So for our builder support program, we offer a number of ways to do that. We can put out front their digital ads or cobranding. We have model home handouts that are customized and cobranded for them. Talk about education -- this is really education that goes toward future buyers that the builder can then insert into their, you know, packages for their potential customers. So it educates the clients -- the customers who

finance and purchase those homes so later on they have that information to refer to.

We also do it through social media. We have sales training and event support when they're having open houses and watch parties for their new products. So it's really important to know that upfront we really want to make sure that we engage with the builders, we engage with their sales staff, and we engage with their customers at the very beginning when they're out there educating their customer base.

Next slide.

Now this is where we're at so far. We're pretty excited about this. Through 2022, we have 36 of the 56 developments within our territory currently in our pipeline with over 1800 single-family units that is -- single-family, I'm sorry, and mixed -- multifamily residential units in here as well. So as you can see the breakout, through 2022, we have $6.2 million reserved.

Now even with current COVID restrictions, essential workers are continuing. We are not seeing a significant drop-off in construction. So pretty excited about that. Now, you know, if the economy changes significantly, we may see some drop-offs, right? But we have smaller boutique builders, other projects that are coming in and we expect that those will fill that pipeline.

As you can see, though, with the pipeline through 2025, we know what's coming because it has to come through our new service or replanning planning process. So we can see up ahead, hey, what kind of projects are coming through? And as a result of that, one of the things that we did through this program and through our building electrification and transportation electrification efforts is to work with our replanning groups and say okay, what's a new requirement that we need to have in place so that builders will meet what our low capacity requirements are. And one of those was to set up a plan where for every home that's all-electric that comes through, they must be able to support a transformer for every ten homes.

So now that new requirement is based off of an all-electric load calculation per site or per subdivision. Right? And so -- so when they submit that for an all-electric, as long as they're meeting those requirements, then we know that whatever measure they choose, they'll be -- they'll -- they'll -- they'll not only be compliant with the program but they'll be compliant with our new construction processes. In the past, they would have gone through a mixed fuel, would have assumed gas and electric.

And so with these new preplanning processes that we can get it into a program design, we've also been able to take that and say okay, how does that apply towards other

programs? And so -- such as a multifamily retrofit program which I'll talk about briefly in just a moment.

And so, you know, we're pretty excited about the success of this program, we continue to see builders engage with it every single day. They call us and ask us more and more about how they can participate, what are the measures could they benefit from. And some of the things that we look at is obviously battery storage is one of them.

We have to look at community solar. I think we're still waiting on a few things SMUD was able to get to work with the CEC with our solar shares program. And so we're excited to be able to partner with solar in our region to offer single-family homes and multifamily our neighborhood solar shares in the coming months and the years with this program.

And next slide.

And so now we'll talk about our multifamily program. What's really interesting, we've offered this program for a couple of years. And we've had variations in the past like many utility programs started off with energy efficiency. And in fact, it was really modeled -- the most recent (indiscernible) was really modeled off of (indiscernible) approach. You have total gas and electric site savings and then you -- we would provide an incentive specific to the energy efficiency, you know, a (indiscernible) per kilowatt

hour. Pretty simple.

And then we had bonuses for electrification. We realized that wasn't really going to help us with our goal. So we had to change the design of the program. So what's coming is we're going to be able to offer and we are offering an electrification incentives first. And we're going to offer it in this deemed way. So instead of having them go through the whole modeled approach, we're going to tell them, hey, up front (indiscernible) what your incentives are going to look like.

Now, who's been interested in it? We've had apartments, obviously, property managers, owners, and such, hotels. We've had dorms. There are a lot of different stakeholders within in a community we're very interested in doing, (indiscernible) to be easy. They'll make it hard for us. So the property manager and owner that doesn't have the resources to go out and pay an energy modeler but knows that they have to replace all of their hot water heaters because they are, you know, at the end of their lifecycle and they want to change their electric to induction cooktop. Keep that available, right?

So want to take a look and see what those options are. And then they also if they want to understand what the implications are if they go from gas to electric, we want to be able to provide them with our research and resources up

front. Now it isn't for market rate, we also offer low-income incentives for those qualifying multifamily sites.

So let's go to the next slide.

Now the second measure that we're looking at initially are heat pump HVAC, heat pump domestic hot water, and induction cooking. Now with multifamily sites we find many of (indiscernible) unitized specifically the heating and cooling, the induction cooking, obviously, is always unitized. But the domestic hot water, you just never know. It could be a centralized system within each building or it could for the entire campus, or it could be per unit. We never know until we get in there and start taking a look at doing a site walk. It's always interesting.

But our air and (indiscernible), our electrification are specifically for gas electric conversions in this area. And so we're pretty excited about offering that.

Next slide.

Now I said this earlier and we continue to see this is that electric panel upgrades (indiscernible). Many times the customers, they've had a gas hot water heater and now they've got to go in and say okay, well, it's -- good luck with 15-year lifecycle on the existing panel, we're going to have to upgrade it anyway. So this is an opportunity that we see that they can take advantage of to convert over, upgrade their panel to what the new load demand would be and then

take a look at the measures and say, okay, what could they take advantage of?

That also means, though, that there may be some additional engineering that has to be done, as well as some permitting support. So we're offering bonus incentives in that area because we know that the local agencies may be requiring additional -- some additional fees surrounding the actual electric conversion.

Now we're also leveraging our electric vehicle charging incentives for our multifamily customers. And, again, just like Smart Homes, we're leveraging our existing commercial no (indiscernible) charging and multifamily programs, inserting it right into the program design and then offering -- now this is the real kicker, this is a -- we can offer up to 25 percent match from low-income funds to our qualifying low-income customers.

And so we really want to find a way to support those customers that meet, you know, that had equity and, you know, some environmental disparity within our community and make sure that they're being supported as well.

Next slide.

Now who are these customers? Obviously building owners, property owners, managers, and tenants. But what's unique to this program, and I think I heard earlier from Srinidhi. She was talking about -- I mean, earlier this

morning about single-family with -- when we talked about engagement. This program specifically had a tenant engagement delivery program. And what that means is when we provide information to our customers because the tenants are our customers as well. Whether it is from a master meter delivering that, where there's a single meter that gets charged to the property owner, but there's certain education components that can be provided to the tenants about how to use the system, right? How do you use the new HVAC thermostat? Right? Or, you know, what the expectations are with a new heat pump water heater? Now how do we do this? We do this though digital delivery. That's basic -- that's appropriate, I wouldn't do that for our senior population, but I might do that for a millennial group, right?

We could do that through apartment visits that are partnered through and scheduled with our low income and our tenant engagement team. And then we can still offer regionalized local community events, whether it's at the site or nearby for that tenant population. And again all of these are personalized and designed specifically for the population at that property.

Next slide.

No one for goal, really. Obviously, we (indiscernible) carbon reduction goal. But really you want to maximize all of the benefits that go along with it such as

indoor air quality, health improvement, tenant comfort. Those top -- those really are three top areas in which we can help tenants really buy in to the technology.

The energy savings will be an added benefit to it. Because also the energy and savings will come based on you. Right? So if you had a (indiscernible) unit that you were running constantly but it was never cooling and then they replace it, now it's running and it's working effectively. Well, if they cut it to their (indiscernible), they understand how to make sure they optimize their actual rate, then tenants become more engaged. They begin to learn the new behaviors that they need to employ to make sure that their continuing to seek energy efficiently while benefitting from the new technology. It's absolutely critical that we have that engagement with the tenants and the property management team.

Next slide.

Now with (indiscernible) incentive rates, I spoke earlier briefly about how it's going to be based on a menu driven solution. So this is after you would try to have a retrofit the entire site at 80 percent or more. Now we're saying look, we want to make sure this is easy for anyone to use. If they want to (indiscernible) a small number of units and then, you know, that way if they -- if they need to move a tenant to another site, you come back to that location once

it's retrofitted, then that's fine. They can do that. But we'll be providing a multiple number of incentives for -- from air source heat pumps ranging from say $600 per apartment to $1500 for a residential storage hot water heater or even a central plant system serving multiple units.

And keep in mind that we really want to make sure that we're reaching large numbers of customers, so we do have to have a cap point. We helped cap it at $150,000 per project. But that is for energy efficiency, plus we have a cap of $150,000 per project for electrification. And then a $25,000 cap for low-income incentives.

So technically, they could receive up to $325,000 per site if they were to take advantage of all the opportunities. So we're pretty excited about being able to offer such a rich incentive and a more holistic incentive. And that's not even really including all-electric vehicle charging, dependent on whether they took advantage of that or not.

So lots of opportunities for them to pick and choose what managers work for their site and to make sure that tenants are really engaged and understand the value of the investment that they put into their property.

Next slide.

And for just a brief cap on our electric vehicle program. As I mentioned before, we leveraged the work that we do on our existing products. And currently we are

partnering with the CEC on the Sacramento County project with CALeVIP. And we offer -- we're -- they're offering up to $6500 per port for qualified low-income multifamily projects. Or we do also offer an alternative. If they choose not to participate in the CALeVIP program, they can participate in SMUD's program at $1500 per port. And so we're very interested in working with multifamily, we just know that there are significant, you know, this is a policy, right? How do they want them to provide that to their tenant? How are they going to define who gets it and who has access to it? So some of it is about how we deliver it and manage it with their tenants on an ongoing basis.

Once the property management has defined how they're going to do it, then we kind of see which program makes the most sense for them. So we're excited about being able to continue the leverage of other resources for them using this program.

Next slide.

Now as far as our low-income incentives. We have a very robust low-income program. Now this is based off of our energy assistance program rate. And we determine participation within our program based on the participation at the site. So rather than say globally that a site qualified based off of -- and there are a number of different programs both with the state and the region that would

qualify a property for a discount, all was based on the tenant's participation. So with 50 percent or more of the tenant's qualifying or actively participating, then that qualifies the site.

Now that might be that we found out up front property managers hand this information on the retro, you know, the tenants, the location, we can do more research upfront. And say, okay, you know what? You're over 20 percent, why don't we send out some information and see if we can encourage participation. If you believe that you have the -- tenants that qualify based on information that you've been given from them and most likely you would if they were a loan from property, then we would like to help you increase that participation.

Because at the end of the project which these project cycles can be, you know, several months, sometimes up to 18 months. At the end of the project, we do a requalification. And at that time, if funding's available, then we would be able to go ahead and offer that to them.

And so it's not a one and done at the beginning when they submit their application. We go back and revisit it for those that didn't qualify at that very beginning. We give every opportunity for them. So I'm always excited to be able to go back and do that and offer them those resources.

And go on to the next slide.

Now as you can see for both our Smart Homes and our Multifamily programs, we have a lot of resources and investments in the -- the program website and in our collateral that educates our customers and our -- and some of our contractors. We leverage all of the work that's happening not just on the commercial side of the house but our residential side as well.

We had our programs team and then we (indiscernible) a dedicated group of strategic account advisors that work directly with our builders and our developers and our multifamily property managers and customers. We utilize a third-party program support team that supports both programs independently to provide a technical review and analysis of the project to make sure that not only does the application submittal meet our (indiscernible) requirements for equipment specification but also that there's ongoing support throughout the program cycle, especially since it is, you know, these do take quite some time to complete.

I mean, I've got a project that will complete this year, and given COVID. I had others that are probably going to get pushed out six months. I mean, it just is what it is, right? And so we need that third-party support to supply that -- that additional support that we need.

And then we have our builder supporting engagement and our tenant engagement plan to help really educate the

builder and the new property owners for a single-family. (Indiscernible) they are probably management team from the back end from multifamily.

And then finally it's just the industry. How do you support contractors? How do we work with distributors? And how do we work with the manufacturers to help them understand what our needs are and how we want to deliver our product which is the program to the community at large?

And so granted this program is really on the implementation side but we couldn't do this without all of the support from, you know, other -- other areas like our partnerships with the state's fuel income weatherization program. We partner with other agencies as well to make sure that customers can take advantage of multiple program incentives. We allow the opportunity for them to layer the programs, making the project more cost effective. It's really important for us to ensure that our customers can take advantage of those opportunities while still addressing, you know, contractor and customer education and providing them with additional resources.

One of the things that we've done most recently is we've added in a new electrification handbook that we are putting together. And that electrification handbook will be for all of our commercial customers and talking not just about building electrification but it will build in things

like transformer capacities, how do you determine where your head space is? What should you be looking for as a customer? Whether, you know, you're a building or you're a commercial entity or multifamily property owner and you want to find out what the profits would be to identify those measures that will best fit your facility.

And so we are really trying to work very much within the hour vertically integrated space as a utility to identify areas that we can leverage support our customers' needs and we really support this market transformation and to lead the effort in our area.

And I think that's it for me. Thank you very much. I appreciate the opportunity to be here today.

MS. MATEO: Thank you, Leah and Srinidhi for sharing that.

Yeah, those three presentations were a good overview of the multifamily building sector just from the context of building decarbonization.

We'll move on to the Q&A portion. And if -- I'm not sure if the -- any of the commissioners are present for questions. I can kick us off with one question.

So for -- question for our (indiscernible) panelists. How do decarbonization plans or choices differ from existing multifamily income-restricted projects?

Go ahead and let (indiscernible) kick that off.

MS. KUMAR: Sorry, could you repeat the question?

MS. MATEO: Sure. How do decarbonization plans or choices differ from existing multifamily income-restricted projects?

MS. KUMAR: Yeah, I think there's a lot of opportunity because they're already derestricted so many of the programs that do require that low-income programs that specify income qualifications, it's easier to qualify these properties and easier to provide funding that goes into them. Even providing -- even going above and beyond in talking about rent restrictions and not really passing on the cost, it's easier to monitor regulate these properties than regular, like, derestricted affordable housing, which I'm not sure you're including affordable housing.

So there's just a lot of opportunity to implement many of these programs and this sector first and see how it plays out before it's offered up to the natural occurring affordable housing.

And I think in terms of cost and barriers, I think both Katie and Leah highlighted a lot of them one from program implementation perspective itself. And I think definitely cost barriers exist and most of these projects can and do electrification largely as part of a (indiscernible) have projects so when they get refinancing, that's when they're capable of doing (indiscernible) large investment

into their property.

Having said that, that needs to be considerations made for standalone retrofits and how that can be made possible as well. And I highlighted the (indiscernible) upfront financing is something important for these -- for this community. And I think because of COVID-19, a lot of programs are definitely looking into it. So I think that's -- that'll be a good learning lesson for all program implementers to see what comes up through that. And definitely there are opportunities that could proceed beyond COVID-19.

MS. MATEO: Thank you.

Katie or Leah, if you have anything to add? If not, we can move on to public comments.

I'll pass it Dorothy and Brian.

MR. SAMUELSON: Okay. This is Brian. I'm going to go up to questions we had for this panelist.

The first one was John Norwood, specifically for Katie Wu.

He says: Many multifamily buildings include swimming pools and hot tubs or spas.

For a heating stand -- from a heating standpoint, we know of no practical alternatives to heating this water. As we understand it, the space alternatives to heating -- or the space required for the number of heat pumps is impractical

and solar is only a partial solution. How do you handle about maintaining natural gas or going to biogas?

MS. WU: That's a great question. I don't know that I have a great answer, though. I think that this comes with sort of the nascent of the marketplace in offering solutions for these high-capacity, high-demand end uses. You know, potentially maybe there's an opportunity to combine solar water heating with some form of electric water heating or in terms of panel capacity, it sounds like you would need at least a 400 amp panel or perhaps have a panel that serves only those end uses.

I think that this an area where the industry needs to provide some input where -- where commercial property managers or where hot tub and swimming pool manufacturers may be able to provide some insight into alternate -- alternate approaches to heat that water.

MR. SAMUELSON: Okay. Cool. This is Brian, again.

I will go on to the next question from Diane Moss. First off, information like it says: Are you aware that Germany -- excuse me, this is for the whole panel, they want from the panel.

Are you aware that Germany is planning to convert thousands of kilometers of existing gas infrastructure to 100 percent green hydrogen and that European gas grid operators are planning to make their pipelines net carbon neutral by

2050?

And are the panelists open to expanding the concept of building electrification to include electric gas to help decarbonize top building application?

Are the existing buildings or buildings in wildfire areas that are particularly prone to long power shutdowns that batteries are not economical or technically optimal for?

MS. WU: This is Katie. I can maybe offer a little bit of information but admittedly this is also another area that I think is new in California. And I know that there are many people who are interested in this potential to repurpose the existing gas infrastructure and to lower the carbon content of fuel within that infrastructure. I think that there's a lot of opportunity and as I understand for green hydrogen, there is a lot of potential as well for leveraging that fuel.

I believe in L.A., the LADWP is repurposing one of their gas fired plants to leverage hydrogen. But as I understand, there are some pipeline engineering standards that may need to be revisted if the fuel within the pipeline changes. And so those are just some considerations to work through. I think that California may be able to take that on but it will, you know, like -- like many solutions, it will require partnerships, it will require collaborative thinking through what -- what safety standards need to be in place,

what engineering standards need to be better understood, and how -- how we can repurpose existing infrastructure.

MR. SAMUELSON: Okay.

MS. KUMAR: I can just answer. This is not something we've done as part of our work but right now our priority as an organization is just to make sure that fuel switching is possible. And we are very much in favor of battery storage and the (indiscernible) and we'd really like those investments going into it and seeing what those impacts are.

And from what we've read, we've just seen that battery storage actually having electrical equipment and giving (indiscernible) actually turn on a lot faster than gas equipment, but I've not work on the hydrogen side of things. But we are really excited about the battery storage.

MR. SAMUELSON: All right. This is Brian again. We've got one more -- got another question and it looks like there will be some more from others.

This is for -- for Leah from John Norwood. Is SMUD open to biogas or other gas (indiscernible) for multifamily building like apartments, dorms, condo that has swimming pools, and spas? Heat pumps are not practical alternatives for these facilities.

MS. PERTL: So what I would say is that we do look at a mixed fuel solution. And with mixed fuels, we - -are looking as kind of a gas for solutions plus obviously the

heat pump solution. So you -- we would have a mixed. We haven't found that -- that's not a practical opportunity for customers to participate in.

So I would have to say that we do -- we would take a custom solution for customers within the multifamily market as well as we would for any other commercial segment. Because we know that there are some technologies that are better suited to that environment. But more specifically to the central plant design so I would say that we would definitely look at it. We wouldn't, you know, cross -- say a flat out no to that opportunity, but we would want to make sure that it was cost effective and could be sustainable from an operation standpoint for the customer as well.

So at the end of the day, we want to make sure that they're implementing something that they could manage for the long term.

MS. MATEO: Thanks for that.

I'm going to start wrapping up unless our panel has any last thoughts.

I'll pass it to Jen to see if she has a few words to say before we head -- head for our break.

MR. ROSALES: Jennifer, I think you're on mute. This is Eddie.

MS. NELSON: Great. Sorry about that.

Thank you, panelists. Thank you, Tiffany.

Commissioner, do you have any questions or comments for this panel before we head to our lunch break?

COMMISSIONER MCALLISTER: No, I just wanted to say thanks to the panelists and to everybody for hanging in there.

It looks like a very little atrophy in terms of our participant group, so I'd like to see that through the afternoon, really a lot of substance there and tons of stuff to follow up on. That way -- we can never do an issue as rich as this, or a set of issues for a position as rich as this. Full justice in the day webinar really does depend on the comments and interactions subsequent.

So we're really breaking the ice here and laying a platform for building something substantive going forward. So appreciate that.

So looks like with that, we will reconvene at 1:15 and I'll see you there, and pass it back to Jen.

Thanks, everybody for their attention.

MS. NELSON: Great. Thank you, Commissioner.

Thank you everyone. We will now take a 30-minute break and we will return at 1:15.

I do expect that we will expand the public comment period this afternoon by 15 or 20 minutes. We are lucky that we have a lot of people who want to ask questions, and has questions they'd like to comment. We want to make sure we

get as many as possible on the record.

So thank you for your attention and I will see you again at 1:15.

Thanks.

[Off the record at 12:46 p.m.]

[On the record at 1:18 p.m.]

MS. NELSON: Great. Welcome back, everyone. I'm going to go ahead and pass the virtual microphone over to Gabriel Taylor who will be the moderator for our third and final panel on Commercial Buildings Sector.

Gabe.

MR. TAYLOR: Thank you, Jennifer.

Good afternoon, thank you for joining the Energy Commission's Building Decarbonization Workshop.

We now pivot to the Commercial Buildings Sector with three panelists followed by questions and discussion.

Share my screen real quick here.

Would the host please switch the presenter over to Cathy.

Our first panelist is Cathy Higgins. Cathy is the research director at the New Buildings Institute and has over 25 years in the energy efficiency strategic planning, research, policy, and largescale project management.

At NBI, she manages evolving work on zero net energy and zero carbon buildings, building electrification,

performance measurement, market and policy trends, and emerging technologies. Cathy is currently leading a field demonstration in Los Angeles on office retrofit potential, the building technology electrification roadmap. She also -- she's also supporting the advance water heating initiative and the New York carbon neutral roadmap.

Cathy, I believe you have -- there you go. I can see your screen, Cathy.

MR. ROSALES: Cathy's on mute.

MS. HIGGINS: I have to find the mute.

Am I unmuted?

MR. TAYLOR: You are unmuted.

MS. HIGGINS: There we go. Thank you. Thank you, all. Let me get back to the PowerPoint, vision slideshow and get going to keep you all on schedule in this important workshop.

So thank you for having me. I see Alberto's -- see him up there, let me see if I can get him to disappear. There we go.

Thank you. As Gabriel said, I'm the research director at New Buildings Institute. I'm here to speak on commercial sector trends in relation to the building decarbonization workshop.

Get it so it advances. New Buildings institute. We were founded in California in the late 1990s. We're located

in the northwest now, but we have offices a few other places. We're national, work primarily in commercial and multifamily. And we really are focused entirely on the built environment, its relationship with the grid and with the occupants and how to reduce emissions through energy efficiency improvements and other strategies in three primary program areas.

Building program innovation, which is what I lead which has the research and the carbon -- decarbonization section. Our zero energy and carbon leadership which is more of a market change mechanism. And then what we're really quite well known for advancing codes at both the national, state, and city level.

So two of the topic that you're interested in today and that we'd love to contribute to which is how to make all of California's commercial sector decarbonized and beautiful too.

One of the first messages I have for you is to build on energy efficiency and zero net energy. Don't forget that the buildings you're trying to decarbonize have come a long ways with this vocabulary. There's many great examples, we're the largest -- we keep the largest database on zero energy buildings and now we're tracking zero carbon buildings. But half of those buildings are in your state or in California as we well know from running the California watch list for five or six years on behalf of CPUC. So

there's certainly good foundation to build on and decarbonization encompasses a lot of factors that energy efficiency's very critical to.

So when I think about change, when I think about strategy, the thinkers in the commercial section are going to be on programmatic and finance. So I'm going to be a little more upstream on strategy and always approach problems with this diagram I've used for a while which is getting the four Ps in place. And I know that very well that California has these. But this is your policies, your price, signals, products technologies, and the people, the marketing, the workforce.

So if you can keep your communications very clear and concise like this and say what you're doing in your areas and make sure that there aren't gaps, that will help the market and both private and public sector understand what you're doing and follow the path that you're laying out. So I'm going to speak to most of these items right now and my recommendations and responses.

And one thing that came out last week in the policy area that I'm sure any of you that are longer term like I am would not have five years ago thought that we would have as much momentum as we do nationally, particularly. Sure California, New York, Massachusetts, even the northwest a little ahead of curve. But you see here in ACEEE's May

publication of rules and policies to enable beneficial electrification in buildings. Through the words very forward facing fuel switching. That was not a word that was forward facing in policies previously. And now you see momentum towards it.

So although you are, you know, ahead of the curve, you can certainly continue to model and learn from colleagues and see what other areas of support your agenda because if it's more national, it advances you more quickly. You heard from the residential sector, we know very well that the cities are leading in what was previously known as reach codes that you like to prefer to call. Codes that have advanced beyond your Title 24 code.

And I tracked these a little different than this diagram that's kept at BDC, but I track actual adopted dates and I keep an eye out for things outside of California. You certainly have the most, over 30 buildings, but there's a few other states that also have adopted either mandated electrification or electric preferred which may be an incentive to the -- to adopting electric technologies universally or maybe a penalty if you're dual fuel, an increased fee.

So there's a lot of paths people are taking, it's not one size fit all when you look at policies. And these policies and the priority that they play in moving the market

forward towards your decarbonization goals are really founded in the fact that if a city or a jurisdictional area has a climate action plan, that's a forward looking document, but they don't have the activities to get there and reach codes and policies are certainly foundational. And you see on the right is that enhance what you put into regulatory statute and standards that they want to build on.

And we shouldn't forget that there's a critical piece that is nonregulated, becoming larger and larger proportion of buildings. As we do better and better with codes, the unrelated loads consume a larger proportion. And we need to look at policies that are pretty nascent, there's some bolder, Seattle tried out, building performance codes that are requirements for submitting and hitting targets on a post-occupancy basis. And I know you're familiar with that, but that is something that is further down the curve and probably needs to be our future in order to comprehensively address all the energy and carbon issues.

News Buildings Institute has done a number of tool kits. There's others in place too. Really got to support cities and local governments with easy to understand and comprehensive sets of resources and tools that can help them be your -- be your pathway to the people they represent in their community. Then you cross through the Chamber of Commerce, you cross through schools, you cross through

residential and commercial both so that they are such critical gateway to decarbonizing.

Again, to really communicating succinctly, we formed an item because we work so much in policies that we call our five foundations to zero carbon buildings. You can see that it builds historically on something that we've already had for 30 to 40 decades here energy sufficiency and now renewable energy. So it moves from the known to the new, as you move to the right. And so it's important to be comprehensive. And I know you're -- be getting into kind of the new area of embodied carbon if you're going to look at a complete carbon neutral building.

But if you were talking differently to the -- to the parties that are designing buildings or owners that are considering new buildings, these would be flipped in a bit different order. If you had new building, you'd want to start with your material selection and your energy efficiency. So the difference in who your audience is and what your messaging is. But keep it clear and simple and easily understood.

Now to the products part of that quadrant. We have tons of technologies that can electrify buildings. There are -- we just saw from the morning's presentation, thousands and thousands of homes already that have gone all-electric. Certainly can show you hundreds of buildings through some

leading firms in California, EHDDE and Integral and others that have built all-electric buildings. So we know how to electrify and we have technologies, but we're also needing to make sure the pipeline is full and the supplier chain can deliver those buildings.

And through some work with building decarbonization coalition, Panama you hearing this morning. But building electrification technology roadmap, we're calling it a better roadmap. Great name in Defense Water Heating Initiative. We're working collaboratively in California to bring forward the list of technologies and the barriers and their readiness and get the pipeline identified for what's ready and what scabs for program administrators.

So product and readiness are some available, some coming. And kudos to the (indiscernible) project that just announced its successful applicants for low GWP. Because if you look at a roadmap, you're going to see the conventional refrigerant technologies and we push all to heat pumps, there's a little bit of alteration in the greenhouse gases associated with refrigerants so we're going to have some great research and market pull on low greenhouse warming potential heat pumps thanks to Epic.

So what are these challenges? That was one of the things Gabriel asked us to speak to and so as succinctly as I can I stated them here that first and foremost, the utility

savings don't cover costs.

I'm going to pause on this one because money -- I mean, I've been in this field a very long time. Every survey you do and every guidebook I've ever done, you have to address cause. I'm not saying you don't but it is our Achilles heel, we have got to get off the band wagon of feeling like we have to be accountable to pay back and no other product does. You can't tell me probably three products easily in a home or a building that is accountable to payback.

We've got to change the dialog, you've heard it before, but it isn't -- it isn't our nature. Our programs savings by design. We've got to get into the other metrics that are important to owners just like any other technology and stop feeling that we have to have the unique metric that other products don't. There's benefits and interests that we can speak to that don't have to go to the payback. And if we don't put payback to rest in commercial and only deal with return around investment, I'm not going to have done my career's agenda either.

We know that workforce training's needed, both in terms of product awareness and in familiarity. We talked to -- about the building owners, they don't really know about some of these products, that's got to be raised up.

We have site constraints in commercial as well with

panel sizes, physical barriers. Retrofit is the name of the game and we've got to figure how to scale commercial retrofits.

We don't have a fully funded statewide effort but two programs I just mentioned that we're working with BDC on just a really having to patch together pieces of funding to do electrification roadmaps. How can we get more universal funding source? And again, kudos to the new SGIP and Tack and Built, you're on those paths. But they're absent now and will they be sufficient?

The adoption rates that are going to be necessary to meet these targets for the water heater example here. I think there's 12 -- 12 million water heaters residentially in California and 90 percent are gas, we're going to decarbonize those. We can't do 100 today as Peter Trimble says, we have to do more than 1,000 a day. 1,000 a day is still a 30-year accomplished target to do 90 percent or 12 million water heaters.

How can we push the acceleration quicker? And lastly clearly time of use. As we electrify and decarbonize and increase the electric load, huge time of use impacts. One of the biggest barriers that we encounter, of course, in talking about technologies, it's not water heating, space heating, it's emotional response to cooking, fireplaces, barbecues, behavioral changes. Our industry needs to continue to

embrace behavioral sciences and how to shift attitudes and perceptions about items.

So to that solution side, here's a -- here's a graph on a whole lot of other technologies. Our industry needs to look at things that were popularized, their penetration rates and curves. There aren't very many efficiency products that have had the type of curves that the electronic industry has. How do we make these attractive? How do we popularize them? Let's have somebody dedicated to looking at models and trying to get our technologies and our strategies and market messaging to mirror where there's been other success examples.

So when we talk about products, they better be integrated and they better have smart controls. A lot of you know that New Buildings Institute and USGBC are working with utilities around the country a handful including Southern California on describing metrics that identify a grid's friendliness and be able to label that building in terms of its operational and physical attributes that interact with the bilateral nature of the grid that we have today.

So again in communications and to decarbonize, getting the message out, this is from you guys's CEC, from Martha Brooks, we do use these heat maps a lot, we want transparency of carbon emissions so that somebody who might have gone into a fully PB net zero assumed building, then say

what do you mean I don't have a green carbon footprint in 24/7? That understanding, that transparency, and that ability to alter loads so that they contribute well to green is highly critical and needs to be one of the forefront items to changing the commercial sector.

Here's an example of what we did with Sonoma Clean Power on that topic. You can see here that we have a December baseline building. This was their headquarters as designed. Their proposed typical baseline building in Sonoma would have been a gas hybrid building. The -- a construction document proposed was lower than that but then when they made it net zero to solar, you see a pulse of peak down by more than 50 percent and it shifts to peak in summer to a later lag which is beneficial.

And down here on the bottom graph what you're seeing is a carbon and energy being now twin and complementary to goals and metrics. Carbon actually exceeds slightly the energy savings in terms of its benefit to the building and its timing. And these -- what I want to emphasize here is these ECMs, energy conservation measures, were series of things that improved the building envelope. So we tend to get very focused on that heat pump technologies as we should as displacement to incumbent gas technologies. But the shell and the envelope, getting it reduced is where your biggest savings can be in terms of normalizing the carbon.

And here's a few comments over here on the left about the game changers of outing the electricity that's going to come and that we start with low envelopes and ramping strategies so that not only the heat pump water heater is known as a storage battery because you can load it in the peak day and then cruise on it in the evening, so is the envelope. Think of the building as a battery in the same way that you're talking about the -- the hot water heating as a battery.

As I'm getting toward the end of these slides, I always just really am pleased with the work done by Johnson Controls on their energy efficiency survey globally. And I just have one snippet here because knowing our audience, knowing how we're going to change the market, this survey represents thousands of business owners.

And last year -- this is kind of a two-year study -- energy cost savings in the U.S. was one of the largest important reasons for -- for investing in energy efficiency. 82 percent said that's their number one reason, 71 percent said greenhouse gas reduction, that's the last survey. You can see the new survey, the shift in mentality in the private sector of the importance of gas whether it's because of risk management with their corporate sustainability reporting or because of forward facing to their -- to their clients or regulatory anticipation, it is the forefront according to

their own response to this survey.

So we can leverage that, we're going to keep that message front and center, and we're going to give them business reasons why it's in their interest. I was up in BC -- BC Hydro before the no travel, just literally before, working on a -- on a heat pump for roadmap. And I have a beautiful case examples for the business sector of how -- why zero carbons in their interest.

And now as I come to the end here, I just for your workshop, I was thinking in this last couple of months, of course, about the COVID implications, Gabriel mentioned I should speak to that. And I made this diagram on the right. And as I thought about the things that have been so prominent in our conversation the last two months, the occupancy variables incredibly different changes in terms of returning the buildings at half occupancy prolonged periods where two shifts change. Ventilation strategy certainly are going to be a big help.

I just wanted to spotlight that ventilation strategies, although some of us kind of cringe that, you know, moving to increase outside air which is a health, potential health and likely health benefit, doesn't have to be an energy penalty that's combined at the same time with both retro commissioning and HRV energy recovery ventilation or heat recovery. It can be strategy that the energy doesn't

go up if it's done integrated.

And the other item that was -- Commissioner McAllister mentioned at the beginning is that equity, down here at the bottom of my diagram. When you look at who's returning to buildings first and who's likely to have to continue to be in buildings that may not have upgraded for health and well-being, that's probably going to be a dis -- the wagering level of those people and the equitable equity in terms of who was able to work at home and who is not.

So we need to do a good job on those ventilation guidance, make sure they're coupled with strategies that don't peak energy, get these new utilization patterns in place where I'm working with my project in L.A. right now to figure out how to -- how to analyze a building that's not occupied and provide the owner variable ranges of occupancy and their energy implication.

And what does off look like? During this last period, I'll bet that there's a lot of wasted energy in what people think is an off building. That's a new area that we could be going to in terms of helping the commercial sector.

So I've covered these things. I just put them in for the record for the workshop and I added a bonus slide of drivers. So these two last slides are just for the record of reference in the future. And I've completed my presentation.

Thank you.

MR. TAYLOR: Thank you very much, Cathy, that was a very data heavy presentation and we really appreciate building our record for this proceeding.

So our next presenter is Chris Malotte. Chris manages the regulatory policy and strategy aspects of Southern California Edison's demand site management programs. Chris helps develop new programs, manages the current clean energy optimization pilot, and leads SCE's coordination with SoCal and tri-county regional area networks.

Prior to SCE, Chris managed electrical vehicle, renewable energy, and new technology assessment programs at Arizona Public Service Electric Company.

Chris, are you ready? I'll be controlling your slides.

MR. MALOTTE: Great. Thanks, Gabe.

Would you mind advancing to the next slide?

So there's a lot of good activity that's going on at Edison right now. I'm going to highlight one particular pilot that focuses on incentivizing carbon reductions for a large commercial customer.

So SCE has laid out a couple of white papers, one's called Clean Power and Electrification Pathway, the other one's called Pathway 2045. Both of those lay out our vision for where the grid is going and more broadly where carbon reductions can happen.

As part of that, one of the key things that we wanted to do was highlight that it's -- we want to drive it to the customer to make clean energy choices. So as part of that, we developed this pilot program that seeks to incentivize and accelerate customers to make decisions to do onsite behind-the-meter carbon reduction activities.

So the goals of this pilot are to pilot the incentive, encourage customers -- pilot the incentive, see how it does, determine the effectiveness and the impacts of this particular performance-based incentive, and then determine the customer-solution preferences based on their -- this particular model.

In terms of the benefits of this particular pilot, it's more -- the primary one is the alignment of everyone's goals in the same direction. So this particular model aligns the incentive with the state's goals and increasing our customer's goals of carbon reduction. It also allows flexibility for the customer to choose the technology that they wish to pursue.

The incentives are performance based so the risk goes to the customer but as long as they perform, they will get those incentives. And then we also think that this is a model that can be scaled across different commercial sector customers, particularly for large customers that are master metered and have a focus on carbon reduction.

So in terms of the pilot customers, we have two pilot customers, one is the UC system and the other one is the California State University system. The pilot is a four-year pilot and part of the reason that we're able to have this flexibility and how we incentivize things is the funding source for this program which uses our cap and trade auction revenues. So it's a little portion of the climate credit that's normally to customer's bills. A small portion of that goes towards this program.

So the way that the pilot works. If you look at the bottom left-hand side of this particular slide, it looks at both the electric and the gas meters and comprehensively as a master meter across the entire campus which allows customers to do things like energy efficiency or cogeneration natural gas-type efficiencies. But also to do things like onsite renewables or smart load growth, fuel switching, and also clean transportation. So we've -- we've incorporated the ability for them to electrify their fleets and also student -- and installed chargers for students and faculty.

So go to the next slide.

This lays out the campuses that are in the particular pilot. As I've said it's SCU and UC. So we have a variety of different campuses. So we've got large, essentially many cities from UC Santa Barbara and UC Irvine, Cal Poly Pomona and Cal State Dominguez Hills. You also have two medical

centers in UCLA and UC Irvine Medical Center. And then we have a veterinarian school in UC Davis. So there's -- part of the reason that this really made a lot of sense with UC and CSU is both of them have a really strong focus on carbon. UC's goal is to be carbon neutral by 2025 and CSU is not far behind that.

They also have a wide variety of different building types. So the campuses as I said are mini cities but what we can do is extrapolate from that. If this particular model works really well in dormitories, that might be something that we can apply to multiunit dwellings. Or if this were to work really well in lab spaces, it might be something that's more comparable to an industrial, that sort of thing. So these two campuses are a particularly good fit for testing out a pilot like this.

You can go to the next slide.

This is how the incentive works. Basically for the pilot, we set a baseline and then each year, we measure against that baseline. So it's kind of -- I broke it down into three easy steps. So the first step is you gather all the meter data. And that's all of the electric and the gas meters that we're considering within the fence line. So for this particular thing, it's within five miles of the campus, all of the meters within five miles of the campus. That includes both the cogeneration and the heating natural gas

meters.

The second step is to do adjustments to the calculations. So there are two ways that we do adjustments. One is for electricity use for transportation. And the reason for that is because it shows an increase in electricity usage but there's not a decrease elsewhere so we have to offset using the low carbon fuel standard method to say that this is the gas that's being displaced -- gasoline that's being displaced.

And then we control for two things. These are two things that weather and square footage. Weather because it's highly dependent on -- electricity and gas usage is highly dependent on weather. Square footage because we didn't want to prohibit the campuses from getting to grow. But we wanted them to do it in such a way that it was the most carbon reducing or carbon neutral possible.

The third step is taking all these inputs and converting them to greenhouse gas emissions. Eye level we take the electricity, we multiply it by an electricity emissions intensity factor, we take the natural gas and multiply that by a natural gas emissions intensity factor.

The electricity one's a little bit more complicated than that because we factor in time of day. So we factor in by TOU periods what the greenhouse gas emissions are for that given TOU period by month. And then what you get is an

output and the output is two things. One is the baseline and you'll see that the baseline's going down over time. And then the second is the performance. So each year we'll be measuring that performance. And the baseline will continue to reduce and get lower and lower as the campuses are continuing to get greener.

You can go to the next slide for me.

So these are some of the activities that the campuses are currently pursuing. As I said, the pilot incentivizes only behind-the-meter opportunities and we were really focused on that for several reasons. But for UC's carbon neutrality goal, they were originally -- you know, the goal is be carbon neutral by 2025. And they're going as gangbusters as they possibly can to get to that but they realize that there's a large gap between where their trajectory is and where they are meaning to be. And so a large way of them being able to meet that is through carbon offsets and biogas contracts.

The problem with both of those is scalability and applicability to other customers. And part of the reason that UC wanted to do their carbon neutrality by 2025 was because they wanted to be an example to the rest of the state on how to do it effectively. And so they really want to focus on behind-the-meter activities and we do, too, because we think that's something that could be scaled across the

board.

So the campuses are able to explore different opportunities including energy efficiency, operational efficiency so that includes things like with their cogeneration units, making them more efficient. Converting to all-electric centralized systems, doing supply site air handlers, controls, focusing on solar and batteries. And in this case, using the batteries for carbon reduction as opposed to more bill management. And electrification of gas boilers and electric vehicle charging.

One piece that I think is really cool about this program is because we're looking at the entire campus in the master meter, it allows the -- anyone who wants to focus on doing something on campus, they can do it. So the campuses are able to leverage their students and their passion to be able to do behavioral programs within the dormitories. Like a switch off the lights type of program, that sort of thing. So it opens it up to anyone within the campus to participate in this.

It also is a good model for kind of how to -- one question is about how to finance all of this stuff. And it allows itself pretty well for doing pay for performance contracting for the UC and CSU. We haven't seen them do that yet, but this is a model that could be applied where the -- somebody goes and installs a bunch of equipment and says just

give us a portion of the incentive you receive. Or just give us the incentive and you get the bill savings for all of that stuff. So there's an interesting way of doing the financing of this side of things.

Go to the last slide.

I just wanted to highlight some of the other building decarbonization activities. This particular pilot is only one of many things that we're doing at Edison. I mentioned the two white papers, the Clean Power and Electrification Pathway. But also the Pathway 2045 which was released last year which looks a little bit further time horizon and how we plan on decarbonizing both the grid and the state as a whole.

There's several programs that we have in flight. So we have the Clean Energy Optimization Pilot but there's a lot of other commercial and residential so the emerging technology is cooking electrification demonstration, is working with Cal State Dominguez Hills on electrifying their cooking equipment.

We have in our energy efficiency side of things, a large focus on fuel substitution measures and then in particular plug loading appliances upstream -- upstream space and water heating incentives.

Focus on reach codes. So Santa Monica's one of the cities that's been doing that but we're looking at several municipalities within our service territory, focusing on

electric reach codes.

And then a couple of other things that were mentioned earlier today, the Clear Program, the San Joaquin pilot. Other things that are in development are we have a couple proceedings in the program design pilots in the income qualified proceeding that are focused on building electrification. That's currently being litigated and likely to come in place something -- sometime in 2021. Both of those are focused on electrifying both new construction and low-income households.

Also work within the SGIP proceeding and some other electrification opportunities with incentivizing new home construction and heat pump water heaters.

And I would just like to leave with one example. I know this seems daunting and the scale of the effort is going to be large. But it has been done before. We have converted not us but the UK has converted -- they converted from town gas to natural gas in ten years. It required them to convert over 13 million residential units. It required them to convert over 400,000 commercial units, and something like 60,000 industrial units.

So I use that as an example to say if the UK can do it in ten years to be able to convert from town gas to natural gas, I think we can be able to do it on the time scales that we're talking about, we just need to have that

focus on actually getting it done.

MR. TAYLOR: Thank you very much, Chris. That was excellent. And clearly, there is an enormous amount of work that has already gone on in this space and I hope that our report can capture all of it and do, the work that's already been done, justice.

The next presentation -- or final presenter of today is Ryan Mazelli. Ryan is the Director of Commercial Programs for Ygrene Energy Fund. He's been with Ygrene for five years building a Commercial Property Assessed Clean Energy, or C-PACE, financing platform for small to medium sized projects. These projects include energy and water efficiency renewables and resiliency measures for both new and existing buildings. To date, the program's financed over $150 million worth of projects at more than 1,200 commercial sites, which is over half of the C-PACE projects funds to date nationwide.

Ryan, are you ready?

MR. MAZELLI: Yeah, thank you, Gabriel, for the great introduction and thank you for having me for this workshop.

So we can go to the next slide and we'll talk about the story of PACE and what is it. So PACE stands for Property Assessed Clean Energy. I want to break down the acronyms that our government loves to use. So first being Property Assessed. So this financing is assessed to the property and is repaid as a tax on the property tax bill.

The specific lien position and vehicle that we have to enable this allows us to streamline the underwriting of the financing. And so what we're able to look at is essentially the building as the borrower of the capital rather than the current property owner. So the financing is primarily based on the available equity and has been a great alternative to traditional financing given the fact that all other financing is really tied to the property owner borrowing the capital.

Then the second portion of PACE is Clean Energy. So we're only financing certain property improvements, specifically for that individual property for the benefit of the public and that is at a high-level energy and water efficiency, energy generation, energy storage, and resiliency measures like seismic in California.

So the story behind PACE really was enabled in California first back in 2008 through Assembly Bill 811. And then two years later, a separate bill, Senate Bill 555. So there's actually two bills in California that enable this. And so the State passes the legislation and then based on that legislation, programs are created either at the State or local jurisdictional level or on a private basis. So you could consider kind of two models, State-run models, or local jurisdiction model are then what we call open PACE or open market platforms.

So here in California, we kind of have a hybrid

model. And Ygrene is a PACE administrator so we operate our own program, we're a tip to tail facilitator across the State and over 300 various jurisdictions in California.

Next slide, please.

So wanted to give a deeper dive into the specific improvements. This is even a high-level but broke it down into four major categories. Cathy brought about the need to look at the envelope. And that's what I would call cosmetic, the outside, the shell of the building. And then it could even be further down to like I have here, some landscaping and other things. So that's looking at anything, roofing, doors, windows. And then even now-a-days, we can even go down to EV charging stations and really a sustainable, from the outside, looking building.

Then you have your comfort and efficiency, all of the controls, HVAC, mechanical, electrical, and plumbing systems. And then, so that's all on the efficiency side. Then we have our renewable energy, mostly buildings are going on the renewable energy side, mostly solar PV and thermal. But we can also do Co-Gen, wind, geothermal systems as well.

Energy storage is a big thing, that's both on the generation and resiliency. So here in California, big for wildfire resiliency. So there was an amendment to the various bills that enable PACE that brought in wildfire resiliency. So that includes natural gas, standby

generators, and also alternative energy storage as well.

And then lastly, seismic retrofits for the various soft story. There's a big initiative in the city of LA to retrofit these and this is a great way to finance and amortize the cost. As well as non-ductile concrete and what I didn't put in here was hospitals and other key (feedback noise).

Oops. Think we're good now? Okay, next slide, please.

So want to give a high-level comparison of the available the financing for these capital expenditures, the building improvements, (indiscernible) either electing to do or have to do, per mandates. And so the typical way is through debt financing, but there's various challenges with traditional debt. Mostly being shorter terms and balloon payments.

So most traditional lenders will end up to 7 or 10 years max. So with this, and maybe they're amortized so the payments are maybe over a 20- or 30-year timeframe, but come due in 10 years. So if it comes due in 10 years, we call it a balloon payment and that either needs to be refinanced or paid off with cash. So this type of financing can be unfavorable to expanding the scope of the work or doesn't allow the overall project to cashflow and so the best thing that happens is if they don't have to do it, they're not

mandated, they don't do it.

The other constraints with that financing are personal guarantees so the borrower has to put up additional collateral. And they have the ability -- the banks would have the ability to have recourse, if the property owner fails to pay. This also reduces that specific borrower's capacity to borrow more, maybe for their core business or other needs that aren't necessarily for efficiency or, yeah, efficiency measures. This also can reduce the net worth of the building based on the amount of debt that's on it further constraining the property owner's ability or desire to make this project happen.

So then the next, we all know, cash. Cash can finance anything as well, but this reduces the property owner's liquidity and they're available cash on hand for either, they're either budgeting for other core things in their business and it's an opportunity cost. So a lot of these projects, while they do have a good internal rate of return, they may be not better than something in their core business. So you are always struggling for project capital versus, you know, it's better maybe to increase inventory for their business or hire more staff. And that has a better IRR than let's say a new roof or new building control system.

And so, lastly, really what PACE solves is they don't really mess with either the debt or the cash. So PACE, once

again, PACE financing is where the property is borrowing the money rather than the property owner. And so the financing itself is not callable, no covenants, no recourse. This conserves both the cash and debt for those -- that core business need or those cash reserves.

And so, let's go to the next slide. Let's go into the really the core benefits of PACE financing. We can provide up to a hundred percent financing on the project. This is much different than traditional financing which could be upwards of maybe 80 percent so the property owner does have to bring in some additional capital to make the project happen.

We are fairly conservative on loan to values so we don't, we're not further extending the rate portion of the value of the property for PACE financing. So we'll go up to 15 or 20 percent, loan to value. We can, however, go up to a hundred percent combined loan to value. So a quick overview of that is if a commercial property has a mortgage of let's say 80 percent loan to value, we could come in with the other 20 percent to make the project happen.

We can go up to 30-year terms so a lot of these eligible improvements have long useful lives. And so the struggles, like I said, with normal debt financing is the short of returns. So since we're investing into the property and that specific improvement with the longer term, we can go

up to 30 years. So as long as the project has a useful life greater than 30 years, we may go up to that. For example, let's HVAC has a 20-year useful life, we can do a 20-year term. But if we were going to do a roof, a roof has let's say a 50-year useful life, we can go up to 30 years.

So what's really unique about our PACE financing here is that it is self-amortized, or fully amortized, so there is no balloon payments. If we go up to the 30 years, at the end of the 30 years, it's completely paid off. We don't have any recourse, so property owner doesn't have to put up additional collateral or personal guarantees. It doesn't accelerate at all so if there is a delinquent payment, just whatever is due is owed. And we can never accelerate the financing. Just like property taxes, you don't accelerate property taxes, if they become delinquent. You just have to come current.

What we're seeing as a great benefit here is deferred payments. So how property taxes are billed, there's a fiscal year from July to June, and so if we do a project let's say right now in May, we can defer it an additional year, tax year, and it would show up on the 2021 -- I'm sorry, 2022 tax bill.

As I mentioned, the property is the borrower, not the property owner. So that means if there happens to be a sale, it may be able to be transferred to the next property owner. It also can be passed through to tenants. Most tenants in a

triple net situation have the ability or in their agreement are paying the property taxes. So this can solve the property owner/tenant catch 22 that a property owner that wants to make improve -- or sorry, the tenant wants to make improvements to reduce their energy consumption or their comfort, but at the expense of the property owner. So the property owner could elect to have this financing and then pass through the property tax financing to the tenant.

Next slide, please.

So just a quick overview. I'd like to put our Property Assessed Clean Energy products into three categories. And we've mainly, here at Ygrene, focus on the middle which is the retrofit. But we do do new construction so that will be a part of the capital stack so it'll be construction, financing, and essentially what we're doing is there's -- PACE can replace some of the higher interest financing like mezzanine or what we call hard money and overall reduce the overall cost of the financing for the property owner. And in doing so, if we can lower the cost, sometimes this can able higher building standards to be implemented in the scope. But essentially this is allowing more projects to get done at a cheaper form of money.

Like I said, Ygrene is focused on the retrofit or rehabilitation of buildings. We have aging building infrastructure and so we've been focused on the small to

medium sized businesses looking to access capital to accelerate the growth or accelerate these projects and get these buildings up to current building code or exceed them. So, like I said, it's a hundred percent. We have the longer terms. Things get the cashflow. It doesn't have to be in the budget this year and, you know, what you've seen mostly is mostly fixing of let's say HVAC, not putting in new systems that have an overall efficiency and can really have a net benefit. So our campaign is to replace, don't fix, and do a comprehensive model. And that comprehensive model could actually produce a net benefit to the property owner.

And then, lastly, what I wanted to say what we solved for -- or have a solution during this COVID crisis is a retroactive or recapitalization. So we have the ability to finance retroactively projects that property owners have done in California for the last five years, since our program has been in inception since 2015.

So for an example we had a property owner that did a new roof, HVAC system for say $500,000 two years ago. Now they're in a scenario that they need, let's say that was a hotel, they don't have any liquidity coming in from, you know, hotel bookings and now they need to pay their mortgage. And they need all this, they didn't budget for this lack of liquidity. We can come in relatively quickly and inject capital into the property and into the property owner so they

can maintain their debt service to their mortgage holders.

And so we can be a great benefit. They can also manage cashflow with this capital coming in. They don't have to make payments for up to two years so they're not going to be burdened with additional payments every month or every year. And so we can float them through this crisis and see the light at the end of the tunnel here while we get back on our feet. So we've seen a lot in uptick in property owners looking for this type of product and it's been great to service these property owners in need during this time. So I want to thank you all for this opportunity to present PACE to this workshop. Thank you very much.

And my contact information is there if you have any follow up questions about the program. Thank you.

MR. TAYLOR: Thank you very much, Ryan, I really appreciate it.

I'm going to transfer this over to Commission McAllister for his questions. But real quick, the -- okay, clearly financing and project costs are top concerns and I'm really glad to have Ryan here to focus on, you know, the general concepts and much more broadly than just PACE. But is there any other financial tools for commercial building owners that any of the three of you would like to highlight?

MS. MAZELLI: You know, it's -- there's not a lot, that's the problem. You know, SBA has, there's a 504 and 7A

loans out there that allow commercial property owners that are owner-occupied so they own a business within the building that they own. They have some pretty good financing for them. But for property owners that have tenants, that's where you're just dealing with standard, traditional ten-year loans and so a lot of it is then, yeah, your financing it via cash. And so that's why I think we have an aging building infrastructure of well, I don't live in the property or I don't occupy the property, it's not really in my benefit to inject a bunch of capital. I own these buildings, they -- just going to react to anything that needs to be fixed rather than create a healthy building. So financing, like PACE, I think is pushing property owners that would normally not necessarily look at it that way. So, yeah, there is a gap.

MR. MALOTTE: This is Chris from Southern California Edison. I will highlight on-bill financing I know was touched on earlier. On-bill financing is a really good tool for energy efficiency. The challenge with it is it requires bill reduction looking at one fuel. And so there may be opportunities to modify that in the future that really target kind of comprehensive bill savings that currently we are thinking through. Or maybe even increasing above the bill, you know, using it as a tool for actually paying off a loan, just a normal loan.

MR. TAYLOR: Commissioner McAllister, I'll turn it

over to you for questions and then we'll have some opportunity for public questions and then we'll move on I believe to the full public comment period.

COMMISSIONER MCALLISTER: Great. Can you all hear me okay?

MR. TAYLOR: Yes.

COMMISSION MCALLISTER: Oh, good. Great. I've been having some audio issues today so hopefully we can work those out going forward. So thanks very much for your presentation. I'm excited about all of what you are doing, certainly a commercial sector is a focus as you know of the building code update for 2022 and so this is relevant not totally for the 3232 work, but more broadly. I certainly appreciate all your collaboration.

And excited about the optimization program that you're doing with the CSUs and UCs just because it does allow this integration that you're referring to, Chris, so I really like that and taking a broad view of how we get decarbonization.

I guess I want to leave time for others to ask questions. My, I guess I would ask all three of you, you know, we're in the COVID era, there's quite of bit of discussion about how the way we use buildings, will change. And our behavior patterns and our work patterns will change. And there's even talk of a glut on the commercial side or

some unused commercial space. So I guess I'm wondering whether you see or if you're thinking about opportunities for decarbonization in this transition or as we sort of seek the new normal in terms of our work lives and how these buildings actually get built going forward. You know, as their usage patterns may be changes, are there windows or doors that open for us.

MS. HIGGINS: Well I think I'll chime in first, Andrew, thank you, Commissioner McAllister. Is my audio okay?

COMMISSIONER MCALLISTER: Yeah.

MS. HIGGINS: Oh, okay. This morning, I get the bi-weekly EU News and they're calling, their terminology -- terminology does matter, you know, it captures the market centers. They're using the term renovation wave for their investment post-COVID and I think in California waves will be pretty popular with your cosign and that term might capture this.

Asset risk is a big concern to the commercial sector and we've been talking to some of the BOMA chapter leads and their entire mindset and concerns is about rent and lease payments, very little about having to do with the building structure itself. It's whether it's going to be literally empty or paid for, those risks.

So I think that there is opportunity, again, back to

what I said earlier about messaging, that this is not, you know, an energy-driven solution just because that's our lands. The solution is about returning to an asset that's more secure, that's attractive, and beneficial to the occupants, the health aspect, the ventilation strategies, the resiliency of the physical space. I would expect that we'll see some pull back on new construction because there's going to be extra existing buildings that may be vacated or changed in the modification. So it'll be great price points for people to reconsider occupying existing buildings. But I'd just echo the opportunity to make our lands symbiotic with the lands of commercial owners in terms of risk mitigation.

COMMISSIONER MCALLISTER: So maybe there's a theme there that is, okay, if we believe that there's a wave of renovation coming, how do we get our ducks in a row to really have an impact on it, have our finger on the pulse of it and get involved early on in each project.

MS. HIGGINS: Yeah, or what kind of building do you want to have in the future instead of what building do you have that's a baggage to you right now.

COMMISSIONER MCALLISTER: Right.

MS. HIGGINS: And combined with a great finance options. I can't believe what I just heard from Ryan that he can go backwards several years. What a fabulous opportunity for buildings to get some funds for items that they need to

do.

MR. MALOTTE: This is Chris Malotte from SCE. Commissioner McAllister, I'm kind of -- I've got a couple of thoughts on this particular question. So, one, I think is COVID has really shown us that by taking action, we can actually have really strong impacts on the environment. And so I think it's a lot more visible to people just how much what we do impacts the environment. And so I just want to throw that out there for thoughts because I think people are a lot more likely to believe that what we adopt in the future will actually benefit the environment because they are seeing it with their own eyes right now.

Second piece is, I think there's going to need to be a large amount of stimulus money going towards kind of the reopening of the economy, however you want to call it, as we get things back up to normal. And there is a lot of benefit to marketing our building decarbonization measures as kind of shovel ready, so to speak, so that it's technology that's there that if properly stimulized can actually move a market forward. And, you know, I'm thinking back to the last recession with really AMI and a lot of the solar stuff that was out there. That stimulus money has paid dividends many times over and that it's now become a market adopted. And so I think we need to take a similar approach on the building decarb side and say this is a really good opportunity for us

to really move these technologies from somewhat infancy to mature marketed option.

COMMISSIONER MCALLISTER: Great. I'll second that. Your CEO is on the Governor's Task Force so please let him know how good this is.

Great. Well, I think, unless Ryan you want to chime in, I think I will open it up for questions so we can make sure we get to everybody as possible.

MR. MAZELLI: Yeah, I'm good, yeah.

COMMISSIONER MCALLISTER: Great, thanks, Ryan. All right, I'll pass it back to Gabe and he can manage the public comment.

MR. TAYLOR: Yes. Turn it over to the Public Advisor's office and the host, PAO office, to read off any questions for this panel. And then after we have a couple of questions for this panel, maybe we can formally transition to the general question period.

MR. SAMUELSON: Okay, this is Brian. I have, yeah, there's a couple of questions for this panel. One specifically for Ygrene from Roger Davenport. Question is PACE rates seem high to me, particularly for solar, which has basically zero risk. Please comment.

MR. MAZELLI: Sure. So rate is just one of the piece of the puzzle. So when comparing rate, there's more to consider with either fees and then mainly the true cost of

the funds over the term. So while PACE won't be the cheapest form of capital, it has the longest amortization possible. So it achieves a more, it achieves I would say cashflow scenarios, in some case for solar, it can be cashflow positive.

So if you have a term of 30 years, the payments are going to be significantly lower than a 10-year term. So maybe the payment on the 10 year, while that interest rate is higher -- sorry, that interest rate is lower maybe from the bank, the payment is greater than the energy savings from the solar system. Now PACE may be a higher interest rate, but the payment is over 30 years which is lower than the energy savings so you have a net cashflow benefit from day one. So it solves the issue of I want to do this project and I don't want to pay any money out of pocket, and I want to be let's say cashflow neutral or positive. That won't be the case with a traditional bank loan. If a customer is looking for the cheapest form of capital, then going to an institutional bank is your best bet. So we're supplementary. We're not the only solution. So it's all -- it's a cashflow play.

MR. SAMUELSON: Okay, thank you. The next question is from Jan Dietrich. This is for all the panelists. An important source for financing for DERs that support commercial solar plus storage building projects is currently going to the IOUs in transmission access charges. Fixing TAC

can redirect over 60 million over the next 20 years. Why isn't TAC's reform part of the discussion for fuel switching?

MR. MALOTTE: So I think that's probably directed closer to me at SCE. And I'll say I am by no means the expert on transmission access charges, but, Jan, I'm happy to get you in touch with the right people so we can talk about that further.

MR. SAMUELSON: Okay. We'll move on to a question from John Norwood. It's a general question. If part of the preceding are to help achieve more improved energy efficiency and housing affordability, how can that be squared with the much higher cost of electricity versus the cost of gas?

MS. HIGGINS: I can address that because what you're really referring to in terms of fuel prices, if you look at a model of analysis of comparative gas technologies versus electric, which is the point before us.

Previously, for example, a gas water heater was definitely the most economical system to operate. But when you've got a heat pump water heater that performs at 3 to 4x the efficiency, the actual cost of operating that system is the same for air source heat pumps. So it isn't a matter of the fuel cost singularly, it's you put the unit in and how many units to get out for your bills. So operating costs of the technologies that are being promoted are lower than the operating costs of the incumbent technologies in order to

make them competitive. The real barrier lies in the difference in the capital cost install them.

MR. MAZELLI: Yeah, I was going to add just like the said levelized cost of the unit over time versus upfront. Yes, some of the incumbent technology can be cheaper to install but sometimes over that useful life of a more efficient or newer technology could be lower.

MR. MALOTTE: Yeah, I'd second on that. I think there's a lot of, it's very much situation dependent as well. There's a lot of different studies that have different numbers. So you saw some earlier in the day about residential situations where it's substantially cheaper to switch to heat pump water heaters, but again it really depends on how much of the house needs to be retrofitted to accommodate that and that sort of thing. So what we have seen is that there's bill savings to be found in the residential space. Less so on the commercial space but there's still some benefits depending on the particular technology.

MR. SAMUELSON: Great. That was all of the questions that I had from the chat.

MS. MURIMI: Thank you, Brian. This is Dorothy Murimi with the Public Advisor's office. We can move on to public comment. And so if folks on the line could use the raise hand feature. If you click the participant button, go

all the way to the bottom, there's a raise hand button, click that, and that'll notify us that you have a question.

We do have one from a call-in user that emailed the Public Advisor's office. That is also another option you can use. Email the Public Advisor's office at publicadvisor@energy.ca.gov. If you're on the phone line, I'll be able to unmute you.

So let's go through call-in users first since I see no hands raised at the moment. We'll start with call-in user 28. Brian, if you can go ahead.

MR. SAMUELSON: They are unmuted.

MS. MURIMI: Call-in user 28, do you have any comments? No. All right. We can try call-in user 42.

MR. SAMUELSON: Call-in user 42 is unmuted.

MS. MURIMI: Is that Lauren Cullum? No response and no hand raised. I'll hand this over -- I'll hand this back to Jennifer. Again, if anyone has any public comments, please raise your hand. Also --

MR. SAMUELSON: Dorothy, this is Brian. I do -- I have gotten one on from the chat that John Norwood --

MS. CULLUM: There you go, Lauren.

MR. SAMUELSON: -- would like to comment. So let me unmute John.

John, I unmuted you.

MR. NORWOOD: Hello. Thank you. My name is John

Norwood and I'm representing today the California Pool and Spa Association and I realize that a very narrow interest in all this. I've actually enjoyed this whole webinar, and hopefully I've learned a little bit.

But, yeah, we are an association of swimming pool builders, but also the service industry, the manufacturers, subcontractors, distributors, and things like that. Our interest today may seem narrow but in a 2014 study, there was indicated that pool and spa industry has a $5 billion effect on California and that didn't include remodeling. It also doesn't include the multiplier factor of backyard furniture, barbecues, you know, a number of kinds of pool toys, things like that. And also it's the industry that is local in nature. We have obviously builders all over the -- in almost every city and county. They buy all their materials locally. So they really are participant in the economic activity of the state.

Our association supports a balanced energy portfolio and that includes natural gas and it's in part because of what we build. We've worked with the Energy Commission through our members on trying to reduce energy use and with LED lighting and variable speed bumps. And, you know, pool heaters that we have less friction and use less energy. But we're concerned about going in this direction because it seems to us that eliminating the use of natural gas in

California are providing incentives for homebuilders to construct new housing tracks without natural gas lines or hook ups, or otherwise phasing out natural gas, kind of undermines our industry. Deprives Californians of choice and at least in my opinion it kind of a regressive tax.

Just to be clear, our members don't just build swimming pools and spas. They build environments for families that, you know, to enjoy their backyards. And we're seeing with COVID-19 that people, you know, want to do that. Even before COVID-19, since 2014 we've come out of the economic depression, every single year has been a record year for pool building in the state. But, you know, we're building outdoor kitchens, barbecue islands, fire pits, fireplaces, pizza ovens. You know, things like that, in addition because people want to enjoy their homes and use those. And that's just on the residential side, a whole different deal on the commercial side.

But we don't see right now to the extent that we can use alternative energy sources, you know, that's one pull. Certainly solar and to some extent heat pumps play a role in that, but they don't play a role in a heater that heats a spa for somebody that wants to take a spa at 9:00 or 10:00 at night. They don't replace barbecues where people want to barbecue outside. They don't replace fire pits when people want to do s'mores on their fire pits. And that may, you

know, seem very small stuff to, you know, this larger goal of reducing greenhouse gases, but it's obviously critical to our side of this thing.

On the commercial side, if you include swimming pools, and schools, and colleges, and universities, and swim clubs, and things like that, the practicality of using anything but gas to heat those pools is just not there. To use heat pumps and solar, you would need equipment pads the size of a basketball court. Even in home applications to be able to have something that would be equivalent to a gas heater, you need these big equipment pads and what we're seeing in commercial, or excuse me, in residential construction is smaller and smaller building platforms for homes to the point where you're talking about you're lucky to have five foot --

MS. MURIMI: Sir.

MR. NORWOOD: -- side yards.

MS. MURIMI: Mr. Norwood.

MR. NORWOOD: Yes.

MS. MURIMI: Your time is almost up. Do you have any other closing comments?

MR. NORWOOD: No. I just like to say that, you know, I think you had somebody from, I think it was Gridworks, prior that tried to pull things together and industries together to have conversations about, you know, how we could

go forward together and maybe we're a candidate for that. But we are interested and would like to continue to be a participant in these kinds of proceedings and to see how we can keep this industry alive. Thank you.

MS. MURIMI: Thank you. Next we have -- oh, do we have anyone else? Brian, I see we have one call-in in George Nesbitt, with their hands raised.

MR. SAMUELSON: Yes, I'm going to unmute Lauren Cullum right now.

MS. CULLUM: Thanks. Hi, can you hear me?

MR. SAMUELSON: Yes.

MS. CULLUM: Hello? Oh, yes?

MR. SAMUELSON: Yes, we can hear you.

MS. CULLUM: Okay, wonderful. Hi, Lauren Cullum, Policy Advocate with Sierra Club California representing 13 local chapters in California and a half a million members in supporters across the state. Thank you so much for hosting this webinar today on the AB 3232 Building Decarbonization Assessment.

You know, considering our current circumstances due to COVID-19, regulatory rollbacks, budget cuts, it is that much more essential that the building decarbonization assessment emphasizes the importance of transmission to 100 percent electrification. Sufficient electrification will ultimately bring methane and carbon dioxide emissions from

buildings to zero as the grid becomes cleaner, eliminate the health impact from burning gas indoors and do away with the safety risks from gas leaks and explosions all while capitalizing on a declining cost of generating electricity from solar and wind power.

And in my comments today, I'd like to just quickly or briefly address the role of biomethane and synthetic gas to decarbonized buildings. The gas industry often pitches these resources as an alternative for building electrification, but it will not be possible to achieve the decarbonization we need using methane fuels for at least four reasons.

First, there isn't a sufficient supply. The gas industry's own research found biomethane can only replace 13 percent of the existing demand for possible gas after two decades of ramping up supply and production. Any strides used to reduce those emissions that relies on biomethane would not lead to full or even substantial decarbonization.

Second, swapping fossil gas from biomethane is astronomically expensive. Production costs can be 8 to 17 times more expensive than fossil gas.

Third, biomethane can have serious environmental impacts. Facilities where biomethane is produced by confined animal feeding operations can exacerbate air and water pollution impact in nearby communities. And biomethane still produces carbon dioxide solution from combustion and methane

leakage throughout the distribution process.

Finally, biomethane is no cleaner than fossil gas and burning it in our homes and buildings can cause the same problems inherent in any combustion-based fuels. They produce (indiscernible), carbon oxide and other pollutants that harm our health and also contribute to local air pollution.

By contrast, UCLA researchers have found that replacing residential gas appliances with zero emission electrical alternatives in California will result annually in at least 350 fewer deaths and produce at least $3.5 billion in health benefits. I'd also like to note that gas is not necessarily more reliable in the event of a power outage as many gas appliances like (indiscernible), ovens, and tankless gas water heaters also require electricity to operate.

And finally, it is important to remember that building electrification will also require a skilled and trained workforce. As recent studies have shown that electrifying 100 percent of California's existing and new buildings by 2045 would create over 100,000 full-time equivalent jobs in various sectors of the economy. That figure represents a net increase in jobs even after accounting for losses in the fossil industry. And 3 out 5 of these new jobs will be inspectors that require and appropriately compensate the skilled and trained workforce.

By prioritizing our (indiscernible) homes and buildings, it can help achieve the climate, safety, affordable housing and economical (indiscernible) methane gas dependency. Thank you so much.

MS. MURIMI: Thank you, Lauren. And just a note before we move on to George Nesbitt, we do have Panama Bartholomy from the Building Decarb Coalition and Meghan Dewey from PG&E. They are available to answer questions if anyone wants to raise hands and ask a question.

Next we have George Nesbitt.

MR. NESBITT: Can you hear me?

MR. SAMUELSON: Yes, we can hear you, George.

MR. NESBITT: Yes, George Nesbitt, HERS Rater.

The main point I'd like to make is that electrification is only a part of decarbonization. So I've been professionally involved in construction. I've done everything from digging a hole in the ground up through the roof and pretty much everything in between. I've done, you know, remodeling, retrofit, repair, addition, a little bit of new construction. You know, impersonated architecture and engineer skill. So I've got a lot of different experience and energy efficiency environment are our core values I grew up with.

I think my experience, our experience for many of us for decades has been the difference between -- there's a big

difference between building that use less energy to do what they need to do and those that use more, has to do with design, construction, commissioning. And I think in a lot of ways we still play a fair amount of lip service to the amount of potential for energy conservation and efficiency building buildings that need very little energy. That the energy they do use, they use efficiently through, you know, efficient water distribution or air distribution system. That's before you even get to the efficiency of the equipment of the heating, the cooling system, the water heating system, the lighting system or the fuel of those systems.

And so, I think for electrification to make sense considering we're talking about electrifying buildings, the transportation system, industry, everything, is that if we do not drastically reduce the amount of energy we already consume, it's going to be a lot harder to electrify everything and we can't just assume that renewable energy is going to be cheaper, or battery use, and nuclear power was supposed to be so cheap they wouldn't have to meter it. And we know how expensive that is. So we really have to pay attention.

And, you know, there are so many decisions that are made, that are made poorly or without thought that basically make it more expensive to go back, do it right. Or to allow you to inflate or do something in the future. And if we don't

have a whole industry that recognizes opportunities when they go to replace a water heater, to make an improvement, we'll never get there. So that's all I really have to say.

Thanks.

MS. MURIMI: Thank you, George. Is there anyone else with questions? You can raise your hand. I see Jan Dietrich.

MS. DIETRICK: Can you hear me?

MR. SAMUELSON: You're unmuted, Jan.

MS. DIETRICK: Thank you. Yeah, so I'm Policy Team Leader for the Ventura County 350 Climate HUB. So we've been, had a campaign to all the cities in West Ventura County for building decarb and one of the barriers that we find is the immense influence of Southern California gas on our city councils and our city officials.

I've been to city council meetings where the SoCal Gas representative has her three-minute pitch, it's opening of meetings, making sure the public and the city council members all know that they have a right to continue to enjoy cooking with gas. And as the Sierra Club person said that this could be clean gas, right? And so I want thoroughly, we thoroughly endorse the comments from the Sierra Club California about getting all gas out of homes and wonder how it can be that SoCal Gas can be allowed to do the kind the disinformation that it's doing in our cities with the amazing

blackmail that the friends of SoCal Gas did to the San Luis Obispo city council deterring them from approving their reach code in their second reading. This kind of pressure and influence from the gas company has really got to stop. Thank you.

MS. MURIMI: Thank you, Jan. We have Pierre Delforge. Forgive me if I'm saying your name wrong. Pierre Delforge, from NRDC, on the line.

MR. DELFORGE: Thank you. You said it very well. So I want to thank you, thank the Commissioner and Commission staff for holding this great workshop and all the presenters for these really insightful presentations today. And I'm speaking on behalf of NRDC.

So I'll be starting to say it's critical to understand how we can decarbonize our building stock at the pace and skill needed through the pandemic crisis. And as Commissioner McAllister rightly pointed out, the challenge how to scale this decarbonization cost-effectively, particularly in low-income communities who can least afford the capital cost of this transition.

As we made the case in our previous written comments and we'll continue to develop in our next comments, we need a moonshot strategy to develop the market for clean heat and cooking technology to bringing down the cost curves so that it becomes affordable to retrofit the entire building stock

in California for energy efficiency and electrification together. California has done it before with the help of others with rooftop solar as, you know, Panama Bartholomy showed in his presentation, with appliance efficiency standards, LEDs, we're currently doing with electric vehicles. So we encourage the Commission to propose a clear road map for California.

As proposed with the -- by the Building Decarb Coalition, to address this new moonshot and to show the rest of the world how we can move to an equitable and just building decarbonization in line with our common goals. Thank you.

MS. MURIMI: Thank you, Pierre. Next we have Charles Cormany. Charles Cormany.

MR. CORMANY: Hello? Can you hear me?

MS. MURIMI: Hi, we can hear you.

MR. SAMUELSON: Yes.

MR. CORMANY: Okay. This is Charles Cormany. I'm calling from, I'm representing (indiscernible) California.

I've heard some interesting conversations today and one thing I want to point out in all of this being a trade organization that represents contractors is there's going to be no scale to this effort if we don't fund and put a concerted effort into contractor education training to bring them into the workforce. We have to put, you know, the solid

value proposition was presented earlier. I think contractors being profitable is key. If we want people to support this industry, we have to get them out of their existing modes of just going in and quickly replacing equipment and thinking a little further down the road and putting in the right solution instead of just the quickest and most profitable.

That said, if you can make the most profitable solution the correct solution, i.e. heat pumps, that would be a good step in the right direction. So I think we need to really fund and support contractor education and training.

And I also want to state that it's also hard for consumers to find people who are supporting this work. I get calls regularly from -- hey, do you know somebody in this region or that region who can help me with my electrification project. So we have people who are going down the path towards electrification or early adopters and there's really no easy way or solid way for them to find a contractor who can do the work.

So efficiently just currently involved in kind of spearheading an initial development on a contractor directory statewide, and we're doing that at on our expense because we feel that it's such an important issue. So I think we really need to get behind making some way for the consumer to be able to find the people to do the work and encouraging -- holding contractors to get on board on some kind of a form

and have a statewide tool for people to be able to find the right people to do the work. I think that's critical to getting scale. That's it, thank you.

MS. MURIMI: Thank you, Charles.

At this time, I see no other hand raised. If you have a question or a comment, please utilize the raise hand feature. I see, okay, I see Tom Conlon. Tom Conlon.

MR. CONLON: Hi, can you hear me?

MS. MURIMI: Yes, we can.

MR. CONLON: Great. I was just reflecting -- I would also, I first would echo what Charlie Cormany just said. Obviously we need to make it viable for contractors, for customers to find contractors and contractors to make a profit when they do a job.

But I wanted to go back to something that the representative from PG&E, Meghan Dewey, said this morning about homework for us to address the customer barriers around perceptions that gas cooking and gas fireplaces are still desirable in a home. And we have, it feels like the AB 32 efforts -- 3232 efforts are happening in a silo right now, that they're not well integrated with the rest of the portfolio of marketing education outreach activities. In particular, the Energy Upgrade California program.

So my question to the panel is, when do we really see this electrification effort becoming central to the rest of

the marketing education and outreach programs, especially in the residential sector.

MS. MURIMI: Thank you, Tom. At this time, this is Dorothy again. At this time, I see no other hands raised. Oh, we have one more. Becky Menton. Becky Menton.

MS. BENTON: Hi, this is Becky. Can you hear me okay?

MS. MURIMI: Yes, we can. Go ahead, Becky.

MS. BENTON: Thank you. So I personally learned firsthand barriers associated with electric service upgrade when my water heater failed and I tried to get it replaced with an electric water heater. And the timeframe and cost both increased significantly when the service panel question came into play.

Given that we know we need to electrify significantly our building stock in order to meet our climate goals, but that estimates range from 30 to 50 percent of single-family homes will need to have service panels adjusted, I'm curious what is being done both in terms of programmatically trying to think through how we can address that problem to enable the scale of electrification we need to see, but also from a regulatory standpoint, it's fair that utilities need to have their cost covered. But some comparisons show pretty broad variation amongst utilities with costs being 3 to 4 times higher in some utility service areas. So I wonder what's

being done or considered a solution to this issue. Thank you.

MS. MURIMI: Thank you. Pardon me. Thank you, Becky. Do we have any other questions? Please use the raise hand feature for questions or comments.

One more time. Any questions, please utilize the raise hand feature. And also you can email the Public Advisor if you're on the line and we will unmute your phone line. Any questions or comments?

Oh, we have Katie Wu, one of our panelists, Katie Wu, can speak to Becky's question. Katie, go ahead.

MS. WU: Thanks, Dorothy. And thanks, Becky, for the question.

I do think this issue of panel impacts and who pays for panel upgrades is huge. You know, to your point, if 30 to 50 percent of single-family homes are going to need a panel upgrade, then, you know, significant funding needs to be available for that. But some solutions might include Amperage Technologies that would require less capacity on the panel and encouraging manufacturing of those technologies.

And then to me, I also think that there is this issue of adequate quality of electric service. And if electric panels are not sized adequately to meet the service that customers want, then I think the state, along with utilities and stakeholders, need to think about what it means to have

access to electricity. How do we improve access to electricity so that customers have adequate service? And for the state then to consider whether it is within its budget or within the Clean Energy stimulus to fund panel upgrades for, you know, the oldest buildings that may not have ever had their panels upgraded. So I do think that there is opportunity to think through creative solutions, but no one agency can do this on their own. I think it will take a coalition of people to think it through.

MS. MURIMI: Thank you. Do we have any other questions? Seeing no one, I will cede the floor to Jennifer.

MS. NELSON: Thank you, Dorothy.

MR. ROSALES: Jennifer, this is Eddie. Can you hear me?

MS. NELSON: Yes. Yes, I can.

MR. ROSASLES: I'm sorry to interject, real quick. I'm just going to give Leah Pertl an opportunity. I think she wanted to chime in and also share one last point on that last question. Sorry about that.

Leah, if you can hear me, you're unmuted. You can go ahead and make your remarks. Okay, maybe Leah's unmuted. Okay, Jennifer, back to you.

MS. NELSON: Okay, great. I want to thank everyone today for making this a wonderful workshop. I want to send a thank you to the attendees, the panelists, our moderators,

Commissioner McAllister. I want to send a special thank you to Dorothy Murimi and Brian Samuelson for facilitating the public comment today. Written comments by June 8th, 2020 by 5 p.m. Information on how to submit the comments is provided in the notice. Below on the slide you will see I have listed staff contacts with emails. If you have any questions or comments, please don't hesitate to reach out to any of them.

With that, I'm going to send the microphone over to Commissioner McAllister for some final remarks and then adjourn.

COMMISSIONER MCALLISTER: Oh, great. Okay, so I think I'm back on here for everybody. Can you hear me all right?

MS. NELSON: Yes.

COMMISSIONER MCALLISTER: Okay, great. Yes, I just wanted to repeat the thanks for everyone. Really I think that we have a stalwart group of a little over a hundred that stuck with us the whole day and I think we topped off at over 200. And recognize a lot of the names as real innovators in this space. So really hopeful that all of you and your colleagues that weren't able to make it can chime in with comments and also just keep your thinking caps on as we move forward with this report.

I really -- I want to emphasize just a couple of high level points that I heard today and I think deserve a lot

more discussion. You know, one is how do we keep contractors front and center as one of the absolutely critical links in this chain, the link between the customer and the product supply chain. And get quality installs at a value to the customer and have the contractor still be able to make money. That have that just a necessary precondition for any definition of success. So how does that work? And I certainly, you know, the time sensitive nature of water heater replacements, all that, I mean, it's just we have to figure that out. And that is a community effort. That's nothing that we can poke and prod at with regulation, but really it's a market solution, it has to emerge with real value behind it. And so that's going to take a real collective effort. So I'm hopeful we can describe that with some specificity and credibility and robustness in this report. And just getting in the workflow, you know, helping that workflow happen in a way that actually can scale, focusing on the customer.

So there was some interesting conversation about including about panels and other issues that just came up here at the end about how we can use creative approaches to get financing for those upgrades that don't necessarily sit entirely with rate payers and that don't require massive amounts of subsidies from the general fund or state coffers that actually do dip into existing capital flows. So I

think, again, those are solutions that we've just got to flesh out. The tariff non-bill is really a solid one that we can try to engage on and describe in more detail and make a real solid proposal.

I also want to just acknowledge that a lot of these conversations we are having at the Energy Commission in consultation with our colleagues over at the Public Utilities Commission. I mean, the Energy Upgrade California program is over there. There was a question about that. And they are in the process of thinking about how they frame and structure their efficiency portfolio going forward that they ask utilities to administer working with lots of third parties. So that's an important piece of this discussion. More broadly, we have contractors and energy performance contracting particularly in the commercial and public sector where there are large capital flows happening outside of any program that we really need to help shape.

So trying to tie together some of the big themes and some of the sticking points that are going to get in the way of success and try to find solutions to those. So I know staff is really rolling their sleeves up ever higher here to crank out this report and a good draft and keep the discussion going with all of you to help that happen expeditiously.

So with that I think I'll again just thank staff for

all of the organization and, you know, managing the moderators and Public Advisor for managing the flow of comments and participation throughout the course of the day. I've really enjoyed it and I hope everybody else has too. It's just the start, one step in a bit of a journey here to really do what I think where the state, where the legislature have asked us to write a robust plan for something that's incredibly fundamental to the state to meet its common goals. So we take it seriously and I think really we're going to have the most success when we get the best engagement from all of you and stakeholders. So thanks again for being with us for the day.

Pass it back to you, Jennifer.

MS. NELSON: Great. Thank you, Commissioner.

Dorothy sent me a note saying we have one more public comment so I'm going to allow that to happen before we adjourn. So, Dorothy, I will send the microphone back over to you.

MS. MURIMI: Thank you, Jennifer. We have one last public comment from Kristen Kessle -- Kessler, sorry. This is emailed in to Public Advisor.

It states: I urge the Commission to say about natural gas and California by 2030. California has some of the worst air pollution in the nation. Emissions from gas appliances is a major contributor to this. Electrification

of home and building is not only the most effective way to reduce methane emissions, but doing so will create hundreds of thousands of new jobs. Thank you. Kristen Kessler.

Thank you, Jennifer.

MS. NELSON: Great. Thank you, Dorothy. Thank you, for everyone. Putting the sign off now. Have a good weekend. Happy Memorial Day.

(Thereupon, the Hearing was adjourned at 3:01 p.m.)

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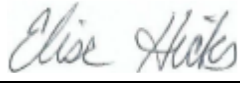
CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 17th day of June, 2020.



ELISE HICKS, IAPRT CERT**2176

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

June 17, 2020

MARTHA L. NELSON, CERT**367