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BEFORE THE
CALIFORNIA ENERGY COMMISSION

STAFF WORKSHOP

In the matter of,	)	
	)	
Senate Bill 68 (2021, Becker),	)	Docket No.22-DECARB-02
Electrification and Electric	)	
Vehicle Charging Equipment	)	
Website Workshop	)	

REMOTE VIA ZOOM VIRTUAL MEETING

TUESDAY, AUGUST 30, 2022

10:00 A.M.

Reported By:
Elise Hicks

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Tom Kabat, Building Electrification Specialist
Joseph Wachunas
Paul Nijssen, EVCharge4U
Hannah Bruegmann, Build it Green
Karen Kristiansson, BayREN
Dominique Lempereur, BlocPower
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P R O C E E D I N G S

August 30, 2022 10:03 A.M.

MR. ROSALES: Good morning, everybody. Welcome to today's workshop on the Development of the Building Decarbonization and Electric Vehicle Charging Equipment Website, Required by the Senate Bill 68 from 2021. My name is Heriberto Rosales, you can call me Eddie. I'm an Energy Specialist with the Existing Building branch of the Efficiency Division here at the Energy Commission. And I'm the project manager for this project.

So, as we get started, just a couple virtual housekeeping items. First, today's workshop is being broadcast through Zoom, and all parties should be aware that this public workshop is being recorded. This includes your participation, and your comments that will be posted onto the Zoom webcast. We'll post the full video recording on the Energy Commission's website in a couple days, and the written transcript of this workshop will be up in about two to three weeks.

If there's any sort of building emergency where you are physically located today, for example there's an earthquake today, please evacuate your building and get yourself to a safe area immediately. This goes for everyone on today's call, both panelists

and attendees.

So, our presenters -- we do have a full agenda today, so as a reminder I'm going to be letting you know when you have three minutes left within your allotted time. This is going to help us stay on track and keep the panels and public comment period on schedule. For all other attendees attending this workshop, including stakeholders, at the end of each panel session we will have an opportunity for you to provide comments or ask questions. Depending on the number of parties interested in speaking, we may limit live comments to three minutes. Please be aware of that.

Attendees, please use Zoom use the Zoom raise-hand function to let our public advisor know that you'd like to make a comment during the public comment period. Our recorder will notify you to be ready and open your line at the appropriate time. For phone in only participants, we'll open your line after hearing from the in-person and written comments first. Please be aware.

Access to all digitized material for this meeting will be available on our project docket, 22-DECARB-02. I'll go over some of that more in a minute. On the project website, Building Decarbonization and Electric Vehicle Charging Equipment Website Development.

Written comments for this workshop are due Wednesday, September 14th. Lastly, the Energy Commission is developing an Equity and Environmental Justice Framework to guide future CEC activities. To participate or follow this work, I encourage you to attend tomorrow's workshop, California's Equity and Energy Future Workshop, with a date of August 31st. You can visit the CEC's advance page, and the CEC website for more information.

Okay. Commissioner, with that, I'll turn it over for you. Dave, can you turn off the slide? Thank you.

COMMISSIONER MCALLISTER: Well great. Well thanks, Eddie. So, really happy to be here. This is a Staff Workshop, so I am listening in intently, like all the attendees. First of all, I just want to thank the Staff, Eddie, and all the attendees, and all the Staff at the Energy Commission that are, you know, standing up this, I think what's going to be a fundamental resource for the state to help us achieve our decarbonization goals. You know, particularly in buildings and in transportation sectors as they transition to carbon-free energy, which largely means electricity. And I think facilitating the market evolution in that direction just requires a lot of different activities.

But one of the most important activities is making sure that the public has the information they need to make decisions. You know, we live in a democracy, everybody's working on their buildings, everybody has real lives, and there's a real need for actionable information that's easily accessible. And I think that's what Senator Becker had in mind when he authored and led the charge to get SB 68 signed into law.

And so, really excited to be engaging in this way. I think, you know, the Energy Commission historically has done public outreach in a number of different ways in support of all of our programs, but I think this is a bit of a unique resource in that it really is truly public-facing and is intended to sort of really get a lot of eyeballs on it. Like really get public engagement and facilitation across the spectrum of the energy transformation. And so, these two sectors are so important to get them moving in this direction.

Now, we are also lucky that we have you know, new federal legislation in the Inflation Reduction Act. And perhaps even more importantly, the state conversation about the Governor Newsom's Climate Package. And the sort of phase two of the budget negotiations is happening, and you know, we're fortunate

in California to have resources to put into these sectors.

You know, the ZEV package and the Building Decarb package are significant resources. There are as many resources, likely, as any state has ever put into these sectors. And I think by a wide margin.

So, we're going to be relying on this resource that we'll discuss today to help those funds and other programs reach their intended audience, and really facilitate the marketplace. And that's what we need. We need people to make decisions, to install clean technologies, those installations need to be done right, and people need to go in understanding what these projects actually look like. And so, this site, while no website can touch everybody all the time, you know, we're going to be looking to this as a place to put resources that are actionable and that will get used.

And so, the discussion today really kicks off I think, you know, the process to target what best practices and really develop a distilled set of resources that are going to be the highest value. And so, really happy to be at this point, and again, want to thank the Efficiency Division Staff, the Existing Buildings team, Eddie, Gabe, and our Public Advisor's office as well, Dorothy Murimi, I see that she's on, and

Amber Beck, who does a lot of our communications in this realm. So, just a lot of staff. Jen Nelson, who leads that office, thanks to all of you.

And, you know, perhaps -- well, definitely most importantly, attendees. So, I see we have good turnout this morning. And we're going to rely on the panelists to sort of have a stimulating discussion. And the attendees, you know, really want to encourage all of you to submit, to comment today, and also to submit comments on the docket.

The way we do things at the Energy Commission is by developing a docket that has substantiative information in it and trying to build on that docket and be responsive to public comment, to all the stakeholder input, to really produce tools and resources that hit the mark. So, that's perhaps nowhere most important -- nowhere more important than in this particular activity, where we are really trying to curate how the state manages this conversation, very broadly speaking.

So, I will reiterate Eddie's point that tomorrow, we have the workshop on equity and inclusion down in Oxnard. I'll be there in person, but I think, you know, it'll be accessible on the web, and so I really encourage all of you to put the word out and attend yourselves.

That is a key criterion for all of our programs, and this website we're talking about today, or this set of resources, set of tools and informational resources is -- we really need to look at it through that lens, I'd say primarily. You know, put ourselves in the shoes of people who are not energy experts, but who want to do the right thing, how we can hook them up with resources, with information, with tools and with trusted partners that they can work with on those projects.

So, I think with that, I'll pass the microphone back to Eddie. Really excited to get started and listen to what everybody has to say. And again, just thanks to everyone for being here, and then thanks to Eddie for running herd on this workshop and really pulling together all these resources up to now and going forward. So, thanks, everyone, for your attendance and have a great workshop and have a great day.

MR. ROSALES: Commissioner McAllister, thank you. Thank you for joining us today. With that, let me start off our workshop with an overview. So, good morning once again to everyone, welcome to this CEC Staff Workshop on the Building Decarbonization and Electric Vehicle Charging Website, as mandated by Senate Bill 68. I'm Heriberto Rosales, an Energy Specialist

with the Efficiency Division here at CEC.

So, our goals for today's workshop are first, introduce the public to the project and the bill requirements. Second, I want to share our request for information, RFI, that was initially posted July 6th, and we're still inviting feedback from all public participants, respondents, and stakeholders September 14th. Third, we'd like to hear form stakeholders today and by September 14th on examples of equipment, tools, and resources that could be used and shared on the website.

Next slide, please.

Climate change is an urgent threat to the health and well-being of California's residents and economy. Switching from the use of fossil fuels to electricity for building energy use is a key strategy for reducing greenhouse gas emissions, GHG. In addition, the availability of electric vehicle charging, or EV charging and guidance for installing such equipment in buildings is an important pathway to advanced EV adoption.

So, reducing GHG emissions and increasing the resiliency of buildings and energy systems are critical for California to manage climate change costs. California agencies and local jurisdictions are focused

on coordinating and reducing GHG emissions economy-wide to meet the state's goal of providing a zero-carbon grid by 2045. The residential and commercial building sectors combine to account for 24 percent of GHG emissions when you include all fossil fuels in buildings, such as electricity and gas for heating, cooling, lighting and cooking, and emissions from refrigerants as well that are used in appliances and equipment within the building.

In 2018, Governor Brown issued executive order B-55-18, which established a state-wide goal to achieve carbon neutrality by 2045. That same year, the California legislature directed the CEC to assess the potential for the state to reduce GHG emissions from buildings by 40 percent using a 1990 baseline by 2030. And for the CPUC and CEC, to develop incentive programs aimed at advancing low-carbon equipment in the market and increasing the number of new electric low-income housing.

So most recently, in July '22 -- July 20, of '22, Governor Newsom sent a letter to the California Air Resources Board requesting their scoping plan account for 6 million new heat pumps by 2030, 3 million climate-ready and climate-friendly homes by 2030, and 7 million homes by 2035. Some pretty ambitious goals.

So, switching the focus from buildings to vehicles, the transportation sector accounts for about 41 percent of all GHG emissions, making it the most GHG intensive sector in the state's economy. The availability of EV charging at the residential and commercial building level is an important factor in advancing EV adoption state-wide.

So, in 2020, Governor Newsom issued Executive Order N-79-20, which set a goal of 100 percent of sales of new passenger cars and trucks to be ready to be zero emissions by 2035. To achieve progress towards the Governor's 2035 goal, California will need nearly 1.2 million public and shared public -- excuse me. 1.2 million public and private electric vehicle chargers within the next eight years to support an anticipated 8 million new vehicles -- electric vehicles on the road by 2035.

Next slide.

In the 2021 Integrated Energy Policy Report, IEPR, the CEC recommended, "The state provide a state-wide information campaign to familiarize consumers with and promote high-efficiency electric appliances and all electric buildings." Senate Bill 68, introduced by Senator Becker in 2021, requires CEC to develop and publish guidance and best practice to reduce barriers

for building owners, contractors, and local governments to transition to electric vehicles, equipment, and appliances. The legislation also codified that, "It is a state climate policy priority to make it as easy as possible for building owners to switch from fossil-fuel powered equipment to electrical equipment for heating, cooking, and other energy needs, and to install EV charging or energy storage equipment."

Next slide.

I'm going to cover a few barriers and solutions for the building sector. What are some of the barriers? While retrofits to existing buildings offer the greatest potential for emissions reductions, they also face more barriers than new buildings. For example, such as scheduling around occupant presence, equipment installation and requirements, upfront costs, space constraints, structural issues, and building upgrade requirements for a construction permit. These are all examples of barriers for existing buildings.

In addition, low-income households face additional barriers to decarbonization compared to higher or middle-income households. These include greater energy burden overall, poorer housing conditions overall, lack of access to capital, and if they rent, lack of control over housing improvement decisions to

their housing structure.

Together, these barriers create a high bar that must be reached to participate in decarbonization activities. Commercial buildings also face decarbonization barriers, including fuel costs, the higher cost of electricity compared to gas fuel in some areas of the state, and the lack of options to inexpensive systems that will replace conventional commercial applications. Such as high-heat cooking, and the lack of knowledge about short and long-term benefits of all electric equipment.

So, some example solutions to these barriers. So, our goal here with this project is to provide information to key stakeholders, resources as well, and best-practices to facilitate and reduce barriers for building owners, contractors, and local governments. Those three stakeholders are going to be key. To decarbonize buildings and electrify transportation, CEC and CPUC are working together to support strategic design of building decarbonization projects and programs to maximize household benefits and affordability in low-income and disadvantaged communities.

Next slide.

So, some barriers and solutions regarding electric vehicle charging equipment, EVSE. Some

barriers -- low electric vehicle supply equipment installations overall, and then permitting. Although about half of all public EV charging in California are installed in low-income communities, our analysis shows that low-income census tract communities still have fewer overall public chargers per capita than middle and upper-income communities throughout the state.

Permitting is also a barrier. So, as of 2020, only half of the 540 jurisdictions tracked by the Governor's Office of Business and Economic Development, AKA GO-Biz, has streamlined or were streamlined charger permitting ordinances. Of the jurisdictions tracked, 269 had no streamlining efforts. Burdensome permitting processes continue to immediately delay charger installation and pose a barrier to California's charger deployment goals.

So again, I think I've covered some of this, but the state has a goal to install about 8 million electric vehicles and 1.2 million EV chargers by 2030. And we are also -- another solution is resources that will be streamlined, and streamlined permitting and resources and increased enforcement.

As stated earlier, California is targeting 8 million EVs and 1.2 million EV chargers by 2030. We do have the opportunity to accomplish this goal. For

example, GO-Biz has assembled resources and example ordinances and a permitting guidebook to support local jurisdictions. GO-Biz also tracks progress across California using an eight-part scorecard.

Next slide, please.

Project phases. So, to implement the SB 68 website project, CEC is gathering information and resources that we'll post into the website in a phased process. I think the Commissioner was touching on this point, we're really relying on stakeholders and participants to provide us information and their recommendations to provide the best website possible.

So, in phase one, we will be addressing devices, appliances, and equipment. So, examples include hard technology such as heat pumps and water heating, and space conditioning and thermostats. These are products or items that must be physically installed into the buildings.

When we complete phase one, we will transition to phase two. Phase two will address all the soft tools and resources. This includes information on incentives, energy modeling software, case studies to support new policy, ordinance templates, and potential process guidance such as streamlined heat pump water heater permitting.

When we complete phase one and phase two, we will have addressed all the requirements for the website so we will then transition to phase three, which will be ongoing monitoring and updating of the website with new information and tools. Staff will develop metrics to monitor website usage and address user and stakeholder questions and input regarding their website experience.

So, today's panel will provide examples of technology and tools and how they can support building decarbonization efforts. CEC staff will be reviewing all stakeholder comments and RFI responses in addition to the examples of today's panel -- that today's panel will be sharing. It's our hope that stakeholders respond to the questions in the RFI, which again, comments are due September 14th, and share their ideas and thoughts on the record so that Staff can use them to help shape the website.

Next slide.

Quick timeline. September 14th is when comments are due to the RFI, but you could also include that as a deadline for comments to this workshop. Public workshop is -- we plan to launch a website later this year. So, by Fall '22, we plan to have another public workshop and a pilot website up so that way stakeholders can test it out and give us feedback then.

And then by later this year, we hope to launch the website.

Next slide, please.

So, this is my conclusion slide. So, for any general questions on this building decarbonization and EV charging equipment and website project, here's my contact information. The docket number for this proceeding is 22-DECARB-02, for your reference. That's where you can be submitting comments on the record, which is our -- going to be most useful again, for considering what ultimately goes into the website.

So, thank you, this is the end of my overview, and I will now -- we will now transition into the first slide. Gabe, can you transition to the next slide?

Gabriel, next slide, please.

So, we will now start with Panel 1. Gabriel, can you go to -- great. Josie, Tom, are you ready?

MS. GAILLARD: Yeah. Do you want me to share my screen?

MR. ROSALES: Yes, you could share your screen. Let me start off with a quick introduction. So, we will have four panelists as part of Panel 1. For those who are following, Josie and Tom will be our first presenters on Panel 1. Josie is an expert and private consultant focused on building electrification. Josie

is a graduate from the UC Berkeley Haas School of Business. And Tom Kabat will also be joining her as a co-presenter, and he is also a private consultant focused on building electrification.

Okay, Josie. With that, I will mute my line and I'll let you take it away.

MS. GAILLARD: Okay. Can you see my screen?

MR. ROSALES: We see it. Yes, we do.

MS. GAILLARD: Okay, great. First of all, good morning, Commissioner McAllister, Eddie, Gabe and CEC Staff. Thank you for inviting us. So, we'll be covering ways to simplify home electrification with circuit controls, which is what we were asked to speak about. And we'll get in to exactly what that is.

First, I just wanted to start with a little bit more on SB 68. As was mentioned, it was authored by State Senator Josh Becker, and it directs the CEC to publish best practices for building electrification. So, for reducing barriers and helping building owners electrify.

So, just highlighting a couple other details of the bill, which is now law -- which is that the Commission should gather this information, put it on a website, and specifically focusing on the following topics. One, is the availability of electrical

equipment that can minimize electrical service capacity requirements. That means enabling people to electrify without necessarily upsizing their service panels. And B., we see here again, kind of emphasizing that same point, approaches to energy budgeting to fit electrical replacements and vehicle charging equipment within the existing electrical service capacity of the building whenever possible.

It's not always possible, but as we'll learn later, we think it's possible in about 90 percent of cases to avoid a service upgrade. And that just allows dollars that would have been spent on a service upgrade to go toward the actual electrification of the building, swapping out the fossil-fuel equipment.

Other topics to be covered, which were specified in the bill, were circuit sharing technology, whole-building electrification plans, and streamlining and standardizing permit and inspections. All of which will be covered in the workshop today.

So, the idea with this bill, is it doesn't actually require citizens of California to do anything. It doesn't provide any incentives for people to do anything. This bill purely provides information, with the idea that information is power. Citizens of California are really concerned about climate change.

They may not know what to do. So, this website was intended to help people with really concrete steps to start on the journey of electrifying their buildings and their vehicles.

So, you know, the reason why we're all here, is despite all of the pledges to reduce global greenhouse gas emissions, this blue line tracks what we're actually doing, which is continuing to increase them. The orange line here is what we need to get on if we want to actually keep the temperature rise below 2 degrees C. And that red dash line is meant to demonstrate what happens for someone today who installs a gas furnace which lasts potentially for 30 years or more, that it locks in emissions at this current level, and prevents us from getting down that orange sloped line to zero emissions.

Just a quick look at equipment turnover rates. Cars, roughly, are owned by people for an average of seven years, whereas furnaces, you know, can be 30 years. Tom and I, often, when we go into buildings, see furnaces that are 70 years old. That's 7-0. These old wall furnaces and floor furnaces here in California.

So, the point is, we have many opportunities to intervene and help people make, you know, go electric in their vehicles. We have many fewer opportunities to

do that with equipment like furnaces. So, every gas furnace -- and there will be 167,000 gas furnaces replaced in California in existing buildings in this year alone. Every one we fail to convert this year locks in emissions until potentially 2052. Which, since the state is targeting a 2045 carbon neutrality, creates a problem, a future problem. So, this is why Tom and I, at least in our work, feel a sense of urgency. Every home that we can prevent from replacing fossil equipment with more fossil equipment is a win.

Okay, just wanted to be clear that our focus is not new construction, it's existing buildings, and we also focus primarily on single family residential. Not multi-family or commercial in terms of swapping them from fossil fuel to electric. There are about 8 million single family buildings/homes in California. And about 64 percent of them currently use gas heat.

So once again, the challenges. We've got about 167,000 furnaces burning out this year, gas furnaces. Many of those will be replaced with gas, unless, you know, this website can convince them otherwise.

The problem is, if we then want to accelerate to that 2035 goal of getting, I think it was 7 million heat pumps into homes, we're really going to need to

increase the workforce. So, that's a question for us all, is who is going to do this work?

And then, there's the cost, potentially, to upsize. If we decide, oh, everyone's just going to have a service upgrade, that will cost roughly $24 billion. Much of that would come out of the pocket of the homeowner. And that's $24 billion that's not being spent on heat pumps or EV chargers. So, from my perspective, if it's not needed it's wasted money.

So, the good news, is in our experience, Tom and I go into existing homes and assess the situation and come up with a plan to help people fully electrify the home. In our experience, the vast majority of homes actually do not need a service upgrade. All of their dollars can be spent on heat pumps and induction ranges, et cetera.

So, people ask us this all the time, what's the percentage? You know, we don't have a huge data set right now, because we're just starting this work. But, in our experience, about 90 percent of homes on 100-amp panels or greater could be fully electrified, including EV charger, without a service line increase.

In this graph, each bar on this graph represents a home, looking at over the past year, the max load that the home had on its panel. And you can

see here, the green just shows how much of the home's panel or service line is underutilized. Even on the far right with two homes that are nearly all electric, you can see that the panel is still underutilized.

So, the National Electrical Code requires that we do very conservative calculations before we electrify a home. But even a home that looks like it might be, according to NEC calculations, maxing out the panel -- in actuality, it's not even close.

So, our approach to home electrification includes three important steps. One, is having a plan, and that's on the far left here. That includes National Electrical Code load calculations to make sure that everything that you want to electrify can fit on the panel.

The second piece is choosing power-efficient equipment. This is really essential. If you choose the right equipment, you can very easily get very close to electrifying a home with a 100-amp panel, no problem. If you still have a gap, then we deploy circuit controls, and that will be the focus of this talk. But I want to make sure it's clear that circuit controls is just one piece of this whole approach. And often, is the last piece to be deployed.

So, this approach of panel optimization helps

again, people avoid the panel, electric panel upgrades, which today -- it used to be being quoted around $3,000 in our area, which is the Peninsula, San Francisco Peninsula. But recently, the cost to do an electric panel, the average, has gone up to about 5,000.

So, whatever we can do to avoid that is great. The plans provide a roadmap for the building owner, and they also help guide tradespeople who might be coming into the home and want to recommend a piece of equipment that requires more amps than what we specify, not understanding how their appliance may fit into the whole picture for the homeowner.

So, people ask us, do the trades know about this approach? And generally, I would say no. There are some, but generally each trade really thinks about their own appliance. So, an EV charger installer thinks about EV chargers. And an HVAC person thinks about the HVAC. And so, no one's really thinking about how the whole building is going to fully electrify.

So, we have a choice. We can either train all the trades in how to do this work and to think more wholistically about the whole building and the future for the building, or we could train electrification experts, people like Tom and me, who understand how all of the home's electric systems are going to work

together.

You know, the other thing that could be done is building code could accelerate this learning by requiring whole-home electrification plans for people. Again, that helps give them a roadmap for this process.

Alright, so, circuit controls. The four basic categories of circuit controllers that we deploy are circuit pausers, smart breakers, circuit sharing devices, and smart panels. We find that the trade who knows most about this are the folks like Paul who will be speaking later, who install EV chargers.

The reason they know about these, is because they're often asked to come into a home and install a really large EV charger for people. And sometimes, that charger won't fit on the panel according to any seed load (phonetic) calculations. So, they have been really at the cutting edge in terms of deploying circuit controls and can be a great resource for the CEC going forward as it creates this website.

So, I want to dispel a couple of misperceptions. First, circuit controls are not a panacea. Some people think like, okay, I'll just deploy circuit controls and then I don't have to have a plan and I don't have to choose the right equipment. That's not true. You won't be able to electrify your building

on your existing panel that way. So, alone, they don't solve the problem. First, you need to have a plan. Second, you need to make sure you choose the most power efficient equipment, and then if you have a gap, you deploy circuit controls.

So, one note about the state of the technology in this field is there's a lot of rapid innovation happening right now. It's driven primarily by this need for fitting EV chargers onto panels. But it's -- oh. Those devices can be used for the whole home electrification as well.

There are a lot of startups in this area. Some based in Europe, some based right here in California, like a company called NeoCharge. So, it's actually kind of hard to stay on top of all of the new offerings, there's so much innovation. Many of the companies are seeking UL listing, although not all. Some of the European ones don't, although they could be enticed to, and that may be something that the CEC wants to look in to.

And then we find that with the current offerings of circuit controls, it's actually very easy to electrify a 100-amp home on the controls available today. And then the emerging solutions, the ones that are coming next, will just make it easier to do that.

Okay, Tom. Now I'll hand it over to you to dive into the technical details of some of these.

MR. KABAT: Alright. Thanks, Josie. So, one of the things that we're finding is most useful if there still is this gap to close -- if the, you know, just choosing efficient appliances hasn't been enough, or adding insulation in order to be able to downsize the heat pump has not been enough. If we've still got that gap to close, the thing that looks like it really does it well is what we call a circuit pauser. And there's a couple different brands and models of this thing. But they basically have these CT clamps, those funny clamp-like things on the right-side of the centered picture. Those fit on the main service lines of the house and measure the current or wattage, either one, they're proportional, going to the house panel.

And so, when the whole house panel is loaded up to, say, 80 percent of its rated loading, the signal goes into the circuit pauser box in the middle there, and tells it to pause the EV charger. Or there's some even more sophisticated ones coming out now that don't pause it entirely to zero, they just cut its output in half and see if that's low enough. And if it's not low enough, then they pause it. So, there on the right-hand side you can see in the upper left picture, you know,

there's the pauser and controlling a EV charger.

Next.

Another thing that's coming along, there's three major breaker companies are making now smart breakers. And so smart breakers have web-enabled access. And so, they're recording the information about the power passing through them. And it looks like there will be future ability to deploy those that will also sense the power passing through the main breaker disconnect for the whole panel. And then comparing that and deciding whether to pause the EV charger to stay -- to keep the panel within its rating. So that'd be another way to shoehorn additional charging onto the same panel, without adding load that collides and triggers a disconnect.

Next.

So then, the other one that's come out is really interesting, that's circuit sharing devices. And so, the homeowners can plug those into the wall themselves. Some of them are plug-based, and so it's shown in the middle box between the dryer on the left and the car on the right. And so, that might be the dryer outlet, and plugging a circuit sharing device in there and then plugging the dryer into the dominant side and so it gets power whenever it wants power. And when

the drying's done, then power is available to go charge the car battery. And the reason that it goes in that direction, is people might be impatient about getting their clothes dry but the car has a battery, and the battery can be patient about when it fills up. It just wants to fill up before morning.

Next.

Another thing coming out now are smart panels, which are kind of like the circuit pausers in a way. A cross between the circuit pausers and the smart breakers, it's all built in together in there where it tracks the total flow of power coming into the panel and where it's going out to the different circuits it allows the homeowner to prioritize the circuits. And as if they had an occasion, say once a year or many times a year or whatever it was, where their panel was getting up towards the 80 percent loaded rating, it would pause their circuits in a priority order.

I imagine that the easiest priority would be pause the car charger first, and then pause the water heater recharge second et cetera. Because you would never notice those are paused because the pausing will be short duration, it's probably while you're cooking on all five burners and two ovens. And as soon as -- and that only lasts for a few minutes that you get that many

burners going. So, then pausing's over and you're back.

Next.

So, this is just a layout of the typical NEC 220.83B calculation method that's used by electricians and building departments to check, you know, is there compliance here with the sizing for the feeder loading or panel loading. And so, the code lets you put in these things, all these efficient appliances, put their nameplates in there, that reduces the total panel size needed. And then if you still need to close that gap using circuit pausers, lets you count just the higher of the two loads on the paus-- excuse me, circuit sharers -- let you count just the higher of the two loads on the sharing device. Like the larger of either the dryer or the car. And if you use circuit pausing devices, it lets you avoid counting the car charger on the pauser at all. So, those are the two different ways that we can track these circuit devices into the NEC load calculations.

Next.

So, we're facing greater challenges than that. You know, what's happening is there's kind of a form of range anxiety that causes new EV buyers to oversize their home EV chargers, leaving no room on the panel for other electrification. And in some neighborhoods where

there's high EV adoption, it's actually overstressing the pole-top transformers already. So that's looking like a problem, that looks like we need to work on right-sizing the EV chargers, because a 20-amp EV charger will deliver 39,000 miles a year of charging just in eight hours a night. But many people are putting in these 50-amp circuits, which just overheat the transformers while they charge the car in the first two hours of the session.

So, people are also still installing, in retrofit, new gas tankless water heaters. And those are a big problem for retrofitting. And they're also a big problem for methane emissions, because they spew methane every time you turn on the warm water. It spews methane to try to ignite the flame.

People are still using electric resistance dryers. But, you know, using these heat pump alternatives will get them less panel impact. So, we think the site needs to be encouraging better heat pump alternatives for dryers for people to use those.

And then, also permitting authorities need to be able to see the site and understand how all this stuff can fit together, and still work out on the panel and update their methods of evaluating situations. And then the trades, as Josie mentioned. Either all the

trades have to learn how to do this, or the site maybe can help professionals get it done together.

Next.

MS. GAILLARD: That's it.

MR. KABAT: Alright, thank you very much.

MR. ROSALES: Tom and Josie, thank you. That was a great presentation. Thank you.

Just wanted to remind everybody on the call, if you do have questions or comments for any of the presenters you will see today, but particularly since we just got started, please hold them. We will have a discussion and question and answer session immediately after the panel.

With that said, I will -- Joseph, are you on the line and are you ready to go?

MR. WACHUNAS: Yeah, I'm here. How's my audio?

MR. ROSALES: Perfect. Thanks, Joseph. Did you need help with your slides?

MR. WACHUNAS: Nope, I should be able to share.

MR. ROSALES: Okay.

MR. WACHUNAS: You guys able to see my slides now?

MR. ROSALES: Okay.

UNIDENTIFIED SPEAKER: Looks good.

MR. ROSALES: Yes.

MR. WACHUNAS: Alright.

MR. ROSALES: Thank you. Let me introduce you real quick, Joseph, before you get started. Well Joseph, good morning, and welcome. Joe Wachunas is a project manager at the nonprofit, New Buildings Institute, NBI, and primarily focuses on the Advanced Water Heating Initiative. He seeks to decarbonize water heating through heat pump water heater technology. Joe has also worked in electric transportation and renewable energy sectors, and regularly contributes to the blog, CleanTechnica. Thank you, Joe, and welcome.

MR. WACHUNAS: Great. Just set my timer. Great to be with you all today, thanks so much for having me. Thank you to the CEC and Heriberto for organizing this great meeting today. Yeah, like Heriberto said, my name is Joe Wachunas. I work for the nonprofit New Buildings Institute. And we help run the Advanced Water Heating Initiative, which is a group of 400 stakeholder organizations that are working together to put heat pump water heaters, which I'll be talking about today, in every home and condo and business across the United States. We have utilities and governmental partners, the CEC is a great stakeholder in our

initiative, and so really excited to talk about this today.

So, we are -- I'll be talking over the next 15 minutes on water heating. And if you're like me, a couple years ago you probably never gave two thoughts to your water heater. Why would we talk about water heating at this very important meeting?

Well, oddly enough, our water heaters, which usually sit there in our garage or in the utility closet, or a basement, and we never think about it. They provide all the hot water we need. They use a lot of energy. You can see that with space heating, our furnaces or heat pumps, and water heating combine to form about two thirds of our energy usage in our house. So, these are the big potatoes that we have to make really efficient and to decarbonize as quickly as possible.

So, water heating, even though it's not something that's top of mind for many of us, it is a really big use of energy. Across the U.S., there's two types of water heaters that are used, almost at a 50/50 split. They are electric resistance water heaters, and natural gas water heaters.

And electric resistance ones are old electric technology that you can think of if you have an electric

stove, you can think of those coils on your stove, where the electrons come in and get smooshed together and get red hot. Well, that's kind of in a water heater. And it heats water well, but it uses a lot of energy.

And the other type of water heater is a natural gas water heater, which burns fossil fuels and as Josie was mentioning, there's lots of emissions with natural gas water heaters. So, to decarbonize, we need a new type of water heater.

Really quick, in California, the newest residential energy consumption survey shows that in California, you all have a majority of gas water heaters. Anywhere from 75 percent to other surveys are showing over 90 percent of water heating in California is using natural gas. So, we're going to need to decarbonize that across millions of households in California.

And so, I'm here to talk about this, the water heater called a heat pump water heater, which is really an exciting opportunity. It's an opportunity to save 100 million tons on our CO2 emissions. It's an opportunity to create really good jobs for underserved communities in installing this new type of technology. And it's also an opportunity, as Tom and Josie were talking about, to help our grid out. As we electrify

everything, the heat pump water heater can be an asset on our grid and can be -- they are smart, and connected, and can use electricity in times when there's not a high demand, and then not use electricity in times when there is a high demand.

So, let's talk about this heat pump water heating technology. And hopefully, by the end of my presentation, you'll be excited about water heating as I am. So, heat pump water heaters are similar -- you know, it's a relatively newish technology in the 10 to 15 years that they've been on the market, and they're growing really fast in adoption. But it's also really familiar technology.

It's really the same technology as a fridge. Your fridge is a heat pump, it just works in reverse. It cools a space, and a heat pump water heater heats a space. And it's really energy efficient. We talked about how that electric resistance and gas are very inefficient. Well, heat pump water heaters are three to four times more efficient than that electric resistance water heater, and five to six times more efficient than gas water heaters. We'll look at kind of what that means in a second.

They are a little bit higher upfront cost. So, you're usually starting at around -- the retail

price is around $1,500 to $1,800 for a heat pump water heater, compared to the six to $900 for the standard electric resistance or gas water heaters. So double, sometimes triple the cost upfront. But the savings as we'll see in a second, are very pronounced, and you can usually pay that upfront cost back within a couple years, and there are rebates as well, which we'll talk about.

They use refrigerants. That is something that California is looking into, how do refrigerants do? If they're released into the environment, they do have some global warming potential. But this is a closed system. And then the electrical infrastructure may need to be upgraded with a heat pump water heater, we'll get into these details, especially the new 120-volt heat pump water heater.

So, heat pump water heaters work by pulling the air out of the room nearby, and pulling that warmth out of the air. And then they compress it, and this raises its temperature. That temperature goes into the refrigerant, and that refrigerant transfers the heat to the water. It's pretty amazing.

They only -- rather than the gas water heaters that emit all these, you know, nitrogen dioxide and all these other noxious fumes, they only emit cool air,

that's it. And a little bit of water. So, you -- it will cool a space a little bit, and we'll see that in just a second.

And also, when you're installing a heat pump water heater, you just have to make room for a condensate line, a little tube that would drain water either outside or into another drain. Like I said before, they're all -- most heat pump water heaters are smart and connected and can be used during times of peak demand and that can help saves Californians money.

So, with any new technology, there's always a question -- where do I install a heat pump water heater? And how do you install one? Well, the good news is they install just like that electric resistance water heater that we saw that half of the country uses. They either need 240 volts, or the new ones just plug right into a normal outlet. We'll talk about that, the new 120-volt ones.

And the ideal places to install a heat pump water heater are number one, a garage is a great spot. It's usually unconditioned or semi conditioned space that can -- that loves that extra cool air, especially in the hot California summer. And it's just an easy spot with a lot of air flow.

Another good spot is a basement, they work

well there. But they can also go in utility closets. Behind my background and over my shoulder I have installed my heat pump water heater in my utility closet and it works great. We'll talk about some strategies.

So, they need -- heat pump water heaters typically need about -- some air to pull that warmth out of. And so, they need about 700 cubic feet of air, most manufacturer say that. Although, a new study done by our friends at NEA, the shrinking room study, where they slowly shrank the room and said, "How much air does a heat pump water heater really need?" Showed that even at 450 cubic feet of air, so a small, small, space, they were still very efficient.

And if you just -- if your water heater is in your utility closet they still work great. You can see below there's a couple of different options. On the left, you can put a louver door on the utility closet, and it gets a lot of air that way. In the middle, you can see you can put some vents on the bottom and the top and they give a lot of air that way. Or, like I did, you can duct a heat pump water heater to an outside space or another room. So, there's lots of ways to put a heat pump water heater. Really, any application.

They do cool a space a little bit, most of it's not very noticeable, but a couple of degrees in

summer that's wonderful. In the winter, you might, you know, just be relying on your other heat pump system to remove that cool air. Or you can use these strategies and duct the air out of the space. They're not difficult to install, they're just like an electric water heater, except you have to think about the -- you have a condensate line, like I said before, and you have to think about that air.

And then the last thing to say on questions and myth busting, do they make a lot of noise? They do -- a lot of manufacturers you talk to say it's not a lot of noise, it's just a new noise. And you're not used to your water heater making a lot of noise. Some gas water heaters do make noise. But they make a noise between 45 and 55 decibels. 45 decibels, just to give you an idea, is like a quiet dishwasher.

Mine, again, is in my living room space, and we never notice it. It's quieter than my fridge is. Some models make a little bit more noise, and so it depends if your -- you might want to look into that if you're putting it in an interior space, how many decibel levels. But most of the time it's, again, like other appliances in a home.

So, the -- I just want to just highlight the savings here of when you change from electric to

electric resistance to a heat pump water heater, you're going to save, again, about three quarters of the energy. It's game changing energy savings. And nationally, that looks like about saving $300 a year. In California, with higher electricity prices, that can be more like four to $600 a year. It's really exciting. So, if you have an electric water heater, you're just a prime candidate just to replace with a heat pump water heater.

Gas, you're saving even more energy, again five to six times as much energy, 86 percent, switching to a heat pump water heater. Nationally, you save about $200 a year, according to the Department of Energy, when you switch from gas to heat pump. In California that might be a little bit different, because you have time of use rates, different electricity rates, and it can be -- electricity is a little more expensive than the average nationally. So, it just depends a little bit. But again, heat pump water heaters are able to ---are connected and smart. And so you can program them, and I know a lot of people who do, to not run during the times of where electricity is the most expensive. And you never run out of hot water, so I'm told.

The -- just another way to think about the energy savings, a quick story. My sister was

installing, or was building a new house and I was trying to talk her in to getting heat pump water heater and she was kind of unfamiliar with the technology. So, she went with the electric resistance water heater, and she said, "Hey, we're going to get solar panels next year anyway, so it's okay, my solar panels will just make up for the less efficient water heater."

Well, I did -- I ran a couple calculations. And to make up for that electric resistant water heater and all the more kilowatt hours it will use, she'll to add six extra solar panels to her roof. And that will cost four to six times as much money than buying the heat pump water heater. So, this just gives you an idea that they save, you know, six solar panels worth of electricity, which is just really exciting. And they're kind of these unsung heroes. The other way to think about it is if you replaced 54 100-watt bulbs in your house to LED's, that's the same energy equivalent as a heat pump water heater.

We just wanted to highlight that not only are there heat pump water heaters for homes and residences and apartments, there also are commercial heat pump water heaters that work in commercial settings, multi-family settings that have big boilers, and they can replace these boilers and they're much more efficient

just like the residential ones. They can be more complex or more efficient. Excuse me. More complex, but definitely more efficient.

And I'll just say, the Advanced Water Heating Initiative, we have both a commercial working group that focuses on these commercial heat pump water heaters and we have a residential working group. I'll put a link in the chat to the initiative, it's free and open to the public and we welcome everyone to join if they're more interested.

I'll talk to you a little bit about the brands around heat pump water heaters. The two common brands that you can find in many big box stores are, Rheem, which is usually found in Home Depot, and A.O. Smith is found in Lowes. And there, you can find they have heat pump water heaters in many different gallon sizes. Bradford White is another large brand that sells right to contractors. There are -- there's another brand called Eco2 systems, which is a split system, the tank is one piece and then there's a compressor that sits on the outside. And then Stiebel Eltron is another one.

I do want to put in a plug for the 120-volt water heater, because this is really exciting coming out in California right now. California is the first state to receive these 120-volt water heaters. Rheem is the

first company that's come to market. And the Advanced Water Heating Initiative led a process to bring these water heaters to market. And they plug in to any normal outlet. You can run on a shared circuit, a 120-volt water heater. But this is really emerging technology, the just, Rheem just released this water heater in July.

And the Advanced Water Heating Initiative is running a field study in California. I just want to put in a plug, we are looking for participants who would receive a free water heater in SCE or SMUD territory, I'll put a link in the chat if you're interested and you want to fill out the form. But this is a really exciting technology, if you have a gas water heater especially, and you don't want to run the 240 volts required for the 240-volt heat pump water heater, you can just plug this heat pump water heater into a normal outlet. So, really exciting about that.

And there's a couple examples that are already on the market, like we said. Rheem is available for sale now. Nyle is another heat pump water heater maker and they have a split system that's 120 volts that's available. And then, A.O. Smith and GE are expected to come out with their versions next year.

This is just a little example of the commercial heat pump water heaters. We're tracking five

commercial but there's lots of manufacturers getting in all the time, and lots of examples in California of residences that are using these really efficient water heaters.

And I'd like to just close with -- by talking a little bit about rebates for heat pump water heaters. California loves heat pump water heaters, that's my icons are showing. Again, to help with that upfront cost, we're really excited about the -- a couple things. The Inflation Reduction Act has tax credits and rebates. A couple of them for heat pump water heaters. So, you want to check that out. And I'll include a calculator that Rewiring America has done so you can calculate your rebates in the chat.

Utilities oftentimes have rebates for heat pump water heaters, so check your local utility. And Energy Star is a great rebate finder, I'll put that in the chat as well. The TECH Clean California program has had funds, they've exhausted the funds I think for now for heat pump water heaters, but they have had funds to rebate them.

And then, the last icon is for weatherization programs. There are several weatherization programs in California that are for income-qualified households that are installing heat pump water heaters. So, lots of

ways to help with that high upfront cost.

Thanks again for having me on today, really excited to be here, and I'll wait for the Q&A portion later. Thanks so much.

MR. ROSALES: Joseph, thank you for that presentation. That was great. We're going to move on with our third presenter. And before we start that presentation, I do want to remind folks that the Q&A function on the Zoom webinar is open. I do see that there's some questions there. We will be getting to them after the panel concludes. And for those folks who do have questions, I just want to remind you, you can use that function now, or you can wait till we get to the public comment period.

Okay, our next presenter is Paul Nijssen. Paul Nijssen is the founder and president of EVCharge4U. EVCharge4U is an electric vehicle charging solution provider. With that, I will stop my video. Paul, if you are ready to go you can start.

MR. NIJSSEN: Okay, good morning, all. I'm Paul Nijssen, EVCharge4U. You can start with the next slide, please. It says a little bit about us.

We are located in Berkeley in the San Francisco Bay Area. We install mostly in Northern California. And we started actually 10 years ago with

EV charging stations.

Next.

A quick learning the language -- going quickly over the cars who we have. We have the ICE cars, everybody knows them, the internal combustion engine. And then we have EVs, and that's, you know, EVs is more like electrical vehicle. And there's overall with everything but we can make portions of it like a BEV or a ZEV. A Battery Electrical Vehicle is totally only on batteries, or Zero Emission Vehicle.

Next.

Then we have the Hybrid Electrical Vehicle, like the Prius. Everybody knows about the Prius, we loved them all when they came out. They use gas and they have also an electric motor.

Next, then we have the Plug-in Hybrid Electrical Vehicle. What comes close to the electrical vehicle but still has, for the people who are still afraid to drive full electric because people think, still, that we -- yeah, that they need to drive far.

Then we have the Fuel Cell Electrical Vehicles. Not too popular, and probably has also to do that, you know, everybody has electricity at home, and fuel cell gas stations are nowhere to be found. Still, it's -- think It's going to be more in the trucking

industry and also the busses who drive on the fuel cells. That's where it's popular. I think electrical vehicles going better for the future.

Next.

How it works? Well, everybody has batteries at home, in your cell phone and your watches and also the electrical vehicles have batteries. And most of them are still lithium batteries. However, the market is changing quickly to get -- to try to get the lithium out of it. And -- so it's more environmentally friendly. There are three levels of charging, and that is Level 1.

Next, please.

The Level 1 is the 110, what you have at home. It will start charging between three and five miles an hour, what can be good for most people who don't drive so much. So, when I come to a site visit and the people don't have enough capacity, then I also ask -- oh the installation can be very expensive. I always ask, "How much do you drive? Do you drive only 20 miles an hour? Please keep it in your pocket and charge on the 110." Works perfectly for overnight for most people who drive only 10 to 20 miles a day.

Then we have Level 2, what is the mainly what we have at homes and also in multi-family housing.

There's 208 in big buildings, and 240 at your regular house. And that will charge from, say, 10 miles an hour up to, say, 44 miles an hour, roughly, depending on. But, again, like Josie said earlier in the presentation, I think you can just have a slower charge and you don't need to charge always fast. I know people say always, "Oh, I want the fastest charge ever, I want to have that 60-amp breaker." It is not necessary. So, calm down and just enjoy your charge.

Can I get to the next slide, please.

Well I went a little bit over it already, and again, 110 is 120-volt, is three to five miles an hour. And for the basic people who don't drive so much, it's great.

Next slide.

It's about the 208-240. Ten to 30 miles an hour, that is perfect for everybody. Most people even don't drive more than 60 to 80 miles a day. So, that's great.

Next slide.

And Josie said also earlier that, you know, we don't need to charge fast. Well, 30-amp -- 32-amp charge on a 40-amp breaker, that's mostly what we install. And now we go to the Level 3 charges, I believe.

Next slide.

Yes. The Level 3 is 400 to 900 volts. That are the, you know, everybody sees at the Superchargers, what Tesla has. But also, Electrify America, EVGO, ChargePoint. They have Level 3 chargers. We use them mostly only for charging at, how do you say, when you travel. So, if I need to go to LA, or I need to go to Fresno from the Bay Area, yes, I need to stop and charge my car. Takes a half hour to an hour, depending on how big your battery is. But we don't use this in regular homes or apartment buildings. We have this just mostly outside and just for travelling.

Next.

Then, the dynamic load management, as I'll call it, or as Tom and Josie said, circuit pausers. If people don't have enough capacity, or if you're in a multi-family housing, that's where we use a load management box. It can be the DCC but can also be form wall box. Wall box has great kilowatt-hour meter, they put a CT's around the -- how do you say, your breaker. And it will shut it down, lower it, when you don't have enough capacity. That's my go-to instead of a service change.

So, first thing what I will do is getting -- see how much people drive. If they don't have enough

capacity then we put in dynamic load management box in. And yeah, that's pretty much it.

Now, I -- what does it cost to install an EV charging station? It's really depends on where your electrical box is. We like to come from your main panel. And if your main panel is close to where you charge, we can stay around $500 for the cost, $700 for the charge exchanger roughly, and $640 for the permit. That's a flat-fee cost that has to do with drawings, being there for the inspector, and including the permit. The permit is very important, and it will be in the next panel later on, they will talk about it that it's all that the installer pulls the permits so the liability is on the installers insurance. So, make sure you have that.

Then, also, ask a few quotes. Don't start with one quote, of course we love it as installers, but people are willing to sell you more than you need. So, please, just get a few quotes. Then, make sure that you're never use aluminum wire. Aluminum wire gets soft and can start a fire when you charge the car, because the car has a continuous load. So please, if somebody installs it with aluminum wire, please tell them no, use copper wire.

Incentives. Incentives are there. Clean Cars

for All, but also the utility company. They have incentives for installing your charging station at home, depending of course on your salary from the family.

Then, EV chargers itself. You have a lot of brands, you have ChargePoint for homes, JuiceBox, you have Wallbox, go on and on. Make sure that your charging station is hard-wired. That's not only good for, you know, that people don't steal your charging station, but it also the new code has that every receptacle needs a GFCI breaker. Now, the charging station has already a GFCI setting in the charger itself. So, if you have a GFCI on the receptacle, and a GFCI in the charging station, the chance that it will trip is very big, and we recommend not to install a plug anymore for a NEMA 1450, or a NEMA 650.

That was it for now, I hope that everybody got a little bit wiser of this. The presentation you can find later on the website. And I'll give it back to our panel.

MR. ROSALES: Paul, thank you for that presentation. That was good. And you brought up a --

MR. NIJSSEN: You're welcome.

MR. ROSALES: -- brought up a good point. I don't think I covered it earlier. I do want to remind everyone on the call as well that all the presentations

you see today from both panels will be on the docket, which you can access through our website. It will be posted probably as soon as tomorrow, but no later than this week, just for your information. If you want to access any if the information from the presentations, you see today it will be on our docket.

Okay. Hannah, if you can stand by and get ready. Let me introduce our last panelist for Panel 1. And if you could turn on your camera and unmute yourself, then I'll do a quick intro. There you are. Good morning.

MS. BRUEGMANN: Good morning, Eddie.

MR. ROSALES: So, Hannah Breugmann is Director of Programs at Build It Green. Build It Green creates credible and accessible resources and hosts working groups that offer professional training in collaboration with partners across California to support building and a healthy housing ecosystem, and also fostering the well-being of individuals, those communities and the natural world around them. Hannah, with that, I will turn off my camera and mute myself and hand it over to you.

MS. BRUEGMANN: Awesome. Thanks, Eddie, and thanks everyone at the CEC for hosting this workshop today. We're really excited to be here. So, I'm going

to dive a little bit more into something that Josie and Tom touched on earlier, which is electrical panels. Just really quickly, Eddie introduced us, but like you said in the intro, we've convened a working group of folks who are really thinking about electrical panels and how they're kind of the hub or the key to allowing/enabling quick, cost-effective, and equitable electrification, just by removing barriers and costs, which we'll go ahead and then talk about today.

So, probably everyone knows why home electrification matters, we'll just talk about it a little bit more. But mostly, we'll be talking about electrical panels and how we can avoid upsizing both panels and service. Again, to be more cost-effective and quickly electrify.

Quick note, similar to Josie and Tom, we're just going to be focusing on single family homes today, because there are just slightly different needs in multi-family, the way that their electrical systems are set up. So, we will be focusing on single family -- not that electrifying multi-family isn't really important, it's just -- has a little bit of a different situation.

So, why? Why does it matter? Probably a lot of folks on this call already know that there's a ton of benefits. The big one, obviously, is climate change

related emissions. As we know, about 25 percent of emissions in California are related to buildings. Obviously, those aren't all residential, but residences do constitute a huge amount of those emissions.

This is less related to decarb, but I still think it really matters. There's also a big health and safety issue at play in electrifying our homes. So, recent research from the Harvard School of Public Health and others has found that gas combustion inside homes, and the leaks associated with the gas distribution system, which have been found to be much higher than previously understood, contain a lot of toxic chemicals. And when released in the home, can lead to a number of health issues, all the way up to cancer. As well as just safety risks around combustion et cetera.

So not only is electrifying homes really beneficial for the climate and the environment, but it's also actually really good for human health. So, in order to hit those goals that Eddie shared right at the top, we need to be able to convert our homes to all electric as quickly, equitably, and cost-effectively as possible.

And that's really important in California. Unlike some other states, we actually have a pretty low number of all-electric homes. The number that we found

from the Energy Information Administration is about eight percent of California homes, that's not just single family, that's all homes. And if you were noticing in Joe's presentation, you saw that a lot of our hot water heaters are gas. We just had such strong natural gas infrastructure in California for so long, we're actually kind of late to the game on all-electric homes. Florida has about 77 percent of homes are all-electric, so we definitely want to get back our leadership status on this as quickly as possible as a state.

And one key way to do that, in order to electrify your homes -- this has already been alluded to today but it is really important -- is the electrical panel. It's sometimes its perceived as a barrier to electrification, but it can also really be an opportunity to allow us to electrify, if we do it in a way that's really smart. Which, again, we'll talk about.

So, there's a lot of single-family homes. Based on where you are in the state, you can have maybe an even older home. So, the median year of homes built in San Francisco and Berkeley for example is 1942. So that's some pretty old housing stock. It's newer in other parts of the state.

Why that matters, is it gives you a rough sense of maybe where electric panel service to homes actually is. So up until 1962, 1960— the 60's roughly, that's when the National Electric Code started to require 100-amp service as the minimum going into homes. It's now 200-amps for all new homes. But for homes built before the 60's, it would be -- you could expect to find 60 amps or less service. So, my fixer home had about 30 amps of service when we bought it, so we did need to do an upsizing on our service.

But for homes that have 100 amps or greater, which roughly the 60's and newer, which is a lot of homes in California, might not need to do an upsize or an upgrade in order to electrify. Which again, saving time, saving money, saving the workforce that Josie and Tom talked about. So, I really focus on doing things like getting those amazing heat pump water heaters into more homes more quickly.

So, like I said, here's the big point. This is -- CEC even found in their own study. They assumed that homes 1990 and newer might need a new panel and service upsizing. It's really hard, unfortunately, to get great data on exactly how many homes need an upgrade or an upsize and where they are. But suffice to say, it's a really big dollar number. So, if you can avoid

that and still have, like, a really lovely quality of life in your home and be really safe, get that gas out for all those health reasons we talked about, that is a major win. So, let's talk about that a little bit more.

Like Josie said, average in her area is $3-$5,000 for an upgrade, that's if you don't have to cut the trees and you don't have to move the panel because it's near your gas service or your water service or some other issue. The utilities require all kinds of safety standards about where they're put on the building. If you need to move it because of one of those things, if your lines are underground and not coming over to your house they can be even more expensive. So, this can truly be a large amount of money. Which, again, you could replace all of the appliances in your home for that amount of money. So, it's really worth trying to save it if at all possible.

It also can take three to six months on average. So, Redwood Energy and NV5 did a study with several of the utilities in California to collect this data. Three to six months was the average. Heard even worse than that, up to nine months. So again, if the goal is to electrify as efficiently as possible and as quickly as possible, every time we can save this time and this money for somebody, we're really making good

progress.

So that last number was actually just on the electric panel upgrade, so that's the hardware and running all the wires to do a new panel. There's also potential cost of a service upgrade. So, that's not within the home that's all of the utility's infrastructure that's associated with these panels.

Tom mentioned it just a little bit. For example, like the transformer at the top of your pole if you live somewhere where there's not that many people that share your transformer, or there's an overload on the transformer and it needs to be upgraded. There is potentially significant costs, again, associated with that.

You definitely won't necessarily always see this cost, but for some folks, this will definitely show up. It's just another reason if you can avoid it, it's not only good for you, it's better for the grid. We hear a lot about concerns about the grid being able to support if we all electrify. Well, there's ways to electrify that are not as efficient and those actually could be problematic. But if we can do it efficiently, then a lot of us can electrify very quickly before it's problematic for the grid. So, again, just reasons why this approach is really important to know about and to

try to implement as much as possible.

Like I said, definitely some homes are going to need an upgrade. My home definitely needed an upgrade, I think it almost made the electricians pass out when they first came it was so bad. If there's been damage to the equipment, of course we need to address that and make sure that homes are safe and have the service that they need.

Even with getting an upgrade or an upsize of your equipment or your service, it still is really helpful to know about some of the strategies that we're going to talk about so that you don't accidentally oversize your equipment and mean that you're paying a lot more money than you need to, to actually do what you want. So, there are stories of people wanting, like 400-amp service because they're trying to do all this stuff and they're just using like an itty, itty, bitty bit of that service. So, it pays to be really efficient, and to try and make a plan for doing that whole home electrification like SB 68 is trying to incentivize.

Okay. So, let's actually talk about how you might electrify your home without upgrading or upsizing your panel or your service. So, there's kind of two main strategies. One, is panel optimization and whole-

home electrification planning. The other one is technology and devices. I'm not going to speak to technology and devices because Josie and Tom covered that super well, so I'm mostly going to focus on strategy number 1.

So, the basis of this strategy is for a 100-amp panel or greater, you can optimize your use of it. Which means, you already have all of those hundred amps. How can you plan to use them as efficiently as possible? Through the appliances that you choose, and through planning how they all fit together.

So, for example, Joe mentioned that 120-volt heat pump hot water heater. There are 30-amp versions, and there's 15-amp versions of hot water heaters. Both of them will give you lovely toasty warm showers for hopefully not too long, because we also need to save water, but long enough to get you clean and warm and cozy in the morning. You probably don't care if it's 30 amps or 15 amps, as long as it's getting you hot water. So, if you choose the 15-amp, the more power efficient version of that appliance, you're then able to have greater capacity on your panel at large.

Load sharing devices can also come into play here, but you can really go a long way with just a 100-amps. So, this example on the right just gives you a

picture of each of the -- for example, each of the circuits in a home, the volts and amps of those devices, how it all adds up, you can see that at the bottom.

This is for a 2,000 square-foot home. It has all of the amenities. It's got solar, it's got EV charging, it's got those amazing heat pump HVAC systems, which are really loved because they help keep homes even more comfortable. I think one of the ways to think about it, I'll talk about it a little bit later with power efficient, is like kind of the difference between sipping a beverage versus just taking it all in one gulp. So, thinking about choosing appliances that are sippers rather than like big gulps.

Here's just a little bit more detail about strategies to optimize this panel capacity. So, the first one I said, it really is the big one, just choosing power efficient versions of appliances. So, if you're getting an induction stove, there's 40-amp versions and there's 50-amp versions. I think there's maybe even a 30-amp, you know, full range that you could get, stove and oven. Same functionality, you can cook everything you want, you can have an amazing thanksgiving dinner. So, you probably don't really care if it's 30 amps or 50 amps as long as it's doing what it wants. And your electric panel would really prefer if

you did the 30-amp version. Same with heat pumps. It's true for almost all the technologies available today on the market that you can get.

The second point -- this is a really classic CEC energy efficiency point, and it still actually really matters for electrification. And it's not sexy, but it's actually also not that expensive. So, reducing the heating and cooling loss in your home by insulating and air-sealing. A lot of older homes, and we've already talked about older homes, don't necessarily have either good or any insulation. They don't necessarily have good air sealing around the windows.

If you work to reduce the load, and as Joe already showed, the biggest electrical load on many homes, if you switch to all electric, is that HVAC heating cooling system. So, if you make your system have to do less, then you can get a smaller system and still get perfect comfort. And again, uses less power, uses less energy, everyone wins.

Paul talked about oversized EV chargers. We've already talked about pausing circuits and circuit-sharing devices. The last small one, it's not necessarily an issue for a lot of folks but thinking about like a 2-in-1 appliance, a lot of people don't think about your oven and your cooktop being a single

appliance. But you can, you know, get separate wall ovens and separate cook tops. So just thinking about getting those in one is a little bit more efficient.

So. I talked really quickly about power efficient appliances, here's just another explanation. If you're familiar with energy efficient, power efficient is very similar. Two common misconceptions -- you're going to be less comfortable, you're somehow sacrificing. You're definitely not. You're still going to get that hot water, you're going to be able to cook, your car will be able to drive. But just instead of gulping, you know, the electricity and energy into those systems, they do it more gradually over time. And easier on the grid and everything. And they're also not necessarily more expensive. So, don't have to be afraid of either, more use or not.

This graph is similar to the one that Josie showed. Every bar is a home. So, one of the questions you might be having is, like, "But is there enough capacity to actually do this?" So, this is 82 homes from a study that Home Intel did about the capacity. You can see over here on the left the number of amps coming into the home for their service. Blue is their peak used capacity, and then orange is what's available.

So, for example, you can see this poor person

who thought that they needed 400 amps and they're only using this very, very tiny amount of power. So, here's all the folks over here on 100 amps, there's still a lot of capacity on those panels that are not getting utilized. So, but -- excuse me. This is just a great example of available capacity to electrify without making any change to the panel or to the service.

Again, Tom and Josie already talked about panel calculations. There's a couple of ways to do this. Your electrician can help you. There's starting to be some tools to help you chose which calculation option is better. So, you can go and check out zerocarbonhome.com, some great tools like that and others to figure out how can you electrify in a way that's totally legal to the code and helps you do it without that upsizing.

Just, this is a quick visual example of what that looks like. So, here's the calculation option, 220.83B, it's like the bottoms up, you just look at the nameplate rating of your appliance. This is 220.87, where you look if you've been living in a home. Again, this is all existing building focused. If you live in a home and you have your power, your energy use history, you can kind of plug that in, add a little buffer, and then start to say, like, "Okay, if I want to add one of

Joe's amazing heat pump water heaters, do I have enough space?" And on this calculation, absolutely you definitely do. If you're using this calculation, you definitely don't. Both of them are totally legal in the code. So, just a good -- just a great thing to know about.

And then lastly, there's also what's actually happening in practice. So, not all loads are going to be coincident all at the same time, or it's very, very, very unlikely unless you're throwing a huge party and doing kind of everything all at once. So, again, the point here is just there's a lot of essentially kind of wasted opportunity right now in our panels, that we could do a much better job of utilizing.

Quick summary, I think the thing that I'll say here is what's most needed is more support, more folks who are able to do that whole-home electrification planning to really help people think about choosing appliances, sequencing, that kind of thing. And the IRA's come out with even more incentives. There's already some incentives around appliances, but really we need more support for low-income homeowners to do this planning, to purchase appliances, and then also to do some of the electrical work that will inevitably be needed. So, more support in all of those places I think

would be really helpful.

Like I said, not going to talk about technology, because that was already really well covered. But, if you only have a 100-amp panel and you wanted to get a little fancy or do a little bit more, these devices are a great way to allow you to do it again while still being kind of grid-friendly.

Already mentioned a few of these other considerations. Non-mechanical home systems are really important. Energy efficiency is still really important, insulating is really important. Choosing appliances and tools that can help manage that peak load, that's really the biggest issue for the grid. So, it was mentioned earlier, heat pump water heaters are basically like big thermal batteries. You can heat your water while the electricity in California is really cheap, and while the grid is not over-taxed, and then you can kind of cruise through those peak periods with plenty, plenty of hot water just sitting in kind of your thermal battery. So, a lot of these choices also support grid-optimization. And some of them can even play and be supportive in like demand response situations.

Lastly, we have a lot of great electrical talent in the state. We need even more to be able to electrify in the way and at the rate that we need. So,

one of the things that optimizing your panel will do is reduces the amount of load on the existing workforce, and that available talent to really focus on the highest value of electrification work while we continue to build up the workforce to be able to do all of the other work that we need.

So, avoid panel upsizing if all possible. A lot of people can do it, you're not going to be sacrificing anything, you're just going to be saving money, saving power, being a great grid-citizen. And if you do have to upsize, which definitely does happen, some places do have incentives to support that, but think about trying to do it as efficiently as possible. So that again, you're not overpaying and the grid's not getting overtaxed.

Last quick note, there's some amazing research that's getting started by LBNL and NREL, funded by the DOE, to really look at, like I said, the data's kind of all over the place on this -- but really looking at electrical panel infrastructure upgrades to home electrification projects. Not just in California, but in the U.S. to highlight least-cost pathways to electrify. So, they're looking at a lot of the stuff that we talked about, but in even greater depth and detail. So, stay tuned for some really great research

coming out of that work.

If you want more resources, there's great guides here on choosing various technologies and appliances. There's some consultants and contractors you can find. The Switch Is On has a ton of great information, both about incentives. You can plug in your address, and it can tell you what incentives are available where you live for all different kinds of things, as well as give you a list of contractors who can help you do this work.

Thank you so much.

MR. ROSALES: Hannah, thank you. That was a great presentation. We -- a couple remarks real quick for everybody on the line. All the panelists who are going to stay for Panel 1 Q&A, Joseph, I know you gotta transition off really soon. If you could turn on your cameras, we're going to transition right into the public Q&A session. So, it looks like there's a couple hands up, it looks like there's some questions waiting in the Q&A chat, we'll get to those in a second. Dorothy Murimi, she's our Public Advisors Advocacy Office, she will assist us with facilitating public comments and questions here.

So anyone -- again, I want to thank all the panelists of Panel 1, all the presenters for your

presentations, for your comments, that was great. I want to remind the stakeholders who are attending the workshop today, that all the presentations, all the materials or examples of those hard requirements I was speaking about as I did the overview, so these are items that again, items that are actually getting installed into a building that will be helpful and efficient to help you decarbonize or fully electrify the building you're interested in transitioning from, maybe from mixed-fuel to all-electric, or at least taking steps toward that way. So those are great examples.

I want to remind folks also that we have the Request for Information and our Question 1 and all the sub questions under Question 1, we are really in response to some of the requirements. Again, devices, appliances, and equipment that go into a building. And so, the presentations today hopefully inspired everyone to understand that better in terms of what can be helpful. These are all market-ready technologies, none of this is behind the curtain or in kind of research and development. So that's one really important thing to keep in mind.

So, with that, Dorothy, I will hand it over to you. I won't -- we will go straight into the public comment and question period. Thank you.

MS. MURIMI: Thank you, Heriberto. And hello, everybody. I'm going to be working with Gabe Taylor on this. So, why don't we start with some folks that are on Zoom raising their hands for comments, and then go on to Q&A. And we can work on that interchangeably.

We'll start with Randy Kim, and then followed by Anthony Fournier. Apologies if I've misstated your name. Go ahead and unmute on your end, Randy, and you may ask your question.

MR. KIM: I don't have any question at this point.

MS. MURIMI: Okay. Thank you, Randy. Why don't we start -- and once again, this is for -- we're doing Q&A first, and then moving on to public comment. So, let's go on to Pat Burt.

MR. BURT: So, I don't know whether -- mine are more comments as opposed to questions.

MS. MURIMI: Well, we'll have a moment for comments a little later.

MR. BURT: I'll wait.

MS. MURIMI: Okay. Thank you.

Why don't we move on to folks that are on Q&A right now. Let's start with Gonzales Stavel (phonetic), and apologies if I've misstated your name. First one is, "Are there any programs via NFPA or utilities to

start demand charges for residential? Average panel utilization in Spain is 80 percent. Average 1,500 square feet house only has 285 a-main, because on average 4-Euro per kilowatts. Demand charge forces homeowners to stagger loads and continuously look at reducing contracted capacity."

So, Tom, I see your hand raised.

MR. KABAT: Yes, thanks. So, I'm glad Gonzalo brought up that question. I've got a long history in electric and gas utility planning. And what we see is other countries are more advanced about how they bill for different electric services.

For example, in Japan, the customers pay on a per amp connection fee. So then, each customer is wanting to do their own amp diet just to get down to a smaller connection to the utility, a gentler connection to the utility so they can save on their bill. It's a thing I think we should be looking at here in California, it's a way to generate a revenue stream for the utility that would help decrease, then, the amount we have to charge for the actual electricity. And so that will help make electrification more affordable. So, thanks for raising that.

MS. MURIMI: Thank you. Thank you, Tom. So, I see one more hand on Zoom for questions. Karl

Johnson? Go ahead and unmute on your end, you may ask your question, Karl.

Again, that's Karl Johnson?

Seeing no communication there, let's go to Enrique. This is for questions, again.

MR. RODRIGUEZ: Oh, hi, yeah. Good afternoon, or good morning actually. Thank you so much for taking my question. This is Enrique Rodriguez, Building Standards Commission. My question was regarding, I think it was for Tom, regarding the use of the tankless water heaters for being electric. And it was my understanding that if there was gas available at the site, I know some local jurisdictions require the installation of gas tankless water heaters versus electric. And I just wanted to hear a little bit about that.

MR. KABAT: Yeah, so I might ask CEC Commission, or CEC Staff to also weigh in on this. But I believe that aspect of the building or energy code used to exist, and has been fixed in the 2000 -- somewhere along the course of the 2016 code. I believe the Energy Commission came out with the clarification that electric heat pump water heaters can be installed where there is gas service for water heating, and that it was an easy transition over to that, very little

paperwork. But maybe the staff can verify that?

MS. GAILLARD: If not, I could also jump in. Not to answer Tom's question, but to say that generally, gas tankless water heaters and electric tankless water heaters are going to be a problem for us going forward. Both the gas -- you know, you often have to increase the gas line coming into the house from a one-inch pipe to a one and a half inch diameter pipe. So, you just have all that much more methane that's being piped through the system to service that.

So, from a client perspective it's a problem, from the state reaching its greenhouse gas goals it's a problem. We find it's a problem, because once you get rid of that space that once had a tank in it in your home, it's very hard to then find a space in the home again for the tank water heater. Which, if you're going to use a heat pump, it's going to have to have a tank. So that's the problem we see.

And if you did decide, let's say you have gas tankless, you can't find a space in your home anymore for a tank water heater, and you decide to go to electric tankless water heaters, those just require a ton of current. So, sometimes a 40-amp, sometimes two 40-amp circuits just to heat up your water instantly. So, it's just a huge load both for the home, so you're

definitely going to have to upsize the panel, and you're going to have a huge impact on the grid, negative impact on the grid.

So, for people who have gas tankless water heaters or who are contemplating it, don't do it. And if you have one already, you know, the good thing for climate and for the state is going to be to go back to a tank water heater, and specifically a heat pump version.

MR. WACHUNAS: If I could just jump in before anyone else weighs in on code -- I'd love to say just pile on that and say that, you know, in our work we find a lot of -- there's this mistaken idea that gas tankless water heaters are more efficient and greener. And together, I think we kind of need to work against that idea. Even though there is no tank that's sitting there all day, the heat pump water heaters, the tanks are very insulated, they lose very little, and they're still, again, three to five times more efficient. So, helping to answer that mistaken idea that gas tankless water heaters are a green solution is a mistake.

And I'll just put a link in the chat to what Tom mentioned before, they also -- there's a great Stanford study that shows how every time they light up they emit a puff of methane. So, they have even additional effect on the environment.

MR. TAYLOR: And this is Gabriel Taylor, Senior Engineer for Decarbonization at the Energy Commission. I -- there was a question about Title 24. The building standards historically in California, for cost-effectiveness reasons, have preferred natural gas going back to the 1970's. But over the past two building cycles, and definitely in the current building cycles under development, our Staff are very much looking at how to streamline and make sure that there are no barriers to electrification. We will also work with local jurisdictions frequently on local government reach codes that are more efficient than the state minimum Title 24 Part 6 building code.

So, Dorothy, I think we're going to do a couple questions, yeah a couple questions from the Q&A.

So, a question from Jeffrey, "Do we have any data on average pause times for circuit pausers with EV chargers? Is this typically a minute-level pause or possible multiple hours?"

MR. KABAT: So, I'll take that one. The way that the circuit pausers are built, a couple that I've seen on the market, they're continuously monitoring the main panel. And when it gets to the 80 percent loading level, then they pause the circuit. And they check back 15 minutes later to look at the condition of the main

panel loading. And if it's now back down where they have space, they will reload at that point.

And from looking at those various bar graphs that both Josie and Hannah showed, those little occupied zone in the bottom of the bar, that was the highest 15 minutes of the year for each of those houses. So, it's very -- you know it's a rare event that something gets paused, and then 15 minutes later the device is looking to return it.

MS. GAILLARD: Yeah, I'll also jump in on that. Tom's right. We also spoke with the founder of one of the smart panel companies that spun out of Tesla, which is SPAN. And I was curious to know what his data had shown in their kind of early installations, how often the SPAN panel actually kicks in and pauses a circuit.

And his comment was that over the course of a year, the SPAN panel might pause a circuit six times. So, you know, that may be a little bit different from a circuit pausing device, but it gives you a rough idea that maybe the EV charging would be paused six times a year. You probably wouldn't be aware of it, because again, it probably paused for 15 minutes or so and then resumed charging, and the homeowner is not even aware of it.

MR. TAYLOR: Thank you. And a question from Kevin Hamilton, "How do we learn more about the electric service panel workgroup?"

I see Jenny has replied with a link to the Build It Green panel optimization group. I'll put that link into the general chat for everyone to see. And, Dorothy, do we want to go back to Karl or do we want to continue with the --

MS. MURIMI: Thank you. Thanks, Gabe. Karl? Karl Johnson? You can go ahead and unmute on your end and ask your question.

MR. JOHNSON: Okay, thank you. This is Karl Johnson, Beyond Fire. Formerly of UC Berkeley and Stanford. I was wondering whether there's any available data on 120-volt heat pump water heaters? I know you're doing the demonstration now, but are there sources of lab or field data on these devices from overseas or particularly for America?

MR. WACHUNAS: Yeah, thanks. I can jump in first and other folks can feel free to chime in. Yeah, Karl, it's definitely an emerging technology and we are, as I mentioned before, we're in the middle of the field study now. So, we're getting lots of good data on 120-volt heat pump water heaters. So, I think the answer is stay tuned, we're hoping to release the data early next

year after the field study. So, if you go to the Advanced Water Heating Initiative website, we'll have lots of good information. But we're installing them now in homes and getting a lot of good data.

MS. MURIMI: Thanks, Joe. Back to you, Gabe.

MR. TAYLOR: And Scott Blunk from Sacramento Municipal Utility District asked, "Can we talk a little bit about the noise that heat pump water heaters make? Is that a concern, and what can we do about it?"

MR. KABAT: So, I read Scott's question to be, "What is the noise a gas water heater makes? And there's a number of different types of gas water heaters. I had the old, the very common old passive gas one, which didn't have an electric circuit, and it was relatively quiet.

In walking around the neighborhood, I can hear peoples tankless gas water heaters go on. They are louder than my heat pump that heats my whole house, because they have a fan in there that's a small fan blowing hard to move combustion products around and out into the neighborhood. The other loud type is the fan force tank water heater that my next-door neighbor had that sounded basically like a jet taking off. But he then put a kind of a ducted vent on it that gave it a little more silencing.

So, the electric versions of gas fired water heaters are louder than heat pump water heaters. But heat pump water heaters are a new noise in the home. For me, mine sounds like victory, but that's just me.

MR. TAYLOR: Apologies to Scott, I did mis-read his question. Thank you for paying attention, Tom.

So, Gonzalo asked another question, "Are there vendors that sell heat pump water heaters without the electric resistance or maybe a 1500-watt version like the European versions? Most big box stores have a very limited supply of heat pumps right now."

MR. WACHUNAS: Yeah, that will be the 120-volt water heater. Well -- not -- well some of them will have electric resistance elements but the, I believe the new Rheem does not have the electric resistance element in it. And those are available, I believe, in Home Depot stores now, they released them in July.

MR. TAYLOR: Okay. Hannah, a question for Hannah from Laura, "On the available capacity slide, do you have data on how many of the homes you showed were actually fully electric homes?"

MS. BRUEGMANN: Yeah. Unfortunately, from the HEA data, I don't. I should go back and get it. But if you recalled the slide that Josie showed with the little blue at the bottom and the green at the top, two of

those homes were all electric. And the available capacity on those was almost the same as for the homes that still had some gas. So, I'll have to go back to HEA and see if they can give that all-electric information.

MS. GAILLARD: I know a little bit about the HEA data. I would assume it just represents the general population in California, that there's no particular concentration of electric homes in it, and there are probably very few electric homes in it. So.

MR. TAYLOR: And Brennan Less asks, "How do we find the appliances that sip rather than chug electricity? The lack of transparency and ease here, I think, is an important barrier. We need consumer and center resource to make this easier."

I'll answer that directly, and presenters are welcome to jump in. But that's the purpose of this workshop and of the SB 68 effort. Obviously, there's Energy Star at the federal level, Energy Commission has appliance standards that ensure that inefficient appliances are prohibited from sale in the state of California. But efficiency is absolutely the first step in building electrification and building decarbonization.

Do any of the panelists want to jump in?

MR. KABAT: Yeah, I'd like to build on that also, Gabe. So, the -- when looking at overall energy efficiency, that's slightly different than power efficiency. And for example, the energy -- the energy efficiency of two different heat pump water heaters, a 30-amp and a 15-amp is nearly identical in those UEF's.

So, you know, that's it. But the 15-amp versions have half the panel loading as the 30-amp version. And then, the 120-volts are going to be having much less than that. So, the 120-volt units are down around just the 3 to 500 watts of the compressor, and no backup resistance heating within it.

So, we definitely need more exposure on both the, you know, putting the power requirements next to the energy requirements. And so that's going to be a great thing for this website to focus on and give the consumers that right thing. You know, we've got Federal Energy Star. I've been asking, can we have Power Star ratings also for these appliances that sip so people can go quickly screen?

MS. GAILLARD: I was going to add, the Powe Star comment, which is Tom's idea. And we have floated that by DOE folks, Department of Energy folks, and they've passed it on to EPA folks who run Energy Star. But, if the feds don't do it, it might be an opportunity

for California actually, which is to produce a list or some sort of badge that could go on power efficient equipment similar to the Energy Star label. So, maybe that's something where California wants to take a lead and help guide consumers toward these power efficient devices.

MR. WACHUNAS: Just jumping in real quick -- Tom, a couple of the 120-Volt versions will have a backup electric resistance in them, and a couple will not.

MR. TAYLOR: And, related -- how can we find information about the lab and demo data on the 120-volt heat pump water heaters?

MR. WACHUNAS: I'll put a link in the chat where folks can get updates.

MR. TAYLOR: Thank you, Joe.

So, Dana asks, "Control systems and efficiency look like great options, but will spread out the load curve and may affect demand-response capabilities. Is there a tool that also includes load-shaping to balance capacity optimization along with peak and or demand pricing?"

I would -- the Energy Commission does have an open load management standards proceeding, where we are working with the five largest utilities in the state to

try to bring a marginal rate to consumers for their use. And there are a number of protocols for automating demand-side optimization. Certainly, if we are looking at peak shaving for capacity for circuit sharing, that's going to reduce the opportunity for peak shaving for demand-side management. But it's just a matter of which is more valuable.

COMMISSIONER MCALLISTER: Hey, Gabe. This is Andrew McAllister. I wanted to jump in here actually just -- I think this is a really great synergy that we're talking about, and I wanted to just dwell on it for a second. So, Gabe just mentioned the load management standards, and those are in development and they'll just ensure -- part of the key piece of that rulemaking is to ensure that any time-based rates are on a platform that is universally accessible. So, in the cloud, machine readable, all the time-based rates for the utilities will be required to be there prior to their actual effective moment when they become effective.

And so, that will open up all sorts of pathways for automation and for load flexibility. And certainly, for third parties to figure out how to kind of help customers respond to pricing signals, carbon content signals, and flex alerts. So that will really

be transformational over the coming few years, I think, where you'll see a lot of creativity in this space and certainly in the C&I sector. But definitely in the multi-family and residential sector more broadly, with a little bit of time.

The second thing I wanted to mention is our flexible demand appliance standards. And this goes right to the point that was -- the question that was just made. We're starting with flexible pool pump controls. And basically, over time we'll incorporate more end-use devices, including water heaters, and it will basically require native load-flexibility for any device in that category that will create an order for it to be sold or offer for sale in California.

So, we're setting up the point I think here is that the load flexibility space is becoming much more highly articulated over time. And demand-response is just not really the -- it's a blunt term, it doesn't really capture the whole thing. So, load flexibility is more like the permanent load shaping, increasing as all of you have been discussing, increasing the load factor for the grid, right? That optimizes the use of the grid, the higher the load factor the more effective your capital investments are.

But that is not to say that that will displace

demand response completely. There will be some sort of event-dependent capacity still available for dispatch if the price is right. And so, I think these two sort of supply side and demand side flexibility as kind of part underneath that whole kind of demand response sort of umbrella, I think those two things are going to each come into their own much more clearly and be complimentary over the next five to ten years.

And so, they complement energy efficiency quite well, and all of the work, you know, I think smart panels and some of the technologies you all have discussed today will really facilitate that marketplace to take shape as well. So, anyway, apologies for the soliloquy here, but I just wanted to connect some dots and I think, you know, we're trying to build platforms from our position so we're leveraging in the best way we know, our position as a regulatory body, as a standards making body, to set up the platform that reduces the transaction costs and really makes these responsive load flexibility really more accessible to everyone, and more effective for the grid as a reliability resource and as a cost reduction resource.

So, you know, we have the opportunity here to as we electrify transportation and buildings, and you know the website is key, you know, a key part of that,

to put some downward pressure on electric rates, which would be something new and different. Right? It's necessary for all sorts of reasons. So, I think we're all rowing in the same direction and I'm just really thankful to all of you for your presentations and your fundamental work on this, I think this is really groundbreaking stuff and looking forward to collaborating.

MR. TAYLOR: Thank you, Commissioner. We have two more questions. First is on workforce, and the second is on funding. So, the first is, "How will California accelerate addressing the workforce training needs identified this morning?"

This is a big question. We've had a number of workshops over the past year or two talking about workforce. Do any of the panelists want to weigh in? Or Commissioner?

MR. ROSALES: Actually, I was thinking of putting this one to Hannah, if she could touch on it. And then Paul as well, if you could touch on it from your perspective. Thank you.

MS. BRUEGMANN: I think the answer is more needs to be done. There's some great programs like Rising Sun Center for Opportunity that are working to really -- and Emerald City's Collaborative, that are

really working to educate folks in building decarbonization, green jobs, green energy related sectors, giving them those really solid skills.

It's definitely not enough. I know there are conversations happening about how to better support that. But I think my biggest answer is we need to do more.

MR. NIJSSEN: Yeah. I'm trying to get in contact with these people, actually, from the Rising Sun, to help them, actually, with a program. I mean, I trained electricians for EV charging stations, but I'd love to get in contact with these people so that we can really do something and get more people involved so that we can build faster the EV charging infrastructure. Yeah, sorry.

MS. BRUEGMANN : I can connect you, Paul. Just a quick note, is the residential existing building retrofit sector is kind of the least well-paid, least well-protected of all of the kind of construction jobs out there. So, continuing work at the state level to make sure that folks who are working in those places are getting, you know, protection, they're getting paid well, they have support and education, I think is a really important part of this whole decarbonization journey.

MR. WACHUNAS: I'll just add that there's a couple elements that are -- around workforce development there's contractor development, there's workforce development. We're really interested in heat pump water heaters as a low barrier to entry opportunity for workforce development. It kind of depends by state, but we're working with Emerald City's Collaborative here in Oregon where you can get a certificate to install heat pump water heaters as long as you don't do electrical work, after around three months of training. So, we see that as a really low barrier entry point for workforce development.

And so, if we can identify those and move forward with them across contractors and technicians, we can move this really important electrification work forward.

MR. TAYLOR: And additionally, Ralph DiNola from the New Buildings Institute points out that there are apprenticeship requirements in the Inflation Reduction Act that will be significant in this space.

So, moving to the last question we have here is about incentives, going back to the Inflation Reduction Act. And the funding that's coming from the state, it looks like we're going to be having a significant amount of funding coming into the space over

the next -- over the near term. "How are you considering these incentives, and how can we best leverage these funds as they come into the market?"

Panelists?

MR. KABAT: So, I've taken a look at the IRA and especially at the upfront discount part of it. It's kind of interesting because they put a dollar amount on all these different technologies. Like $1750 upfront discount for the water heater, $8,000 for the heat pump, $840 for this electric stove and the heat pump clothes dryer. Basic weatherization to help get our homes more efficient, $1,600. Electric wiring to go do these circuits, $2,500. A whole home energy reduction, for making the whole home perform better, that will definitely take pressure off the panel, at $8,000 performance rebates.

Anyway, when you sum all these up, including there's one of $4,000 for an electric panel, the total is $27,000 but the limit is $14,000. So, these eight things need to compete with each other for your attention. And what we've been showing you here is that you'll be able to do this kind of panel optimization so that you can free up those $4,000 that you might have wasted on a panel upsize and put them into these other better things that we know you need to decarbonize. The

heat pump water heater, the heat pump space heater, the cook top and the dryer and the circuit. So, it's like they've kind of set this up so that there's going to be a way for the site now to help people navigate what is the best use of your money.

MR. WACHUNAS: I'll just add an important thing on incentives that we hear from a lot of partners is that, you know, when you have really exciting incentives like the Inflation Reduction Act, or the potential for the TECH Program to be re-funded -- looking for consistency and longevity is really important. You can see that, for example, in heat pump water heaters and heat pumps there's usually substantial rebates that pay for some of the high upfront cost differentials. And you can burn through that rebate money really quickly and the market then gets this sugar high where it's installing a lot of heat pump water heaters, or heat pumps, and the rebates run out and then that market then can crash. So, with an eye to longevity and consistency is really important with rebate programs.

MS. GAILLARD: Yeah, I would echo that. I came from the solar industry, and California did this right actually in providing solar subsidies, solar incentives, starting in the early 2000's. And it really

gave the solar market a very long runway to develop, ratcheting down incentives over time in a way that sort of signaled to the market -- eventually, you're going to have to function without a subsidy. So, anyway, I would echo what Joe said, which is when there's a long-term, you know, view of subsidies and they're predictable, that allows small business owners to make big pivots and feel confident that that subsidy isn't going to evaporate. So, just echo that.

MR. TAYLOR: Ralph also asks if there will be new incentive laboring workshops in light of these significant funds?

I don't -- we don't have any scheduled at the moment, but the Energy Commission's very proud of our public process, and I guarantee you that we'll have appropriate workshopping and other modes for stakeholders to participate in any distribution of funds.

MS. MURIMI: And just want to note, for our call-in users, for those calling in, press star-nine if you'd like to ask your question, and star-six to unmute on your end.

Back to you, Gabe.

MR. TAYLOR: I'm told that the links that we're posting to the chat are not working. Is that --

is there -- they should be working. We do get a copy of the full transcript from the chat and the -- so we will post links if that's the case to the docket.

MR. ROSALES: We'll follow up, I think Mark added that comment. So, we'll follow up on that Mark, we'll make sure -- we'll reach out to all the panelists to make sure we have all the recommended links and then we'll put them on probably on a separate document and make it easier for anyone to access. Thank you for that.

Okay, Dorothy. I'll give it back to you and see if any more questions or comments out there.

MS. MURIMI: Yeah, we do have one from Brennan Less. Brennan, you can go ahead and unmute on your end and ask your question, and followed by Pat Birch.

MR. LESS: Yeah, hi, everybody. Brennan Less from Lawrence Berkeley National Lab. I think Hannah mentioned, you know, some work that we're starting to engage on for the Department of Energy around thinking about panel upgrades and, you know, avoiding them. And part of that is looking at the National Electrical Code and what in there is maybe, you know, not supportive of sort of the low power electrification path we're on, and, you know, what we can do to advocate to make changes to that code that would be more supportive of

all of this.

I guess my question to the folks out there, is what's happening to California in regards to that? I mean, California is typically one or two code cycles behind the NEC. And even if you look at, you know, the upcoming 2023 code, there's already things in there that are much more supportive of this kind of like low power load management type electrification. And I'm wondering what, if anyone, is thinking at the state level about how, you know, California could interpret or speed up its adoption of some portions of the electrical code that are more supportive of this process. Thank you.

MS. GAILLARD: That may be a comment that sort of stands on its own. But I would echo that, yeah, I think there's huge opportunity because, as Brennan said, California usually adopts the NEC at least three years after, maybe six years after they, you know, launch it at the national level, which is typical for states. It's not like California is in some way particularly lagging.

But when there are newer, you know, opportunities in the code, maybe there's an opportunity for California to take those pieces and adopt those pieces earlier than it normally would. Or, you know, in -- the NEC is a recommendation, and states get to

choose. There could be opportunities for California to actually you know amend the code in ways that could support electrification.

What we find is that the NEC is extremely conservative. Hannah showed that graph, which was, you know, the home that looks like the panel is maxed out according to one section of the code. It's not maxed out according to another section. And then in actuality, it's even lower than, you know, than the less conservative part of the code would indicate.

So, we think there's opportunities to -- you know the code was developed to be sort of an approximation and a very conservative one to avoid fires in homes. Now, we have lots of technology that will allow us to know what a home's, you know, actual load is. So, let's use that technology and let's get smarter and not use these very antiquated, kind of, approximations when we're telling people how much they can put on their panel.

MR. KABAT: And actually, these parts of the code, they're to avoid nuisance tripping of the main disconnect. So, there is that safety feature there that's protecting the service line wire and the panel. So, yeah. But I agree with Josie though, it makes sense that the state is naturally grandfathering along older

versions of the NEC code and then the state has the opportunity to reach forward and pick new things it sees out of the more recent NEC code, combine the two, and also create its own, because the NEC code is that suggestion.

MR. TAYLOR: Yeah, here at the Energy Commission, there's deep coordination between our decarbonization team, and our billing standards team, our appliance standards team, and research and all the other branches. We are also coordinating with the CPUC, the ARB, and a lot of the other players. So, I suspect that these issues have been brought up already, but if they have not been brought up in the appropriate context in the appropriate proceeding, then they certainly need to be.

Under this proceeding, we're looking to bring the information available to consumers, local governments to ensure that they have access. I think we're at the beginning of a very exciting time.

UNIDENTIFIED SPEAER: Shelly has her hand raised.

MS. LYSER: Hi. This is Shelly Lyser, from the Public Advocate's office at CPUC. I had a question mainly for Josie and Tom. Very exciting information you're presenting, thank you for sharing. I had a

question about whether the kind of circuit control options and panel sharing can also be applicable for multi-family buildings? You said your focus was typically on single family and there's just a lot of people in the state that are living in multi-family residences. So, I was hoping you could speak to the opportunities for those kinds of buildings.

MR. KABAT: Yeah, I'll address that. They are very similar, and there definitely are even more opportunities and needs to use circuit pausing and or circuit sharing in multi-family. I'm doing some pro bono work with a multi-family apartment that's trying to electrify all their car charging on 60-amp circuits and under. And so, it's pretty interesting, but we are finding some of the best solutions look like they're using some of these circuit pausers on that type of thing so that, you know, essentially after dinners done cooking then the circuit's available or, you know, the device sees that the panel's now unloaded again and there's room to be charging the car.

MR. TAYLOR: Looks like we're running a little short on time, so I think we're going to cut the discussion here and move on to the public comment. Dorothy?

MS. MURIMI: Thank you, Gabe. So, for

individuals who would like to make a comment, we're going to start the public comment session. And so, use the raised-hand feature if you'd like to make a comment. And again, for those calling in, press star-nine to raise your hand and star-six to unmute on your end. We'll have three minutes to give your comments, and one representative per organization. There will be a second public comment session later on today, so if we don't have time now, we'll be able to handle public comment later.

MR. TAYLOR: And then panelists, you can turn off your camera. Thank you very much for your attendance and for your excellent presentations.

MS. MURIMI: Alright. I see Pat Burt. Pat, you may unmute and give your comment.

MR. BURT: Yeah, thanks. So, I'm Pat Burt, Mayor in Palo Alto. Tom had encouraged me to speak and share some of our experiences that are, I think, relevant to this discussion. And I also want to really thank all the presenters, that was really valuable information.

So, by way of background Palo Alto owns all its own utilities. We've had carbon neutral electricity 100 percent since 2016, and had it's supposed to be the highest EV adoption rate in the country for some time,

which has all caused us to run in to the next set of challenges of perhaps ahead of some of the other municipalities.

So, as we are moving forward on our 80/30 goal, 80 percent GHG reduction by 2030, we have a great focus on building electrification and within that, home electrification. We have aggressive programs that have been going on by our utility's program group. But, we -- six to nine months ago we had our utility's operations come forward and say you basically have to halt your building goal home electrification program because we can't keep up with the ad hoc, piecemeal additional system demands. They were -- basically lack inadequate capacity on pole mounted transformers, and we would need to do a study for a couple years and a 10-year plan to system-wide increase the entire capacity in the city.

We've gone back, looked at this. Basically, looked at the low-watt approaches and recognized that first, that we could have heat pump water heater conversion across the board, which is where our most focused goal of an end of live conversion to heat pump water heaters. And starting off with 1,000 units in the next year is our scaling from our pilot program to pilot production, we'll call it.

The other thing is that we saw the whole home

low-wattage approach, we can do certainly on many areas of the city where we've already increased the transformer capacity. But a big a ha for us was that it didn't make sense that our home electrification was triggering this capacity problem, and as we looked at it, it was EV chargers and specifically oversized Level 2 chargers, 50-amp Level 2 chargers, that EV purchasers were being upsold and oversold in response to range anxiety and that's what was triggering our capacity problems.

And so now, we're looking back and looking at how do we go through a multi-faceted program to re-calibrate consumer expectations, permitting these and all those things to right-size home EV chargers, in addition to right-sizing lower wattage appliances and the other smart approaches.

The other thing --

MS. MURIMI: Mayor Burt?

MR. BURT: Yeah?

MS. MURIMI: If you could complete your comment?

MR. BURT: Okay. Well, I'd be glad to share additional information on additional barriers that we've encountered, and tentatively how we think we can overcome them. Thank you.

MS. MURIMI: Thank you, Mayor Burt. One last commentor, Medhi Ganji. You may give your comment, you have three minutes.

MR. GANJI: Sure, thank you. It was a great presentation, and informative webinar. One thing I would like to mention as a follow-up to Mayor Burt, and also Josie and Tom's presentations. We noticed that they came up with the cost of, I would say an estimate for upgrading the electric panel, the cost of $5,000. And I would say that's the cost of the panel upgrade in the best case.

In a worst-case scenario when the homes are being fed through the underground utility infrastructure, or system, the cost might get up to $20-$25,000 in some cases as well, as we need to pay -- as the customer or homeowner should pay for the cost of trenching and bringing new underground wires from the closest utility point of contact to their home. And in some cases there is a combiner box right in front of their garage that needs to be upgraded as well. Thank you.

MS. MURIMI: Thank you. So, we are at time at the moment. Heriberto, I'll hand the mic back to you. We will have a second public comment session right after we come back from break.

MR. TAYLOR: And Mayor Burt --

MR. ROSALES: Thank you --

MR. TAYLOR: Mayor Burt, if you would like to send an email to our staff, we are all very eager to collaborate with you and your staff, so thank you very much for attending.

MR. ROSALES: Yes, thanks to everybody for participating with the public comment period and for all the questions and comments. We will have time later after -- this afternoon after Panel 2 for additional public comment as well as questions. So, if you didn't get a comment submitted now, you can get it submitted then. You could also just write it in the Q&A box and we will make sure it's written and recorded.

With that, let's break for lunch. We will have approximately 40 minutes starting now for lunch. I will pause this recording and then we will reconvene at 1:00 o'clock, and we will reconvene promptly with Panel 2 presentations. Thank you everyone. Thank you, Dorothy.

(Meeting off the record at 12:20 P.M.)

(Meeting on the record at 1:00 P.M.)

MR. ROSALES: Everyone, it is 1:00 P.M., we will start off with the second half of our workshop. We will get into the Panel 2 discussion and presentations.

The moderator for this workshop will be Gabriel Taylor. He is online. All presenters, if you can stand by and be ready.

Just a quick reminder for all the participants including our panelists, the focus of the project is really to build a website that will be, again, resourceful to three key stakeholder groups. First, being building owners, seconding being local building officials, and third being contractor/trades groups that will be handling all the professional installation for a lot of the equipment and appliances for the buildings we're speaking about today. So, I just wanted to remind folks again, a lot of the suggestions and ideas -- the most helpful ones will be ones that will let us understand what should be going on to the website. Again, that is a core delivery for this project.

And so with that, Gabe, I will pass -- I'm going to get off camera and I will pass it on to you so you can moderate Panel 2.

MR. TAYLOR: Thank you very much, Eddie. Good afternoon, everyone. Thank you for returning to the afternoon section of this workshop. We're looking forward to hearing from four panelists this afternoon, and then we'll have time for questions and for public comment. If you have questions, please try to use the

chat function, it seems to be working most fluidly to put your question in to the Q&A box and then we can read it to the panelists and discuss it. If you have -- there will be an opportunity at the end of the panel for public comments, and we look forward to hearing your public comments. As Eddie said, we're really interested in your thoughts.

So first up today, we will -- first up in the afternoon panel rather, we have Karen Kristiansson. Karen is the Lead for the Codes and Standards Program at the Bay Area Regional Energy Network, or BayREN. Karen? I'll stop sharing and, turn it over to you.

MS. KRISTIANSSON: Great. Let me share my screen.

MR. TAYLOR: Karen, your camera is on.

MS. KRISTIANSSON: Here we go. Hopefully it's getting now. Can you see my slides there? Hopefully that will work.

MR. TAYLOR: Yes. Thank you, go ahead.

MS. KRISTIANSSON: Great. Alright. So, thank you very much, Gabe, Heriberto, Commissioners and everyone who's here. I heard a lot of good information this morning, looking forward to this afternoon's discussion. As Gabe mentioned, I'm Karen Kristiansson, I'm the Codes and Standards program manager for the Bay

Area Regional Energy Network, or BayREN. And I'm going to talk today about some tools and resources focusing on examples for local government staff, particularly building department staff.

Just a couple words for those of you who are not familiar with BayREN, we work in the San Francisco Bay Area with the nine counties. And are one of four Regional Energy Networks, RENs, in California funded by ratepayer dollars through the CPUC. So, we focus on buildings, saving energy, and reducing emissions from buildings.

Most of our work is done through six programs that we run in the bay area. We have programs that focus on helping single family homeowners save electricity, reduce their GHG emissions through incentives, green labeling, saving water. As well as programs that provide technical and financial assistance to multi-family and business owners. And then the program that I'm with, the Codes and Standards Program.

Our Codes and Standards Program focuses on supporting local government staff in the three ways that you'll see here. And so today, I'm going to focus on tools and resources for improving code compliance, energy code compliance at the local level. And in particular, I'm going to be talking about a couple of

efforts that we've been involved with that are aimed at helping local government building departments with permitting.

Just to set a little bit of the stage here, the energy code is a pretty complicated document. It changes every three years. Buildings are also -- can also be complicated, and they change as new technologies and construction methods are developed and become available. We heard a lot about heat pump water heaters this morning, and I'm going to talk a little bit more about those as well.

So local government staff need information and resources to help them bridge that gap between the code and the different technology options to make sure that what is actually built is safe and code compliant. So, the processes to do that is permitting. Appling -- when people apply for and receive a permit from a local building department for a project, and then the building department inspects the project once its complete to make sure that it does fully comply.

There are a number of existing sources of information and resources that local governments can use, and these are the websites that I refer local government staff to frequently. I kept thinking of other ones, but I was sort of limited to how much I

could fit on the slide. So, there are more. But there -- this is, you know, people are working on this, and I think one of the challenges for this website is also going to be on how to pull things together in a navigable way. So, for today, I'm going to dig a little bit deeper on a couple of examples. Heat pump water heaters and reach codes, and some resources that we've worked on to help building departments with permitting for each of those.

So, we heard a lot about heat pump water heaters this morning. They're a very efficient technology for heating domestic hot water that has not been used very much in California so far, so its relatively new here. And a reach code, sometimes in other areas is called a stretch code or beyond code, and that's a way for local governments to establish more stringent requirements than the state code. They can be great ways to accelerate and test ways for people to save energy, to you know, to test building improvements.

So, the first example I want to get into is heat pump water heaters. We talked about these, they're a really important technology for building decarbonization. Many stakeholders are involved in bringing about that market transformation that we need in water heating. And building department staff are an

important part of that, because of their role in permitting and inspecting heat pump water heaters.

So, you know, to do that effectively, they need to know -- they need to know about heat pump water heaters. What are they, what are the code requirements, what do they need to look for? And we heard a little this morning about how technology is changing rapidly, there's different types of heat pump water heaters for different types of buildings. So, it can be difficult to keep up on all of this.

And when answers to these questions are not known or are not clear, then there can be delays and problems in the permitting process. So, we've certainly heard about some of that as heat pump water heaters have started coming online. Although I would say that a number of jurisdictions have really been working hard on this, and have developed good processes.

We've also tried to help that and support our local governments. So, we started -- we developed a training curriculum and some assistance sheets that can be accessed any time from our website. To try to, again, you know, answer those questions, what is a heat pump water heater? What are the code requirements? What do you need to look for.

And we also partnered with the TECH Program's

permitting pilot effort and worked with them to identify needs, find lists of developed resources, including one originally drafted by Tom Kabat and Josie Gaillard, whom we heard from this morning. And to make those resources widely available. So, all of these, as well as the other resources I mentioned before, are on our website for people to download and use. We want to get them out to as many people as possible.

Did I just go backwards? I guess I did. There we go, wrong way. So, the second example that I'll mention today is reach codes. So, when a local jurisdiction adopts a reach code for their jurisdiction, the building department staff need to enforce the reach codes as part of the permitting process. So, again, they need to know about the requirements, how they relate to the base code, and what to look for.

One common problem when folks are working with local governments is that, you know, a local government like any agency, it's not just one thing. There's the building department staff, and even within the building department there's the plan checkers, the, you know the permit technicians, the building inspectors, the sustainability coordinator or manager might have been working on the reach code, the building official might have been working on the reach code, but probably all of

those other people were not. And all of those folks need to be brought in, need to be made aware of what the reach code is, and how to work with it. Not just, you know, the local government adopted it so the local government needs to know how to do it. It's a little more complicated than that.

So, to address these issues, you know, we worked with a wide group of organizations to develop reach code implementation resources. Like many things, you know, if you develop a policy but you can't implement it, it's really just a piece of paper, it doesn't get you where you need to go. So, in addition to customized trainings that we offer, we also provided or worked with the group on a template training curriculum that cities can use themselves. And a template reach code summary sheet and checklists for various types of buildings. So, these are things that people can download and access and use themselves in this process.

So even though these two examples are very different, heat pump water heaters and reach codes, the resources for each of them serve a few common goals. The first and most obvious goal is just providing information. And I think that's what we think about most commonly when we think about a website. And that's

really important, but it doesn't stop there.

Another key goal is to encourage consistency between local jurisdictions. And we hear this a lot from contractors who work in multiple jurisdictions that if they go to two different building departments, you know, they might not get the same answer. They might not -- there might be different processes, there might even be different requirements or development interpretations of the building code. So, trying to encourage consistency between local jurisdictions is another goal of this kind of resource.

And then, a third goal is to help the building departments and the applicants get on the same page so that the applicant understands from the beginning what the building department will be looking for and there doesn't have to be a lot of back and forth between the applicant and the building department when someone submits an application requirement, they know exactly what they need to submit, what format it needs to be in, you know, and what's going to be checked for.

My daughter is in school, so it's kind of like the teacher telling you, like, "What are you going to be looking for in your paper?" Or, you know, on the test. Just making those expectations really clear.

And, then a few other key points that I wanted

to make. The resources need to address the right questions. And for this, you need to know, you know, the perspective of the people that you're aiming to help. So, you know, for local government building departments, it's still, like, what are heat pump water heaters? But they don't need to get into all of the details that a mechanical engineer would want to know. What they really need to know are what are the code requirements, what do they need to look for, what are the things that you need to check for in order to know -- - so that something can be installed safely and in a code-compliant way.

The resources need to be reliable and accurate. And part of that, but also a little separate, is the need to reduce confusion. And having multiple resources around the same thing can also create confusion. Especially if they don't say exactly the same thing. So, it's important to make sure that the messaging is consistent, that the resource is -- there are resources out there that local government staff can bank on, they can count on. Like, okay, these are the requirements, and they don't have to worry about any problems with the reliability of that information.

And like with the two examples that I mentioned here, I think the information is especially

needed for new technologies such as heat pump water heaters, and new policies. And I think, you know, we heard a little bit about some of the circuit shutters and other items this morning, some of those things. You know, there's a lot of new technologies related to building decarbonization. So, information related to those will probably also be important. And new policies, like reach codes. New items that people will need to enforce.

And another important part of this is collaboration. This is the note on our reach code resources that we had a large group of folks who took a look at those, provided some feedback, and you know, it's important to avoid like I said, that consistency of messaging but also to avoid duplication. Because, you know, we don't want multiple resources out there that might say slightly different things, we really want to be sure that everyone who is working with the different stakeholders understands and is onboard with all of the messaging and that we can all be promoting the same things. We don't have enough time to develop a lot of duplicative resources, especially ones that aren't consistent.

So, this workshop's a great start to that collaboration and discussion, and thank you very much

for having me today. That concludes my presentation, and here's my contact information for any follow-ups from anyone here.

MR. TAYLOR: Thank you so much, Karen. Next, we'll transition to Dom Lempereur. Dom, are you there?

MR. LEMPEREUR: Yes, I'm here. Good afternoon, everyone.

MR. TAYLOR: Good afternoon. Did I get your name pretty close?

MR. LEMPEREUR: Lempereur, not too bad. Not too bad.

MR. TAYLOR: Excellent. Dom is the Chief of Engineering at BlocPower, a climate technology company focused on urban clean energy products. Dom, will you share your screen?

MR. LEMPEREUR: Yes. Can everyone, everybody see my screen?

MR. TAYLOR: Perfect.

MR. LEMPEREUR: Yes, okay. Again, thank you very much for the introduction, Gabe, and good afternoon, everyone. So, I'm the Chief of Engineering at BlocPower. So BlocPower is -- a little bit about BlocPower. We are a minority owned clean tech with five years of existence. And what we are really focusing on is on the market that have been, we feel, underserved,

and it's small to medium sized buildings, commercial buildings. So multi-family buildings. And particularly talking about multi-family buildings, about the low and medium-income neighborhood and buildings.

So, while the company started doing energy efficiency and making buildings more efficient, starting with any type of energy improvements, for the past three and a half years, almost four years now, BlocPower has been focusing on electrification and gas to electric technology, basically, for buildings. Right? Those type of conversions.

As a tech company, we built a platform to what we think can help reduce the cost of electrification and particularly the cost of developing those projects. As you can see on the screen, we have been backed up by government offices, utilities, and private investors.

So how do we get started successfully, right? You could be a city, a city or town, a utility, a real estate company with a portfolio of buildings, or an individual building owner. What we think is very important is to have access to data. And data is often publicly available, there's also often a set of proprietary data.

But, knowing what we are looking at and how to make the right decision in prioritizing the type of

buildings or type of measures that makes the most sense for particularly a group of buildings or building is essential. Learning, right? And having the data or set of data -- using the platform for instance, we can actually visualize and support marketing campaigns, for instance. BlocPower, just a few years ago, had been tasked to identify multi-family buildings in rungs that are oil buildings, right? And how can we approach building owners, for instance, and that was a utility program, right? How do we access and do the outreach to the building owner to explain what electrification is, what is the benefit of electrification? So, data visualization is a very important part as a first step, right, of an energy program for instance, or an electrification initiative.

Now that -- assuming that we have all the data and all the visualization, we have a pretty good idea -- looking now from the perspective of a building owner or decision maker, right? We need to talk a little bit about, and very early in the process in our view, about the journey that the building owner will have to take to go to and install electrification in a specific building. And the problem is that building owners have to face, you know, more than six parties in this example to actually put a project together.

Starting with an energy consultant, an engineering company to do the design. Financing entities that could be multiple it you're multi-family building and low- and medium-income. Finding other contractors, what are the incentives that are available? Local but also federal. And with Inflation Reduction Act, for instance, there's a lot of things going on, right? Having access to the information that pertains to the actual -- that can actually help a building owner make a decision on electrification. There's a lot right now. Right? So, all this -- and if you are multi-family building owner, and there's a lack of capacity of resources, you have other things to do and this task of thinking about to electrify a building can be daunting.

So, what is a solution? Again, based on data, based on the journey that a decision maker will have to take, right, to electrify a building, we believe, and we have found out working on over 50 electrification projects, 12 of them being in California, we believe that turn-key projects are the key to a successful electrification.

Turn-key means that there is one entity who is the point of contact to the decision maker or the person who invests into electrification. And going through all this journey, again, you can see on the screen that

from the acquisition to the analysis, right, the first pass at providing what really the electrification project needs, to talking about finances, installation, and beyond the installation, talking about the performance or the maintenance of the system.

We believe that having one company who can provide this turnkey project is the way to go. And we can -- for the customer, it means also a reduction in the cost of electrification. The reason for that, that all the players working towards the project have access to the same data. So, they are not putting any type of mark-up on their quotes, right, to make this project happen. So again, we feel that there is quite some efficiency gain by providing a turn-key project as the methodology to deliver this project.

So, let's start again with energy planning, right? So, you're convinced that electrification is the right thing to do for a specific building. The scope budget and timeline is the pillar, or the three pillars basically of this -- or to initiate this electrification project. Scope of work means that hiring a professional to come up to the building, do a lot of data collection. You can see on the screen for instance, this gentleman with an actual video cam on top of the helmet to capture and collect all the data on the building. Later on,

that can be used to generate drawings. For instance, for the design.

When you have a list of measures that makes sense for a specific building, you need two additional information. And it's budget, right? How much does it cost obviously to implement the scope.

And again, I think access to professionals who can efficiently provide, and accurately provide a project cost savings also associated with electrification, what are the pre and post expenditures is an information that people would like to know early in the process before implementing electrification. What are the available incentive rebates, taxes? What are the possibility to finance such a project? Are all those questions that needs to be answered relatively early and efficiently, quickly in the first step of the project development.

In addition to that in talking about tools that are available, sharing the information -- basically we put together, BlocPower put together, a specific model, right, that consists of creating a questionnaire that is not too technical, but that has basic information about the building, right? And from there, we can relatively quickly generate a report saying, "Hey, this the opportunity to think about

electrification. This is how it should look like."

Talking about another tool also that is very critical is connecting to the history of utility data so we can do some analysis. And, with the owner's consent, obviously, right? There is some information that is available today to fetch that utility data and come up with a model and savings, you know, in dollars to estimate those savings.

Specific to what we do about energy modeling, we use Energy Plus to really simulate a specific building, or a group of buildings, and come up with heat loss calculation and also sizing of equipment. So now, you have more answers to the initial question saying, asking, you know, is electrification good for you? Does it mean that the decision maker needs to go ahead and start today? The answer is not or not necessarily. And electrification -- so that's where the timeline of the project is very important, right?

And I'm going to take an example. You're a building owner and you replaced your heating system, a gas furnace, or a boiler last year. The system didn't go through the amortization cycle yet. Is this the right thing to rip it off and replace it? Some people would do it. Economically, some people are not so sure about this.

Does it mean that the decision maker will have to wait, you know, eight, 10 years before thinking about electrification? No, because there is -- if starting a project doesn't make sense the next year or immediately, there are two measures that need to be considered to prepare for electrification. The first, is to upgrade the electric panel or the service. And that can be done if, for instance, a building owner, single home, decides to install an induction stove for, you know, electric induction stove replacing a gas stove, right? There will be an electrician coming, this is a good idea to think and project how much services and what the panel should ultimately be to be ready for electrification. So, if you're thinking about an EV charging, maybe a 400-amps makes the most sense, right? So that is a measure that can be done relatively quickly in preparation to a full electrification.

The second, is about the building envelope. And there are two benefits in to -- with tackling that building envelope. The first is, even though the heating, let's say, or the cooling, the heating is provided by let's say natural gas, right? There will be savings on the utility expenditures immediately because the building is tighter. So, savings in dollars can be generated immediately. And the second, is the fact that

because the building is more efficient, the size of the heat pump system can be smaller. Right? For a home that is not properly insulated, maybe you will need four, five-ton unit. With an insulated system, home, you might only need three tons et cetera. So, annual reduction in the cost of electrification all together. So, again, just to summarize this point, if electrification is not sound or makes sense for a specific building today, we can still prepare for it.

As I mentioned earlier, the turnkey is a way in our view that makes the most sense and the simplest way for a building owner to go for electrification. Right? Because of the multiple stakeholders and multiple trades that will work on a building. But maybe we can go a little bit beyond that, and there is a new type of service called electrification as a service, or heat as a service, that is being developed in many parts of the country.

A utility like Con-Edison in New York City is actually opening a program to help building owners who may have some difficulties in finding the capital to go with electrification, to instead work with a provider of such -- electrification as a service. And one of the possibilities is to, instead of purchasing the equipment, is instead to lease the equipment. So, it

means that the provider will design, install, and operate the asset, being electrification measures such as a heat pump for the duration of the lease that can be multiple years. You know 10, 15 years. So, the benefit of that is -- and it works a little bit like a call payment when it's not yours, you can use it, and you pay every month. Right? So that's the type of service I'm talking about.

The benefit of that is really to have a brand-new system with no upfront cost of capital, and also to have really a system that can be performing and maintained by others, right? So, we believe that this is a type of service that is beneficial to electrification as everybody has heard before, this is not -- electrification can be expensive and we believe that this is, you know, this type of deliver that that can make a big difference.

So that ends my presentation. I understand that questions will come a little bit later after the next presenters. Thank you very much for the opportunity to present.

MR. TAYLOR: Thank you very much, Dom. We've already received some questions and we will handle those at the end. Next up, Erich Fleck, is the -- Erich Fleck is the acting manager of the Switch Is On website

project, and related ambassador programs. Erich is with the Building Decarbonization coalition. Erich?

I can see your slides. There's a bar at the top, let's -- if you can full screen it? It should work fine there. There you go. Thank you, sir. Go ahead.

MR. FLECK: Thank you, Gabriel. Hello, everyone. Well nice to meet you. So, we're going to talk about the BDC, the Building Decarbonization Coalition and by extension, our Switch Is On website and campaign. So, here at BDC, we are a coalition that unites building industry stakeholders with energy providers, environmental organizations, and local governments to help power our nations homes and workspaces with clean energy.

Early on, we realized as far as resource sharing, that each unique audience needs a customized portal to best serve the needs of each audience. And so, we came up with focusing on homeowners and residents, contractors, and resources for local governments and staff. So, some of the homeowner-resident resources that we have from a state-wide standpoint is that BDC is a member of TECH Clean California, in addition to our partnerships with cities, IOU's, CCA's and municipal utility districts, help create the nation's first consumer-focused home

electrification campaign centered around our website, SwitchIsOn.org.

The mission of Switch Is On is to educate and inspire homeowners and residents to be able to participate in making the switch off of gas infrastructure in the buildings to an electrified home. The journey itself, is it's all about knowledge sharing and learning and finding and helping professionals and residents find ways to plan and complete the projects, and also to make sure that we have searchable databases so that you can connect with those to do the work, as well as find ways to help fund the projects themselves.

We recently were able to put together a big ask that we've been receiving over the past eight months as more of a concierge type service for people to be able to -- and by people I mean homeowner and residents, to be able to ask all the questions that they have, which are quite numerous at this stage in the game. And so, we do provide expert support to residents, both through a contact email, but also more specifically through a third party that helps people navigate that process.

And one of the really great additions to our campaign is our ambassador networks, both neighborhood ambassadors which are just volunteers across the state

that are embedded in this work or just really, really interested in it, and they give us the eyes, the ears, and the voice of what's going on so that we have this feedback loop that's constantly learning. That, all at the same time, is being supported by our, as I mentioned before, our partners, our utility partners, CCA's and Muni's, as well as the Regional Energy Networks, and some of the private companies out there doing this same work.

So, I'll talk a little bit more about the educational content. Our website is for one, the main goal is to have it be as accessible as possible to all residents in California. And the way that we accomplish this is through being not too technical, but technical enough to be able to understand the technologies and the processes needed to install them in your homes. But also really digestible for the broadest array of consumers.

Our website is translatable into a multitude of languages with many of our downloadable resources, video, digital, radio adds, all produced in the four main languages spoken in in California, English, Spanish, Mandarin, and Tagalog. We have, on the website, RSS news feeds and blogs and spotlights highlighting decarbonization income qualifying programs,

just specifics about heat pumps in general, induction cooking, the contractor's journey, training programs, and overall awareness to the benefits and realities of being able to make the switch.

The most visited part of the website in these past eight months is our incentive finder, because it's not surprising that people want to be able to know that they can fund this work. And the incentive finder tool is maintained day in and day out through collaboration with our program partners throughout the state that are providing the incentives. But also, we have a third party that helps us manage the database.

The incentive finder is a way for you to be able to, as a homeowner or resident, and or contractor, go to our website, type in a zip code, search what kind of projects you'd like to be working on -- so central, HVAC, heat pumps, and you will -- as a for instance, here in San Luis Obispo County where I live, if you were to type in 93401, San Luis Obispo's zip code, you'd come up about 28 different incentives that are active at the moment in that area.

And you're able to click on the incentives, learn more about the incentives, understand the requirements. It's very important for us, too, to be able to distil the programmatic information in a way

that the general public's able to do something with it. And we do that through just consistent communication with the program generators, and always trying to perceive how the information will be received on the resident's side.

Similarly, we have a contractor directory that helps residents and homeowners be able to locate contractors in the area that can do the work that they're hoping to have done on their homes. From this slide, you can see that because we're still in the early stages with a lot of this transformation and there's not quite enough contractors yet to do all of the work, the zip code allows for a range of distance from wherever it is that you live to hopefully increase that pool of contractors that would be able to come and provide a quote and hopefully get the project up and running.

But it's all searchable by your zip code and by the type of work that you're looking for. And this is maintained by a third party, Efficiency First California, and they, in concert with TECH Clean California make sure to be monitoring customer experience with the contractors, to make sure that business licenses are up to date and functional.

I talked a little bit, too, about that concierge piece. This is -- we're a learning campaign,

so it's something that is iterative in nature. But we do have on the website expert guidance provided by Electrum, a third party that can allow, at least with heat pump water heaters for now, to be able to cost compare and see different savings and applicable incentives, as well as Electrum provides solar battery storage advice. And not just advice, but detailed analysis.

And the way that that plays out is that we have a phone number that a resident or homeowner could use to connect with Electrum. They would share their address and the type of project that they're looking to be completing. And through that process, they can use -- Electrum can use satellite imaging to kind of look at the roof of the home and see how many solar panels they might need to do all the things that they'd like to do as they decarbonize their home, as well as then take it to the next step and connect them to contractors, provide quotes, and instigate the project itself.

From a contractor's standpoint, early on after we -- prior to the launch of the website in December of 2021, we did a lot of outreach to contractors and interviews. And the three biggest things that were materializing from these conversations from contractors already doing this type of work, were that they wanted

third-party marketing materials, they wanted there to be a clear place for incentives to exist both for them and for residents to be able to understand where the starting point is. And they also wanted to build customer leads.

And that is what the contractor portal on Switch Is On serves. The -- as far as the lead generation, that's how it works. You type in your zip code and the contractors are given leads, and then there's a follow up email. I've done this myself for work on my own home, and it was -- I had two or three contractors reach out to me within 24 hours and it was really great because it kind of kept things going and kept the interest there on both sides.

The marketing materials -- we do help the contractors on that end, both in house and with TECH Clean California. And we also amplify any trainings that are either being provided by manufacturers on the website of the equipment. Or, if for instance what Karen showed earlier with the BayREN contractor training sessions.

And as we can see here, we're all about amplifying what already exists. And then just keep bringing it to people's attention in the easiest ways possible. Easiest and most effective.

And then lastly, the government, the local government staff resources component of what BDC does, is we work our team our groundswell team specifically works with local government staff resources, here, our staff in California and outside of the state. But with items like a best practice library, you can find this on the Clean Building Compass, which Karen also had on her slides.

And then amplifying trainings. A number of entities are already offering these trainings and topical workshops for local government staff. We engage with co-learning and coordination and sharing of these resources such as Civic Well. I just mentioned what some of the Regional Energy Networks do and a lot of what's going on with the investor-owned utility reach code teams.

Guidebooks are another great way to share resources, one that we would like -- you know, a key resource of note would be Silicon Valley Clean Energy's All Electric Permit Guide. That can be a really valuable component for city staff.

Calculation tools. There are a lot already out on the market, but when you're a coalition builder, you're bringing a lot of these resources into play so that everyone can use them as effectively as possible.

And then lastly, we've created relationships with organizations such as Green Cities California, who bring municipal sustainability staff together to just learn from each other. And it's through that co-learning that everything is constantly improving. And in a way that not only you can benefit from a contractor standpoint with your own business, with your own access to being able to train your employees, but also from staff and local governments and then with the biggest component being the cultural change of hearts and minds that Switch Is On and attempts to do each day with our website as a one stop shop for building decarbonization. Thank you.

MR. TAYLOR: Thank you so much, Erich. Really appreciate it. Excellent. So next up, we have Shelly Lyser. Shelly is from the Public Advocate's Office at the California Public Utilities Commission. Shelly, are you ready?

Can't year you.

MS. LYSER: Yes, ready. Just sharing my screen. I'm going to make it -- my PowerPoint full screen. Can you guys see that?

MR. TAYLOR: We can hear you fine, can't see a full screen yet.

MS. LYSER: Might take a minute to load.

MR. TAYLOR: Now we see your desktop.

MS. LYSER: Uh, oh. Alright. It may have gone to the previous slide. Let me try that one more time. Here we go.

MR. TAYLOR: Still not seeing yours show.

MS. LYSER: Yeah, I'm having the two-desktop issue. Let's see if I can change that over.

MR. TAYLOR: If you go to the share screen after you make it presentation mode, you should be able to share just that presentation.

MS. LYSER: Here we go. Let me try this and see if that helps. Unplugging second monitor might make a difference. How's that?

MR. TAYLOR: Perfect. Go ahead

MS. LYSER: Great. Well, thank you for having me. My name's Shelly Lyser, I work at the Public Advocate's Office at CPUC. We advocate on behalf of residential and small commercial customers that are paying utility rates. And so, we are trying to keep an eye on how high rates are going, trying to keep them as low as possible while also still meeting state environmental goals and keeping the grid reliable.

And so, happy to be here today. I'm going to be talking about overall equity implications of these types of programs, and how we can address these issues

in program design and implementation.

So quickly, the topics I'll cover are some existing programs, which I think will be relevant to this website related workshop, since we're trying to consolidate all of the incentive programs to make things easier to find. Which I've been very interested in seeing everyone else's presentations about how you're trying to consolidate the information and make it more easily accessible, because that's a common concern.

And then I'll zoom out and talk a little bit about, you know, who is actually able to sign up for these programs. First, of course, there's the hurdle of being able to find them. But, there's some groups, in fact large portions of the population that have issues accessing the incentives or taking advantage of the programs. So, we want to try and address that, and I'll talk a little bit at the end about how we can problem solve there.

So, what are some of the available programs today? There's two ongoing pilots through the building decarbonization proceeding at the Commission. I think several of you are familiar with them, because they've been referenced in previous slide decks. But there's the BUILD program, and the TECH program. And they both provide incentives for decarb measures. One's in

existing buildings, and one is for new construction. And there are different initiatives overseen either by the CEC or the CPUC. And we also have, in at least SoCal Edison's service territory, they have a building electrification pilot for their low-income customers. So, it's specifically targeted at customers that fall at or below 200 percent of the federal poverty line and seeing how we can, you know, access those populations and provide them with electrification benefits.

So those are pilots to evaluate, you know, feasibility of different options. There's also several ongoing and well-established programs that are funded either through cap and trade auction revenues, or through utility rates. And that's the self-generation incentive program, as well as several programs within the Utilities Energy Efficiency portfolios. And when I say utilities, I mean folks like PG&E. Not necessarily SMUD, although SMUD of course has its own EE programs.

There's also the Energy Savings Assistance Program. So that's targeted at low-income customers. And they tend to have measures like fuel substitution, like heat pump water heaters as part of it, although it's not typically the primary emphasis of these programs. So, I'm listing these here partly for awareness, but also to note, you know, there's hundreds

of millions of dollars of funding for incentives that have been approved. And we want to have access to those be as equitable as possible.

But what are some of the barriers that especially lower income customers face? Some other panelists have touched on this, but I'll go into a little bit more detail here and underscore it. So, this was actually from a study by the CEC talking about access to clean energy programs for low-income and otherwise disadvantaged customers. They have low home ownership rates. So obviously, it's difficult to, you know, change anything to do with the place you're living, like building envelope or the appliances, if you're a renter.

So that kind of creates an inherent roadblock that I think some programs are trying to address by, you know, looking at multi-family whole-building approaches, working with landlords, but it is an inherent hurdle that I think needs to be emphasized strongly because there's a large chunk of the population in California are renters. They also face often very complex arrangements and requirements for, you know, in the buildings where they live, there's a lot of paperwork, a lot of different hurdles inherent once they're in the low-income, any sort of low-income housing to have

access to programs.

They often have less access to capital. It's very difficult to borrow funds, or you know partially fund any sort of programs even if there is a lucrative incentive. If it's not 100 percent funded, or you know there are other issues such as structural issues, panel upgrades -- which I'm glad was addressed a lot earlier in this workshop talking about alternatives to panel upgrades. Some of it just isn't feasible for lower income customers.

There's also the issue that lower income customers are more likely to live in older buildings. And so, there could be further work that needs to be done specifically for low-income customers. And, you know, there's a lot of programs and interest in some of the urban centers in California for these types of programs. Especially in the Bay Area where I live.

But throughout a lot of the rest of the state, especially in more rural areas like the San Joaquin valley, there just isn't as much availability of contractors, of the technologies themselves, and, you know, a lot of the resources that folks in more urban areas can take for granted or at least have slightly easier access to.

So those are the suite of barriers faced by

low-income customers when trying to access these types of programs, and it's something to keep in mind when we're talking about, you know, doubling down on increasing decarbonization incentives.

Go to the next slide.

So, also there's the kind of broader issue of where's this money coming from. So, something to keep in mind as we're talking about incentives that are available, especially through utilities, but even through some of the cap-and-trade auction revenues, is that electric and gas ratepayers are funding those programs.

And we are in a rates crisis. The utility rates are increasing at a much higher clip compared to inflation. You know, sometimes several percentage points higher and it's just rising all the time. So, we're in a fairly urgent situation here. We shouldn't do anything to make, especially electric rates worse right now.

So that's something to keep in mind, is as we're looking at designing programs and funding these programs, there has to be some consideration of the cost versus benefit of you know what we're getting versus what we're putting in. So, if you're utilizing funds, especially rate payer funds or even cap and trade funds,

there has to be a balancing analysis showing that there's a dollar going in and a dollar coming out equivalent of value. So that's, you know, the benefits can include GHG savings, it can include, you know, energy expenses that would otherwise you know -- gas costs need to be offset by electric savings.

And, you know, for these types of decarb programs it can be fairly complicated to do this analysis but there are tools available and the Commission has developed them to do this sort of cost-benefit ratio where it makes it easier to compare having a full you know fuel switching decarbonization measure as opposed to something like building insulation to get the equivalent greenhouse gas savings. And so, when you're spending the money, when you're picking, you know, which appliances how much they're going to cost, how much we're willing to incentivize, you have to look at what the value is that's coming out. Otherwise, it will actually undermine these decarbonization goals.

So, that's an additional concern, I'm sure, among all implementors of, you know, folks who are trying to push for electrification and encouraging customers and trying to tell them that, you know, it could have bill savings or it at least won't have undue harm for the rates that they're paying. We don't want

to see electric rates rising at a higher rate than gas rates. So, we have to keep an eye on, you know, unsustainable spending in these areas and always designing programs with that kind of balance in mind.

So, I'll go on to solutions, since now that I've listed a long suite of problems and concerns. But there are plenty of ways to address this. So, here's a whole suite of kind of answers or beneficial design and things to consider as anyone is rolling out these programs. Don't push for further ratepayer funding. In fact, we could try to decrease electric rates and make these technologies more attractive if we're not funding programs that don't have equivalent benefits.

And so, you know that includes education programs. If it's not demonstrating that it's showing results, then maybe it shouldn't be coming out of utility ratepayer's pockets. This includes cap and trade funds, so using auction revenues like some of these programs do. And they're designed to fund programs that reduce greenhouse gasses. But, from a lot of these funds, the cap and trade revenues would actually be flowing back into customers pockets if they're not spent on programs.

So, there's an opportunity cost there if we're utilizing cap and trade funds for programs like for heat

pump water heaters if we're not seeing requisite benefits, or if it's many times more expensive than something else that would save just as much energy or just as many GHGs.

So, there's also alternatives to these options and other panelists have touched on this. So, rather than using utilities and utility rate payers as the primary source of these incentive funds, there has been tremendous interest -- I'm sure everyone is aware of the new federal legislation, the new federal funding that's becoming available. There is also a tremendous amount of funding coming from the state budget. And using general fund dollars, you know coming from income taxes versus utility rates, is a much more progressive way of funding these programs.

Funding through utility bills is inherently regressive and has disproportionate impacts on lower income customers. So, I'm very glad to see that all of this new state and federal funding has become available. We should focus on that and replace some of the older funding sources in order to keep electric rates sustainable.

There's also some discussion on several forms about rate reform. It's not the silver bullet, it won't fix everything. But having rates be more tailored

towards folks' income, so having for example an income based fixed charge could help a lot and having rates designed in a way that actually favors electrification could also help encourage these programs.

And then, there's also the, like I mentioned before, the ongoing pilots. So, the BUILD and TECH programs are ongoing. SCE's ESA building electrification pilot is ongoing. And we should take a pause, learn from those, and then take those learnings to improve program design.

I think there's a lot of jumping the gun about, you know, we need panel upgrades, we need you know these certain technologies. But unless we actually have on the ground experience like I'm glad some of the companies and organizations on this call are developing, we won't know the right way and the most efficient way and the most cost-effective way of implementing these programs. So, we should take a step back, let these pilots continue and then take the learnings from that to design better programs going forward, rather than, you know, increasing funding you know without taking a step and looking at those evaluations.

Some folks may be surprised to know, or not, that there's also on-going incentives that are being approved through ratepayer funds to continue to fund gas

measures. So, there's, you know tens if not hundreds of millions of dollars begin spent right now to further fund appliances like gas water heaters, you know, upon failure so that when they need to be replaced. There's actually a lot of energy efficiency funding right now that goes towards gas water heaters.

So, that seems like a no-brainer. It should just be -- the plug should be pulled on those programs as soon as possible. Because as everyone on this call is aware, we have very ambitious, but I think doable and reachable targets for GHG emissions reductions. And so, continuing to lock in gas utilization is definitely not the way to go, and kind of seems like a simple solution.

I was also happy to hear my colleagues talk about continuing codes and standards improvements. I think that will also help kind of level the playing field a bit where if you make it a requirement to have these more efficient electrification measures, then you don't have to also add incentives in order to push them forward.

So, kind of returning to the individual customer level. So, I've talked, you know, in a big picture way about funding options and funding sources and affordability, but this gets back to the individual customer who is going to be adopting these measures as

we're all very interested in. So, optimizing these programs and these program dollars requires having a combination of measures being applied. So not just the heat pump water heater, but when you install it -- and this actually speaks to the concerns raised by the govern-- or Mayor of Palo Alto, excuse me, that you should have them enroll in demand-response programs. And, you know, that can even provide further incentives for the customer.

But you need to make sure that they're not operating directly during the peak capacity periods on the grid, otherwise it will create reliability problems. So that creates value all around. And you need do -- you would need to build in that kind of automation as you're doing the installations. It also helps to have, as other folks have said, building insulation paired with the appliance installation. So, it can reduce the size of the appliance you need to put in, and then also improve the cost-effectiveness sometimes quite significantly.

I also list here, you know, certain climate zones are better suited for electrification than others. You know, there's sort of ongoing discussion about how you can reduce the need for gas system maintenance by having further electrification that's maybe a little

ways away, but it's a good ongoing conversation to have. And like I mentioned, just keeping in mind grid reliability when you're adding a lot of electric load, is very important. And so, having that pairing with demand-response programs should help.

So, with that, I'll pass it back to Gabe.

MR. TAYLOR: Thank you so much, Shelly. Really appreciate it. As always, appreciate post coordination with the Public Utilities Commission.

I'd like to invite all of the panelists to turn their cameras back on so we can have a discussion. Opportunity for -- we have two questions that came in online. And if attendees would like to comment, sorry, or would like to ask questions of the panel, please raise your hand. We'll have an opportunity for public comment directly after this discussion.

Let's see. So, our first comment from -- or our first question for the panel from Brendan, and this touches on something I was thinking about myself. He says, "For new website, will it overlap with existing websites like BayREN's, which is on -- it's the Clean Energy, Redwood Energy, PG&E, or supplement them in some way? There's a lot of great information available online that can be difficult for homeowners to know where to start and what to plan for."

This was touched on by some of the panelists. And I had jotted down my own questions, very similar, which is, "Clearly there are already many online resources. And avoiding duplication is one of our staff's top priorities on this project."

This is a legislatively mandated state website that we are tasked with putting together here, and our hope is that it will be very useful to the community, to decarbonization, and to local governments. So, do the panelists see any major gaps that the state can fill in this space?

MS. LYSER: I'll just add briefly that I think the highly beneficial part of this new CEC initiative is that it is, you know, public general fund funding, for lack of a better word. So, it's, you know, rather than piggybacking on utility programs, it's actually having a centralized location and having a more progressive funding source. So, I'll just add that.

MR. TAYLOR: The Energy Commission does have some funding to maintain this website, so that's encouraging for the long-term benefit. Also, the legislation requires, in addition to, you know, consumers and contractors, it requires that this be a resource for local governments. So, that might be a gap that the state could fill in this space.

Any other comments on the topic of overlap and gap filling and that sort of thing?

MS. KRISTIANSSON: Hey Gabe, I think Tom has his hand raised and as I do, I don't know if you can see the hand.

MR. TAYLOR: Oh, go ahead, just go ahead. Sorry.

MS. KRISTIANSSON: Tom?

MR. KABAT: Thank you. One of the possibilities, I've seen it through helping Redwood Energy Partners with writing our recent five guides on all electric buildings, including two guides on retrofitting -- is, if the Energy Commission can staff up the kind of the database management and looking at you know, the catalog of equipment that's available in the category and keeping that up to date. That could be very helpful in terms of giving people a place to look at, to really sort through things, and like we mentioned earlier, you know maybe even having a power star category where it would help people figure out, you know, what are the -- what equipment that will help them get around the panel sizing problem?

MR. TAYLOR: Karen?

MS. KRISTIANSSON: Yeah. I mean, I think there's a couple ways to go here. And I think, you

know, in terms of the gaps that the state can fill, there's -- I kind of want to flip it a little bit and talk about some approaches to that. And the two main approaches that I see are, you know, collaboration and also leveraging other resources.

So, you know, working with folks who are already working on these things, like we did with the reach code. Resources that I mentioned to collaborate to create resources with new technologies, new policies that come out. But also, you know, leveraging what's out there. And the switch is -- not the Switch Is On, the building -- Clean Building Compass that BDC put together does that really well and references a lot of other sources.

So, it's something that we try to do informally, but I think this website has the potential to maybe do it even better. And to also I think I mentioned the importance of, like, of reliability and knowing that something is accurate is something that you can count on. And, you know, when the Energy Commission has reviewed something and agrees with it, then that, you know, everyone's comfortable saying that is what the Energy Code requires, because the Energy Commission is the authoritative source for that.

MR. TAYLOR: Dorothy, I think you had an

attendee?

MM: Thank you, Gabe. There is an individual on Zoom. Bruce Naegel, and apologies if I have misstated your name. You can go ahead and ask your question.

MR. NAEGEL: Yes. Thank you for the opportunity to speak. One of the key areas that was kind of hinted at but not fully developed in this is what I'll call the need to do and support transitions. As a challenge, you know, you mentioned for example gas rebates. The gas companies continue to get rebates for, you know, for extending gas, which is counterproductive. So, part of the challenge is, if we in essence will be putting the gas companies out of business, and there are a set of workers there that need to be put someplace else.

And so, one of the things that we need to think about is, what do we do to help transition the process so that the people who are currently in the fossil fuel industry have a place to go. We make sure that, you know, as you hinted some ways, is that when lower income people move these new things, they have facilities to be able to do that. But we have a transition problem and unless we solve it, it will slow down our process. Thank you.

MS. MURIMI: Thank you, Bruce. Eddie?

MR. ROSALES: Hi, everyone. Great presentations. I wanted to remind especially all the attendees and public stakeholders that we will be doing a couple things and we are also looking for your feedback on this, which is, we will be linking our website, our future website will be linking to other websites that are doing similar work. I think, you know, we've gone over some examples where, like The Switch Is On has already developed some tools on the website to -- in order to facilitate some of their visitors, especially building owners, to be able to understand, you know, what financial incentives are available in the area. That's one example where, you know, we will be creating a link from our website to their website. So, we'll be working in coordination with some of those websites.

That's one example. We have other websites in mind that we will be, hopefully will be collaborating information with back and forth. And so that leads me to my other point, which is we are -- if we're missing anything or if you'd like to just share a website with us, again, that's what we -- we are welcoming that type of feedback both as a response to this workshop but also as a response to the request for information that is on

the docket. So, I just wanted to remind everyone that that's part of our overall effort. Thanks.

MR. TAYLOR: Thanks, Eddie. So, Ralph DiNola has a comment/question that is related. He says that, "Seems as though the new website could act as a central clearing house for all of the resources and websites that already exist and help people to navigate and curate resources for consumers, owners and developers."

Do the panelists agree? I mean, would that be a useful resource to have? Kind of as Eddie described, have a state-level website that provided links to all of these other resources in various jurisdictions?

MS. KRISTIANSSON: I'll jump in and just say, I think it could be very helpful. There are a lot of resources out there, and sometimes, you know, I work in this space pretty much all the time. But it still happens that someone will mention something, and we'll be like, "Oh, I haven't heard of that." You know, so you don't -- it's hard to keep track because there's so much going on. And so, having a central source that really does that work and helps to link it together -- it wouldn't be a small project, you know? That would be a significant effort.

Also, organizing it in a way so that people can find what they're looking for fairly easily and

without spending a lot of time. Because, when you have one of those questions, you know, you just want to -- you don't to spend a lot of time going through a lot of things. You want to just get the answers. So, I think that could be valuable.

MR. TAYLOR: Thanks, Karen. Looks like we have another question from the attendees. Dorothy?

MS. MURIMI: Thank you, Gabe. We have Cooper from QuitCarbon. Cooper? You can go ahead and unmute and give your question.

MR. MARCUS: Great, thanks. Hi, everyone. We at QuitCarbon help homeowners electrify their homes by providing plans, assessments, and really fundamentally, navigation of all this information that everyone on this call has been talking about and sharing. It is a notable effort to sort of correctly map all of this information, especially given how dynamic it is to each individual homeowner.

I'd like to make two requests or suggestions for the proposed website. The first, is that I sure hope it has a large section of its budget and the way it's designed to work focused on updating it. It will be wrong in many ways forever, and it will need constant updating. Ideally, that would be open sourced in some fashion. A wiki, or some other way that the community

can contribute updates and improvements to the website will make it that much more likely that it stays up to date.

We see great examples from other companies like Microsoft, where anybody can go in and edit or propose an edit to Microsoft's technical documentation. That's a big company with some important products, and yet they basically let the general public come and suggest improvements. I hope this website will do the same.

But that demands the second suggestion I'd like to offer, which is that a really important role here will be the sort of editor and librarian. So, to the extent the website is allowing contributions from the community, which I hope it does, we need folks who are there reviewing them and deciding yeah, this one gets published, or no, this one is maybe not quite right.

We also need a similar role helping folks navigate and find the information, a librarian type of reference librarian. I see far too many informational websites that lack both of these features, and sometimes fall quickly out of date despite all their best intentions.

So, community contributions and a librarian.

I hope those get included. Thank you.

MR. TAYLOR: Any comments from the panel regarding open-source public participation in maintaining this information resource?

MR. LEMPEREUR: Yeah, I think this is absolutely right. I mean, technologies are you know coming up very, very quickly. They're changing, there are better applications every year. So, manufacturers and with the global focus on electrification, you know, talking about those manufacturers, they will come up with new products so that's one.

We talked like at least a couple of times during this presentation about the Inflation Reduction Act. I mean, this -- you know, I cannot emphasize how much this can actually change what we try to do and just that alone requires quite some resources to absorb, understand what the state is going to do with, you know. And it's just constantly, you know, it's a moving target, you know, all the time. And I cannot agree more with this gentleman's comment, you know. Yes, update, be agile, quick, with information.

MR. FLECK: I would, I'd add in agreement too that it's all about emergent learning, and you do that through that open-source ability. As all of this information is distilled, sometimes information's not

even what people are looking for and you will never know that until you've had the conversations with all the different stakeholders that are involved.

And it's -- I mean it's the heat mapping of culture, essentially. And you get that by being open to receiving a lot of feedback, both localized, and state level feedback from partners that are in government, partners that are in the actual manufacturing and industry component of it. So, I think that that's a really great way of being able to adjust your trajectory as it goes. And to also keep the message as relevant as possible, because we can get really stuck in just this is the information, go find it, and then everything will come from that. But that's not really how it works, at least in our experience.

MR. LEMPEREUR: Yes, and along with the website, maybe a suggestion to have your staff to update, to review but potentially a committee really behind the website with different stakeholders from manufacturing, distribution, building owners and so on. Although they should be the recipient of this information, but have different perspective also. So maybe, again, you know a committee of experts feeding and using the website as a media to convey the information or the latest updates.

MR. TAYLOR: So, really interesting concept. Thanks for mentioning it. We have one idea or comment here from Arthur, "Regarding EV chargers -- as bidirectional EV chargers start becoming more commercially viable, the website should give guidance to customers on how they can use their EV as a home battery."

Does the panel think that this website should be a resource for that type of kind of next level decarbonization? How to -- as new technology becomes available, I guess we would share it. Any thoughts on EV chargers specifically, or more the general kind of pathway to decarbonization?

MR. LEMPEREUR: Yeah, the integration of the vehicle and the home is definitely something that must be addressed, right? And that sounds maybe like -- it's going to be a dream that will come true, right? It's going to be used. Right? We know with storage, with storage from the vehicle and potentially a stationary storage at the home -- how everything is going to play, I don't have the expertise to answer that. But for sure, working on a project at the level of city in New York state, the combination of the two is largely being discussed.

The integration of multiple technologies,

including, you know, EV charging, right? So, it's multiple measures that needs to be understood and that's part of the complexity of electrification. There's two schools thought, right? Either we plan and we can be as comprehensive as possible to look at a project, program, or we start electrification with a couple of relatively simple measures or basic measures and evolve. It can go both ways, but there's too many questions from people in general about electric vehicle.

And so, in my view, it's a yes, it should be approached and discussed on that website.

MR. TAYLOR: Thank you, Dom. Tom, did you have another comment? I see your hands up.

MR. KABAT: Yes, I did.

MR. TAYLOR: Go ahead.

MR. KABAT: You know, I think actually this question and how we're addressing it is a great example of kind of integrating that whole wiki concept, where new ideas are coming up that we may not have included when we first put things together. And that vehicle to home type of thing, as well as a technology that almost fit in to what Josie and I talked about, it was the new technology of meter-collars as a very powerful way to connect a circuit right between the meter and the house. And a great place to be integrating those vehicles to

home chargers and providing that resilience as those technologies are evolving.

So, having the CEC website up that might be able to track what's the latest in the technology and how is its approval being spread across California utilities? Because different utilities adopt different technologies at different, you know, periods. So, it would be great to have kind of the, you know, the approval map of where are these innovative meter collars now approved. And I know they're approved in the L.A. area, LADWP, but not yet in, you know, all the IOU territories. So, they are advancing their way and the site could help track that.

MR. LEMPEREUR: This is great. One of the danger, also, of providing all the information available, right, is just to make really a clear -- how we communicate that if the specific technology is available off the shelf, or if it's being, you know, just established or designed, right, with delivery in 2024, right? I mean there's that -- that is -- and people are getting excited, I want that technology tomorrow, and it's not even fully developed or so on.

So, just to make a clear distinction, maybe a different category, right, for people who are curious about what's coming in the next year. Which is

exciting, I find that very exciting too. Part of my job too. So, but, making -- you know, communication is critical here. What is available today, what is coming up so that should help people making decisions as well. And being more informed, right?

MR. TAYLOR: Dorothy, I think we have one attendee who would like to speak.

MM: Yes. Anne Arquit, and apologies if I have misstated your name. You can give your question.

MS. ARQUIT: Yes, thank you very much. I just wanted to begin by thanking Heriberto and Gabe for a wonderful workshop. And also of course, to the speakers. I learned a ton, I took a lot of notes, and I'm probably going to be following up with some of you. So, thanks a lot for a great event.

There have been a lot of mentions of the importance of helping building decision makers invest in products that reduce load and power draw. And I just wanted to talk a little bit about this through an equity lens. So, following up on some of the comments that Shelly made just before.

First of all, it's important to note that the largest component of electricity bills in California is actually appliances and other plug loads, and the Low-Income Potential and Goals study that came out last year

also found that almost 60 percent of low-income energy efficiency potential is actually associated with plug loads. And therefore, I think it's important to also address the needs of renters who are making a fair share of these buying decisions that affect grid requirements.

I just came across a really interesting study by Apex Analytics that was done for MCE, and they actually found that almost three quarters of single-family renters and over 25 percent of multi-family renters actually have authority for appliance purchases. So, we should definitely make sure that we consider the needs of renters when we're building out the site.

And the other point I just wanted to make is that it's also really important to include market-based approaches to empower low and moderate-income consumers to decarbonize on their own. My company Enervee, we operate online decarb marketplaces in California and also across the country. And we most recently rolled out a statewide online marketplace in partnership with the CEC's counterpart in New York, which is NYSERDA. And that marketplace specifically targets income qualified households.

And the platform, you know, addresses a lot of barriers to efficient purchases, but also the upfront purchase price barrier that was talked about. And the

way we do this is by offering integrated eco-financing. And we've seen really great uptake by underserved borrowers with this new offering, including in California where we've seen 70 percent of the loans going to low and moderate-income customers, and 50 percent of the loans going to credit-challenged borrowers.

And so, for example, if you had an $800 appliance you would be able to buy it with monthly payments of only about 20 bucks a month. And we also are able to layer in all the incentives to buy down the upfront purchase price. And so, you know, I think just coming back to what Commissioner McAllister said at the very beginning, it's important that this site serves as an effective channel for incentives, both state and federal incentives, as well as rate payer funded utility incentives.

And I just wanted to point out that this is already possible today and that we just really need to ramp it up, and that the way we do this really is by bringing all the parties together including retailers, including contractor partners. So, I think we're really set up well to do this right and to scale going forward. Thank you.

MR. TAYLOR: Thank you very much, Anne.

MS. MURIMI: Back to you, Gabe.

MR. TAYLOR: Thank you. I see a couple other questions here. The -- so, Dorothy, maybe you can make a quick announcement to the attendees. If anyone else would -- if any other attendees would like to make a comment, it might be a good time -- idea for them to raise their hand now, and then we'll finish up these last couple of questions and then move to that public comment period. Does that sound reasonable?

MS. MURIMI: Yup.

MR. TAYLOR: Alright.

MS. MURIMI: And once again, for folks that are on the line who are calling in, press star-nine to indicate that you'd like to make a comment.

MR. TAYLOR: Alright, couple more questions here. Ralph DiNola mentions a How to Electrify Your Home You Tube channel, and curated by a librarian on the site. How do people feel about how to videos, including video libraries, that sort of thing?

MS. KRISTIANSSON: I think, you know, they can be useful. They can be done well or poorly, like everything else. And there are resources already out there. But there are certain things for which a video is a really good tool to demonstrate things that, you know, a picture is worth a hundred words. So, I think

not everything needs to be a video, but when it is the right tool, it could be a really powerful way to do it.

So again, I think -- I do definitely agree. I think Ralph had said and someone else had suggested earlier, like a librarian, someone who can judge and curate and that kind of thing would be really helpful.

MR. TAYLOR: We have -- you know, we do have budget for ongoing maintenance for the site. Obviously, this is going to take long term and close maintenance so that is something that we are considering and we'll have more details about that as we progress to a more fleshed out plan.

Hiro mentions a question here -- Karen you mentioned encouraging consistency across local jurisdictions in terms of processes and program and what not. But Hiro mentions that most -- many jurisdictions have a cumbersome application of permitting processes, and it's obviously a barrier to adoption of electrification measures.

So how could the website help solve that? How does this fit with the scope of our effort if -- or if at all? Is this something that the state website could -- the state resource could help with local permitting? I saw some of the resources that you provided, Karen provided, on the BayREN website. Maybe thinking along

those lines, perhaps? Although, obviously there are a lot of jurisdictions within California, so that gets quite complicated quite fast. I can think -- I have a couple ideas. So, the panel, do you have any ideas?

MS. KRISTIANSSON: I'll jump in one more time also, because I do need to drop off at 2:30 so I wanted to get this in before I go. Which is just -- that's exactly what we're working on with the permitting pilot with the TECH Clean California initiative. And trying to find resources that can really help local governments do this when they're not familiar. Like what exactly do I need to look for? Sometimes, you know, instead of an over-the-counter permit, when it's a new technology that they're not familiar with they'll send it off to their plan checker, and of course that adds time and difficulty.

So, making this process easier and faster and just getting everyone on the same page -- this is what you need to look for, so that both the building departments know and the applicants know and all of the building departments have that information, you know, at their fingertips ideally. That's what we're trying to do in the Bay Area, and I think TECH is working on as well as part of the permitting pilot project.

So, I think the CEC website would be an even

better way to make resources commonly available that local governments can take advantage of. And when a question comes up, like a new technology that they haven't seen before, they know where to go and they can get it right there and know that's what they need to do. So.

MR. TAYLOR: And that's consistent with the legislation, which identifies three categories that this website's intended to support, which is building owners, building contractors, and local governments. So, thanks.

Karen, I know you needed to go. There's one more question here, feel free to drop off, Karen, if you need to. But a question for the group. So, Anne mentions that many multi-family buildings, in fact a lot of tenants of multi-family buildings are actually owned by individual owners in smaller buildings. So, one to four-unit multi-family buildings owned by an individual landlord. And these can -- it's obviously a large universe of building owners who have mixed incentives for these upgrades. Does anyone on the panel have recommendations for what the best channels to reach these individual multi-family owners would be?

Dom, I see you already answered here, you mentioned Menlo Park and the contractors and cities.

Oh, you're muted, Dom.

MR. LEMPEREUR: Yeah, but cities is one instance, right? And through funding from the state. It's public information, so it was $4.5 million coming from the state going through Menlo Park so that's one way. And Menlo Park is an interesting example, right? Because we see Menlo Park as a wealthy area. But, you know, there is also a different, you know, all the targets including some low and especially medium-income individuals and building owners.

Another thing also that we might think of is really through contractors. I mean with developing project electrification and project of any type, right, there's different ways to actually tackle that based on the size of the project, right? And some buildings might, you know, larger buildings might need a more thorough development, design and so on, the complexity, right? And therefore, maybe a different way of developing and installing a project.

But with small, I mean not small. Individual homes of, you know, one to four as it was described in the question, typically the most cost-effective way to look at those project is really working closely with contractors through, you know, distribution channels, with the manufacturers having also a role that typically

-- that have seen going beyond just, you know, selling equipment, right?

So, they're being proactive, there's a lot of competition between the contractors. So, yeah, that's my initial answer is really looking at those two channels that we have observed, right, and identified. There certainly may be others, but to answer the question, you know, with some examples, that was my initial answer.

MR. TAYLOR: Thanks so much, Dom. Any other panelists want to weigh in on channels to reach multi-family, small or multi-family landlords?

Eddie, I think you wanted to talk about the RFI, right?

MR. ROSALES: Yes. Let me add a comment about that. And I see one more hand up, so maybe we could go to that hand after myself. So, we're kind of nearing the end, so I want to make sure I get the plug in one more time which is, we have a Request for Information on our project docket.

We have a project docket that is facilitating all comments. So, I think Mark had just posted another comment, and then he had mentioned earlier about having a wiki type process for improving some of the items on the website. I think that's a good idea, and you know,

that's something we should probably look in to and work through.

But a comment like that, for example, it would be best if a comment like that, a suggestion like that was on the docket. So please, go to the docket. Again, it's 22 -- I'm going to put it on the chat box right now. It's 22-DECARB-02, and it is facilitating just this project. We are asking all stakeholders to submit comments to that docket. We have the docket open right -- or the comments and responses for the Request for Information are still open, and it is open through September 14th.

So please keep that in mind. Just want to remind folks before, you know, we wind up here that that's another process that's the official record for this project and all comments and suggestions and ideas are welcome there first and foremost. Thanks.

MS. MURIMI: And we have one more commenter, Todd O'Connor. Todd, you can go ahead and unmute and give your—

MR. O'CONNOR: Yeah, thank you. It's Tod O'Connor, and I thank you for this opportunity to comment. One area of building owners who did not get a lot of play today was in the commercial area. And I understand the need for focusing on homeowners and on

low-income communities, it just makes a lot of sense.

But in order to have a robust and comprehensive building decarbonization program that will also be related to EV charging, and this comes under tools and resources, is to bring in commercial owners, especially those commercial owners who rely on chillers for their buildings. And I believe energy storage, behind the meter energy storage, regardless of the technology, could be a tool in the toolbox, pardon the cliché, that the CEC can utilize on their website to emphasize the need for getting chillers off the grid during the most expensive time of the day. And also, during the most stressful time of the grid of the day. I've been in energy policy for a number of years, especially in California, and I can tell you that the grid is most stressed during the, you know, as we're coming into what will be in Southern California, a week of stressful periods on the grid.

And the more we can get those buildings, those large commercial buildings off the grid during this time, you do several things. One, is you take the stress off the grid. Two, is you reduce -- significantly reduce greenhouse gas emissions, which is one of the drivers for building decarbonization electrification effort going on.

So, in order to be consistent with the legislation that wants to create this website, I would suggest very carefully that you reach out to U.S. Department of Energy. They have a Buildings Office. And they look at large commercial buildings as a way to become virtual power plants, so grid asset buildings. Because I think that goes a long way to meeting the goals of creating the website under the local legislation. And I'll amplify my comments with written comments for the record, but I do want to bring that out, that's important that in order to have a robust comprehensive building decarbonization program that you include commercial buildings.

And then the reason you do that, another reason you'll want to do it is because you'll free up existing capacity. So, in a constrained area like the L.A. basin, it's very hard to bring in additional capacity for EV charging. And also, those building owners are going to be the ones who are going to be -- through load serving entities, are going to be the ones who are going to have to meet the mandate for EV charging stations. And given the very aggressive deadlines, 2030 to 2045, we're going to need as many viable options as possible to meet those deadlines.

So, if you can build up -- if you can use

existing capacity by reducing the pressure on the grid and using that, and you can time the energy storage so where you don't stress the grid but still can provide EV charging, especially on a large scale, I think that goes a long way to meeting the program.

Thank you for the opportunity to comment.

MS. MURIMI: Thank you, Todd.

MR. TAYLOR: Thank you, Todd.

MS. MURIMI: We have one more.

MR. TAYLOR: Dorothy, sorry to interrupt. But I'm going to let the panel go, I think we're moving to the public comment period. So, thank you very much to the panelists, you can turn your cameras off. And feel free to chime in if you want to have a comment just raise your hand, and Dorothy will call on you. Thank you.

MS. MURIMI: Thank you, Gabe. One more commentor, Ralph DiNola. Go ahead and unmute and you can give your comment.

MR. DINOLA: Hi, can you hear me okay?

MS. MURIMI: I can year you. You're sounding a little low, but we can hear you.

MR. DINOLA: I can try speaking up, is that better?

MS. MURIMI: That's better, thank you.

MR. DINOLA: Thank for this opportunity. New Buildings Institute is a California non-profit corporation. And this year, NBI is celebrating our 25th anniversary. As a market transformation organization, we are driving building decarbonization to support equitable and resilient buildings and communities. Our collective work has helped to spark broad coalitions that are advancing game-changing technologies such as heat pump water heaters, metrics for grid interactive buildings of the future, climate aligned building codes, carbon neutral resilient school buildings, low-carbon financing specifications, and much more.

But we applaud the work of the panelists today and the CEC. We're excited to support the ongoing work of the CEC, the CPUC, and CARB, as they work to decarbonize the building sector and the California economy. As we work to equitably electrify buildings, transportation and industry, we would like to encourage everyone to consider wholistic approaches, including what we call the five foundations of building decarbonization. Which include efficiency, renewable energy systems, building grid integration with energy storage and electric vehicle infrastructure, electrification, and the building life cycle, which includes low embodied carbon, materials, and low GWP

refrigerants.

So, we stand at the ready with research, design guidance, software tools, webinars, factsheets, a resource hub and convening. We have a lot of work to do, but with this significant infusion of funding coming from the state and the Inflation Reduction Act, the Infrastructure Law, and numerous other initiatives that are coming to the fore, we're optimistic that we could make great progress together.

So, I'll share some additional resources, maybe in the Q&A, and thank you for the opportunity to comment today.

MS. MURIMI: Thank you, Ralph. So, going to give one more moment for folks to use the raise-hand feature, excuse me, use the raise-hand feature to indicate that you'd like to make a comment. Or, if you're on the phone, once again press star-nine to indicate that you'd like to make a comment, and star-six to unmute.

Seeing no more, Gabe, I'll hand the mic back to you.

MR. TAYLOR: Thank you, Dorothy. And Ralph and anybody else who has resources to share with this proceeding and with the other stakeholders and also with the staff to include on the website, please, please

submit written document to the docket. That will get it in the formal record. Thank you so much.

Eddie, I'm going to turn it back to you. This was an excellent second panel, I really liked how we had the morning session where we focused on kind of what was the potential was, what are the kind of things that we should include in the website, in the afternoon we kind of shifted a little bit more to the implementation of the website. Obviously, staff has a fairly monumental task here to respond to the requirements in SB 68, and we're looking to our stakeholders to provide us guidance. So, please keep the comments coming in. Thank you very much.

Eddie, back to you.

MR. ROSALES: Thank you, Gabe. Yeah, that was a great panel. Well, we are at the end, I see that our Commissioner, Commissioner McAllister had to leave just before we ended here, so we don't have a Commissioner representative present. Real quick check with my Efficiency leadership if there's any last comments they would like to make before I log off and stop recording.

MR. SOKOL: Just a thank you to all the participants and the panelists today. A lot of good food for thought and a lot of good input as we approach this proceeding here. Thank you.

MR. ROSALES: Thank you, Michael. And for everyone's reference, that was Michael Sokol, our director from the Efficiency Division. Thank you, Michael.

With that, I will wrap up. I want to, again, remind everyone to submit their comments both either as panelists, because you are also stakeholders, and also participants, to the docket. That will be the most efficient and best way for us to review and evaluate your comments and your ideas. If you have any questions about even doing that, again, I have my contact slide up. Please reach out to me and I will guide you through the process if you need help there.

Other than that, that concludes this workshop, thank you all for attending and have a great day.

(Whereupon the meeting was adjourned at 2:44 P.M.)

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 5th day of October, 2022.

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.

MARTHA L. NELSON, CERT**367

October 5, 2022