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BEFORE THE

CALIFORNIA ENERGY COMMISSION

CALIFORNIA ENERGY COMMISSION

In the matter of,	)	
	)	Docket No. 19-IEPR-06
	)	
2019 IEPR Joint Agency Workshop	)	
on Building Decarbonization	)	
	)	

CALIFORNIA PUBLIC UTILITIES COMMISSION AND

CALIFORNIA ENERGY COMMISSION

JOINT AGENCY WORKSHOP ON

BUILDING DECARBONIZATION

LA KRETZ INNOVATION CENTER AUDITORIUM

LOS ANGELES CLEAN TECH INCUBATOR

525 S. HEWITT STREET

LOS ANGELES, CALIFORNIA

MONDAY, APRIL 8, 2019

9:30 A.M.

Reported By:
Martha Nelson, CERT # 00367

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Michael Picker, President, California Public Utilities Commission

Genevieve Shiroma, Commissioner, California Public Utilities Commission

Keynote Speaker

Senator Henry Stern

Los Angeles Cleantech Incubator (LACI)

Matt Peterson, CEO

Staff Present

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Bryan Early, Advisor to Commissioner McAllister

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Tiffany Mateo, Mechanical Engineer

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Eddie Rosales, Energy Specialist, California Energy Commission

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P R O C E E D I N G S

APRIL 8, 2019 9:30 A.M.

MS. THAKAR: Good morning, everyone. Good morning, good morning, welcome to the Los Angeles Cleantech Incubator.

So, I'm Nidhi Thakar. I'm with President Picker's office at the California Public Utilities Commission. I'll be your MC for today's workshop.

So, welcome to the Joint Workshop hosted by the CPUC and the California Energy Commission on Building Decarbonization.

We're pleased to welcome you to this workshop, which is intended to develop a shared understanding of key policy issues related to building decarbonization, learn from actions taken by local agencies, and consider possible approaches for implementation of SB 1477.

I have a couple of housekeeping announcements before I do some introductions this morning. So, we have -- this is being -- the workshop today is being webcasted and we have a microphone in the center of the room. Please note that all of your conversations will be picked up by that microphone on WebEx. So, I ask if you have any conversations that you take them outside of the amphitheater to ensure that our folks on the webinar and webcast can hear us okay.

Also, our court reporter is seated to my left, in the green. If she has any trouble hearing, she will ask for us to take a pause and get order of the room again.

So, with that I will make some introductions. So, we have a packed agenda today. I'd like to recognize some folks in the room today.

To my left we have Senator Henry Stern, who I will introduce very shortly.

(Applause)

MS. THAKAR: Senator Stern will be providing our keynote this morning, followed by a welcome from Matt Peterson who is the CEO of the Los Angeles Cleantech Incubator, also known as LACI.

And I would like to recognize some of the Commissioners we have in the room here. In front of me, moving from my right to left, we have Commissioner McAllister with the California Energy Commission. Commissioner Janea Scott, with the CEC. Commissioner Shiroma with the CPUC, our newest PUC Commissioner, which we are very happy to have. And President Michael Picker with the CPUC.

(Applause)

MS. THAKAR: We're also joined by a number of CEC and PUC staff that worked incredibly hard to pull

this workshop together today, so thank you to all.

And with that, I would like to introduce our first speaker today who, really, honestly needs no introduction, Senator Henry Stern.

Senator Stern was the key author and sponsor of SB 1477 and so we are really pleased to have him here today. He's a sixth generation Californian and native of the district. He credits his passion for public service as a family trait. His diverse history includes farming and ranching, music and film, and a steadfast commitment to helping young people fulfill their potential.

Senator Stern was elected to represent the 27th District, which includes parts of L.A. and Ventura Counties, on November 8th, 2016. Senator Stern is also a very active of his community and enjoys volunteering at the local Boys and Girls Club, and is a member of the Santa Monica Mountains Conservancy Advisory Committee, the Jewish Federation, the American Jewish Committee and the Truman National Security Project. He's also an alumnus of Harvard University and UC Berkeley Law.

And with that, I would like to turn it over to our keynote speaker, Senator Stern.

(Applause)

SENATOR STERN: Thank you, Nidhi, and good

morning. I'm hardly one to upstage such an incredible group of leaders before you today, but I'll be quick. I've got to go up to Sacramento and keep doing this work.

It's amazing when you see a piece of legislation that you work on actually become more than just a bill and it becomes people, and their jobs, and progress. So, I'm just so honored to stand with you all today. And I want to thank the PUC, and the CEC, and LACI for being such gracious hosts. Thank you, Matt, and to the Mayor's Office. I see Lauren here and a lot of friends from multiple sides of the industry. But most of all I see my brothers and sisters in the labor community here today. I do want to welcome, I see Liuna (phonetic) in the mix, and I see our United -- I think it's 132 is here. And then, I'm sure we've got some IBEW in the house. And probably many others that I'm not naming.

But to all the laborers, and the utility workers, and everyone throughout this industry, you know, the vision, and not just the legislation and the details of what you're about to hear today, but I think the vision of what our building sector and, frankly, what our entire energy economy can be is one of abundance. We want to grow the whole pie.

And I know there's going to be details that we

dig into here today, and looking at the mechanics of this program that's designed to be about innovation, and sort of path-breaking technology coming into building decarbonization.

But on the whole, we need more skilled and trained workers doing the work in our building sector. And the fact is that as ambitious as we want Title 22 and Title 24 to be, and all of our big greenhouse gas reduction goals are, they're nothing if we actually don't have codes that are being enforced, actual compliance and high-quality work being done out there.

So, a quick heads up for you all coming down the pike, we're working on a follow-up measure looking at building efficiency work at large, with SB 524 this year. We're trying to get more skilled and trained work doing these installations.

Because a lot of times we see the jobs aren't getting done properly and folks don't get what they paid for when they, say, buy a new HVAC system, or install that new furnace or that heat pump.

So, the main thing is whether you're a small business, or a large business, or a homeowner we want you actually realizing the benefits of this clean energy economy when you invest.

And some of this stuff is not that

revolutionary. Some of it's as simple as your furnace breaks down, you have an opportunity to make a small decision in your life. You're probably just going to default into the same old same. But there's new product coming onto this market. And I never thought I'd see a hashtag for heat pump nation, but it's getting out there. I don't know if it counts as viral yet, but I'm there.

And I see huge opportunities, not just in reduction of carbon in this future, in our building sector, but also, truly an era of abundance where we do grow this pie, where our ranks expand and we all sort of -- beyond just a transition, I don't even know if that's where I like to put my emphasis. I like to think of our clean energy future as a jobs-first agenda. And one where we're actually going to do the up-front investment we need to grow our ranks.

Now, all that said, you all may know a little bit about my background. But I represent San Fernando Valley and Ventura County. So, it's almost a million people. It's a tough job to do right. We just had a massive set of wildfires and some other tough challenges.

And when I first got started in this job, we had a blowout at Aliso Canyon that's continued to be a

tension in that community for years going forward. And so, what I promised them is not to do pie-in-the-sky policy to somehow pop that critical storage asset out of our system tomorrow, but to actually find a future where we can save homeowners money, where we can make people feel safer and actually start to look at what a transition can be to an electrified future.

Now, you may say decarbonization versus electrification and I know there's going to be tension around that. The RNG promise I think is a real one. I do see huge potential, especially coming out of the Central Valley where, by the way, the Aliso Canyon gas settlement just got settled. And we sent all the money from our community out to the Central Valley to fund a couple of dairy digesters to push more RNG onto the system.

So, for those of you excited about RNG know that dollars are leaving Los Angeles and going straight into RNG infrastructure. So, don't worry, it's happening. Hundreds of millions of dollars of subsidies are going into that sector.

But the vision of 1477, from where I sit and from the conversations I've had with my colleagues, is to do something more exciting than just the same old same. To actually come up with a way to make our

buildings possible to just feed off of pure electricity, if that's what consumers want.

Now, I'm not talking about a future where we have to force everyone to get rid of their stoves. I don't think we're ready, there yet. I don't think that that's going to be possible. And I don't think mandates are the key to the future.

But I do think, you look at a community like Newhall Ranch, where you're going to have 26,000 new units going on in the Santa Clarita Valley, where a bunch of new work is going to get done, why can't we offer homeowners options when they're coming in? And why can't we limit the amount of gas we have to pull off of Aliso Canyon to build that facility.

Now, that may make some of you all uncomfortable because you want to say let's keep going. And to my friends in the gas company, who are here this morning, I know you want to say it's safe, and we're ready to go, and there's no problems. But the fact is that dependence, in general, on centralized gas storage in L.A. is putting our rate base at some risk.

We've seen it this off-season, where we've had line 235 down, and we've had over a billion dollars of impact in the system because of capacity constraints. That's a problem for those of you who pay your utility

bills right now, in Southern California.

So, affordability's going to be a huge piece of this puzzle going forward. And I don't think that affordability just means keep doing what you're doing. I think it means finding ways in the long term that if you own a home, or own a business, and you own that asset, or that you're a developer that you have incentives that are squared with what the State's climate goals are.

So, I know we've got a ton of firepower here amongst our Commission, both at the Public Utilities Commission and the Energy Commission. And welcome to the Commission, by the way. We have our newest Public Utilities Commissioner from Sacramento who -- you'll be hearing from SMUD a little bit later about some of the incredible interventions they've made.

But I truly see the possibilities here of something much more scalable than what we currently have in our system, which is low compliance with Title 24, appliances that are the same things that we've been using for years. Lack of job opportunities, frankly, for our skilled and trained workers. And a promise that we're breaking, frankly, to Southern Californians.

So, I think the Department of Water and Power has made an incredibly bold and exciting step to put

that 100-percent clean energy vision out there.

I know the Southern California Edison and our CCA are likewise pushing ahead and seeing what possibilities are out there.

But for those who actually do this work in the field, and the contractors out there, the coalitions that go into these communities and actually do the developments, we're looking for vision from you, too. But we're saying today you don't have to do it alone.

There is going to be some money there to actually help get this going. And I actually don't think that this is enough. You know, the $50 million that we're going to be putting together over this period of time that the bill is in place, I think is just one small piece of what really ought to be a broader investment in infrastructure in this State.

And we made an announcement in the Capitol, I think two weeks ago, to say what our green new deal looks like. It's not the same as the debates going on in the Capitol and, you know, tit for tat, and who can embarrass who on Fox News versus CNN.

We have a hundred billion dollars sitting in this State that's going to be spent between now and 2030. It is just going to be spent on energy and infrastructure, whether it's in transportation, whether

it's in our national working lands, or whether it's here in our building sector.

But the question is how do we want to spend it? Do we want to spend it strategically in a way that's going to grow jobs and reduce carbon or do we want to just sort of let it go, and not put any focus and vision behind it?

So, I'm hoping today, as part of putting that focus and vision together, and doing it in a way that's going to be practical and really get this program up and running, because I get antsy.

So, I'm hoping you guys can sort everything out today. No pressure. You've got what, you've got 12 hours here. What, are they going to lock you in the room, or lock the doors?

Please push yourselves today, and step out of your station, and think of yourselves not just as whatever interest you're sitting in, whether it's in your utility or in your business, but as Angelinos and Californians, right. What does that bigger future look like?

And I know we can get there together, but I can't do it alone. So, we're going to need your help. My office door is always wide open. We're out there in Calabasas, if you can make the schlep all the way north,

or in Sacramento. I hope you all will also take a look at 542 as a -- or, I'm sorry, 524 as a follow-up measure. We're still working through some of the kinks, but we're very excited about this new investment.

And I just want to thank you for having me out here today and letting us meddle in your affairs. We can't help but do that in Sacramento. That is our mandate sometimes. But less is more. So, we're hoping to kind of leave this as is, now. Now that we've sort of put a vision out there that we feel is technology neutral, that has some funding in place, that gives the CEC and the PUC the tools they need to do their job with all you stakeholders. And, you know, go invent the future and we'll take credit for it in the end.

(Laughter)

SENATOR STERN: So, listen, no pressure, but by the end of the day I would love to hear a report back and something tangible that we can actually start to agree on I think is a huge goal. And I thank you all for endeavoring towards that. So, thanks.

(Applause)

MR. PETERSON: Let's give another round of applause to Senator Stern for his leadership and being here today.

(Applause)

MR. PETERSON: Thank you, Senator, appreciate you being here this morning.

My name's Matt Peterson. I'm the President and CEO and the Los Angeles Cleantech Incubator. We're honored to be the stewards of this incredible resource you're sitting in. Let's just have a show of hands, how many it's their first time in our facility. There's a lot of you. Welcome. We're really excited to have you here.

This is a manifestation of a vision of many people, this building. It's a 60,000 square foot campus that's actually owned by our public utility here, the Los Angeles Department of Water and Power.

It started under Mayor Villaraigosa administration, while Eric Garcetti was counsel president. And Mayor Garcetti got this building finished with the Department of Water and Power, and the many partners.

It's an exciting place to be, full of innovators, and startup founders, and entrepreneurs from the social, public and private sector.

And we really are excited to host this important workshop this morning and have esteemed leadership from both the Public Utilities Commission and the California Energy Commission, long-time leaders and friends of Los

Angeles and the environment.

LACI's an organization that works with startups. You'll see some startup founders here. We have some exciting ones around the campus you might run into during the course of the day.

We also do a lot of work to help industry lead and move forward. So, we have a partnership we call our Transportation Electrification Partnership to figure out how do we accelerate the move to zero emissions, mobility and goods movement.

And then, we're doing a lot to try to find entrepreneurs from under-represented communities. How do we support women and people of color who want to start their -- you know, grasp the ring and build that startup to create jobs, and make a difference in their community?

As well as workforce development, trying to make sure everyone is a part of the green economy.

I want to recognize somebody else, Lauren Faber-O'Connor, who's the Chief Sustainability Officer for Mayor Garcetti. Really a champion, as is the Mayor, in moving us forward and setting ambitious targets. I think we're going to hear some exciting news from Lauren and the Mayor next week, about some goals and targets for how L.A. is going to continue to lead the way, not

just here in California with our great State leadership, but across the country and the world of how cities can reduce greenhouse gas emissions, makes sure everyone's protected and lives in a more resilient community and city, while really creating and setting the bar, sending those market signals to create the jobs we so desperately continue to need to make sure everyone's part of this green economy.

I won't speak much longer. I just want to say building decarbonization I guess is a topic that I've been working on for 25 years. It's hard to think about, but I really started with volunteering with Habitat for Humanity, in 1993, trying to help them build green houses and Watts and Willowbrook neighborhoods in Los Angeles.

Now, we see California leading the way on greening affordable housing, on net zero energy, on green building standards and set the bar in so many ways. And we really thank our leadership from CPUC and California Energy Commission to continue that work.

And we also need to continue working on existing building stock. When I was running another nonprofit, called Global Green, we sponsored a bill called AB 758, which was about trying to increase energy efficiency in all of our existing building stock. Creating jobs, and

growing the economy and putting more money in the pockets of working-class people across this State.

So, thank you for your work. We look forward to the results, as does Senator Stern, to see what kind of entrepreneurial ideas come out of this and create the next great business that defines California's can-do attitude, and taking on the toughest fights facing humanity, while improving our economy at record pace here at home, in Los Angeles, and across the State.

So, thank you and have a great day.

(Applause)

PRESIDENT PICKER: So, I'm Michael Picker. I work at the California Public Utilities Commission. And I want to thank Matt for letting us use his beautiful facility. And I want to thank all of you for joining us here today.

So, there's a lot of folks here who we don't normally see at the California Public Utilities Commission. That's because the format that we use for decision making is fairly old. It's actually sort of a technical court, like the tax courts, or the admiralty courts, or patent courts. And so, in our formal proceedings, people actually have to come before the judge, be sworn and participate in very specific ways.

This, however, is a way that we can learn about

what other people think, hear about innovations from people who wouldn't otherwise have time, energy, money to come and participate in our proceedings.

So, I'm always heartened to see folks who I don't know because most of the time when I'm sitting before a group of people, it's people who have always been here before.

And so, I'm just going to ask a couple questions. How many people here are from the building efficiency industry? Okay.

How many people here are from labor organizations? Okay.

How many people are here from environmental agencies? Okay.

So, it's a broad spread. And again, I'm really happy to see some fresh faces. So, particularly because we don't get to see most of the line workers from the labor organizations, the labor movement, I'll spend some time at lunch, if you're still here, if you don't die of boredom before then, and I'll explain more about what the PUC does, and I'll be happy to take your questions. I'll just bring my leftover pizza outside and we can talk there.

So, let me just kind of explain the task that has been set for us and a little bit of what the

challenge is that we all face. And I'm going to talk a little bit at a pretty high level.

How many here think that climate change is an issue that we need to address? Okay.

So, this is just a little bit of the specifics of the challenges that we face. So, in 2012, the State of California did a study called Pathways, and I think you'll hear a little bit more about that from Amber Mahone of E3, who performed the study.

And at that point, 20 percent of all the carbon admitted by California's economy came from the electric industry. Roughly 30 percent came from buildings using natural gas, industries using natural gas. Homeowners, who use it for heating and cooking. And I'll come back to that in a little bit.

And in 2017, we repeated that. The electric industry was only responsible for about 17 percent of all the carbon emitted by California industries. The gas industry had shrunk a little bit, down to about 29 percent of all the carbon emitted. Transportation in both cases was stuck at 40 percent. Actually, somewhat increasing on absolute value. Because people are driving more because of the high cost of housing.

Now, we can get to 100 percent electricity by 2030, but we won't get to our carbon goal. We have to

use clean electric fuels to actually reduce carbon in the industry, in natural gas and in petroleum used for transportation in order to hit our carbon goals, carbon reduction goals. So, that's the challenge.

Very specifically, here in Los Angeles there's some other kinds of challenges that we face. The maximum use of gas on any day is about 5.7 billion cubic feet. The pipelines into L.A. only can bring in about 5 billion cubic feet, if they're all in operation.

So, how many of you are busy working on repairing line 235? Anybody? Okay. That is one of the pipelines that brings gas into L.A. When it's out of service, then the amount of gas that's available here in L.A. is even less.

The way that we've always dealt with that as a community, as a State, as regulators and as utilities is, we have gas storage facilities. And Senator Stern talked about Aliso Canyon.

When that broke down, it alarmed people because a piece of infrastructure that they had never paid attention to all of the sudden was creating havoc in the community. And so, as a result there are real constraints on how much gas we can put into that. Which means that there are constraints on how much gas that we can take out.

Now, in the winter, the biggest use of that storage, 60 percent, is for home heating and cooking. If we were to actually be unable to serve all of the customers, it means that somebody's going to be short on any given day. So far, we've done pretty well by really trying to hone the system, but it's a challenge.

So, SB 1477 was a legislation that Senator Stern created to begin to pilot some of the technologies that we can use to start displacing the use of natural gas in people's homes to allow them to use clean electricity. And they're cost effective, as some of the studies we'll hear about today, for new housing.

So, does it make sense, then, to build 21,000 units of new homes directly adjacent to Aliso Canyon, where people are dependent on gas hookups, and they also have choices at their million and a half dollar homes as to whether they have a natural gas pizza oven in the backyard or a natural gas barbeque in the backyard.

So, these are all the kinds of challenges that we will dance around here today. The real topic, however, is what are the technologies? How do we deploy them? How will we measure how they work? How will we measure how cost effective they are?

So, there are two programs in SB 1477. I won't go into them. You'll hear a lot from other people about

that. You'll hear about what local governments are doing elsewhere in the State of California. I just want to say, though, 50 percent of all Californians live south of Wilshire Boulevard. So, what happens here and how people start to think about these things is really important to the State of California and its future.

So, I also want to turn this over to my colleague, Andrew McAllister, because the Energy Commission is a very important partner in all of this since they set the standards for housing energy efficiency, the Title 2 and Title 24 that we heard about earlier.

So, with that, I'll get out of your way and I'll see if I can maybe find a couple more chairs without making the fire marshal upset.

So, Matt, do you want to quickly tell us how people evacuate in the case of an emergency?

MR. PETERSON: (Giving evacuation details)

PRESIDENT PICKER: Okay, thanks. And again, I want to thank every body who turned out today. So, Andrew, it's all yours.

(Applause)

COMMISSIONER MCALLISTER: Thank you, President Picker. Great. Well, thanks President Picker. That background's really helpful.

My name's Andrew McAllister. I'm a Commissioner at the California Energy Commission. Really happy to be here. I wanted to first thank the staff who put this together, Nidhi Thakar and Forest Kaser, Bryan Early, my advisor, who have been working overtime to make this happen, along with a number of others.

This is a really critical issue, as you've heard. I won't sort of go over why we're here because you've heard that. I want to thank Matt, and LACI as well. Just, you know, the future, I like to say the future comes first to L.A. So, we're here and we're having a conversation that really is critical for California's future. So, I'm really happy to get this going kind of in earnest, really.

I wanted to recognize Commissioner Janea Scott right there. You saw that she was here before. Commissioner Scott is the lead on this year's Integrated Energy Policy Report, which is a wonky acronym. But it's every two years the State of California does a state of the state in energy, and it's called the IEPR. And Janea's leading it. I'm helping out on a couple of topics, of which this is one.

And it's really critical. We do forecasting for all of our electricity, and our natural gas, and our liquid fuels and, increasingly, for demand side

resources like energy efficiency, and behind-the-meter PV, and electrification of vehicles.

So, all these forecasts, all wrapped up into one, they're really critical to get right and to get to some agreement across the agencies of where we are going as a state.

So, what is the load that we're going to see in our buildings? Well, that's what we're going to talk about. And decarbonization and 1477 I think are a really nice platform, not only to get the details of those programs right, but also to understand that it's in the longer-term context of where California, as a state, is going.

One thing I want to just describe quickly, that the Energy Commission is working on, and then make an invitation to you, is the -- so, Matt mentioned AB 758. It was Nancy Skinner's bill when she was in the Assembly. She's now in the Senate and remains super interested in this topic. That is how we get our existing buildings more energy efficient.

So, we have a plan at the Energy Commission. We have to update it this year. And we've folded it in with a number of other things that, since then we've been tasked with by the Legislature. Doubling energy efficiency, and that's in new construction, and existing

buildings, and industry and agriculture, so a broader mandate. That's from SB 350.

And then, AB 3232 is a building decarbonization law, now, that Laura Friedman in the Assembly authored. And so, we're kind of folding these activities together. And we're starting a roadshow next -- tomorrow, in fact, in San Francisco is where we're starting it. But we will be down in Southern California soon, in the next few weeks.

So, this is the California Energy Efficiency Action Plan that is going to be receiving and asking for a lot of input from across the board. And that's why we're trying to get out of the building, move around the State and really get -- really, get people's honest views on what they think is going to move the needle on this.

As Senator Stern indicated, you know, getting money, it's going to take a lot of money to getting our existing buildings retrofitted whichever way they're going to go. Efficiency. If they're going to be electrified, you know, we're going to chart that path over time. We need to make some decisions here in the next couple of years about where that's going to be.

But our existing -- our building stock is going to have to have some investment. And it's going to be

not just in the tens of billions of dollars, it's going to be in the hundreds of billions of dollars, and that's going to create a lot of jobs. However, it goes, it's going to create a lot of jobs.

The U.S. Energy and Employment Report, the national study that was done, that just came out a few weeks ago, and you should all -- I recommend that you all look at it. But it shows at the State level there are about 400,000 clean energy jobs in California today. Now, those vary in quality. Those vary in the level of professionalism that's brought to it. You know, the residential, as Senator Stern said residential is kind of a little bit pretty diverse in terms of the workforce that's getting into those buildings and the quality of the work that's being done. We need to up the ante, we need to up the quality absolutely.

But we could double or triple that. Okay, we could have 1.2 -- one and a half million dollars of local jobs, funded with local capital, that can retrofit our buildings and have all sorts of positive spillover effects across our population. Quality of life, air quality, health impacts. You name it, there are just incredible reasons why we should be doing this and it creates good quality, long-term, sustainable jobs.

So, all of these things are related. And I

think the platform that we have here to talk about 1477 and to begin to talk about how we get clean energy technologies into the marketplace at scale is really critical. We have to show success, so that we can then replicate that success across the board.

So, for Commissioner Scott and myself, really looking forward to today. And I will pass it back to Nidhi for -- our MC. So, thank you very much for being here.

(Applause)

MS. THAKAR: Thank you, Commissioner McAllister.

Okay, we are going to get started with our first panel for today, which is entitled "The Big Picture". Our moderator is Amber Mahone of E3. And our panelists include Eddie Rosales, Energy Specialist for the California Energy Commission, Panama Bartholomy, Director of the Building Decarbonization Coalition, and George Minter, Regional VP of External Affairs and Environmental Strategy for SoCalGas.

And with that, I'll ask our panelists and our moderator to please come up.

So, Amber Mahone, our Moderator, is a partner at E3 where she directs E3's Clean Energy Team. Her work looks across all sectors of the energy economy to evaluate the feasibility and implications of long-term

climate solutions. Over the course of more than a decade at E3, Amber has worked on greenhouse gas reduction strategies across California, the Northwest, New England, and the U.S. as a whole.

In the course of this work, she has studied renewable integration, transportation electrification, building efficiency and electrification, biofuels, and emerging low-carbon technologies.

Amber holds and MPA from Princeton University and a BA from Wellesley College. With that, Amber, I'll turn it over to you.

MS. MAHONE: Thank you. Can you guys hear me. Is this on? No, you can't hear me. Can you hear me, now? Okay, I'll speak loudly.

So, we're fortunate to have a very experienced panel here, with a very diverse set of perspectives. And I'll introduce each one in turn, in a minute here.

But the plan is that they will each give a 10-minute presentation. I'll kick off the discussion with a few questions. And then, we'll open it up for any questions from the Commissioners and from the audience. So, please hold your questions until the end.

And this first panel is about the big picture. So, what is the big picture here that we're talking about? We've heard this morning about Aliso Canyon, and

gas leaks. We've heard about California's housing crisis and the fact that the State needs to build a lot more housing, quickly, to bring down the cost of housing and make it more affordable to live here.

And we've heard about California's climate goals and the fact that, you know, we need to reduce emissions as a State, and as a globe, really, to create a better future for our children and ourselves. So, that's a lot for a big picture.

So, I'll just give a little bit of perspective about my big picture, which is that -- so, I grew up in Sacramento, in a house of energy efficiency Wonks. And so, my parents have been working on building energy efficiency in the building code in California since almost the beginning, in the 1970s. And, you know, to me that was never really an exciting thing to work on. I wanted to save the world. I wanted to work on solar, and wind, and electric vehicles.

And when I started in the industry, Governor Schwarzenegger had just passed AB 32, back in 2006. And that was the big challenge. How was California going to get to 20 percent renewables? You know, everybody was sort of hand-wringing about whether that was possible. And, you know, the industry has transformed incredibly over that time.

And so, now here we are. Just 2018, we passed the first piece of legislation that's looking at carbon emissions in buildings. Which is kind of remarkable since it's been over a decade since California passed its first set of climate legislation. So, why did it take so long to get to buildings?

But when you think about it, California has been leading on buildings since, really, the beginning. So, even though there's a lot of new things in this bill about decarbonizing buildings, it's also about returning to California's roots with our leadership in energy efficiency.

So, it's kind of an interesting circle and here I am back, talking about buildings, just in following my parents' footsteps.

So, with that, I'd like to turn it over to our first panelist, Heriberto Rosales, also known as Eddie. So, he got his start working in housing and community development projects. And he has now since been with the Energy Commission working on energy policy since 2014, where he lives in Sacramento.

So, take it away, Heriberto.

MR. ROSALES: Can you hear me? Great.

I'm going to touch on some State sector policy overview and give everyone an overview about where the

State is right now, and some of the goals that we're kind of trying to orient and direct ourselves to. So, I think we've got a Power Point slide in a second.

MR. SMITH: It's going to be a few minutes. Which is the slide?

(Technical consultation)

MR. ROSALES: Okay, so regarding what the State is doing on what we're now calling building decarbonization, there's quite a few things to talk about. And as Amber was saying, stuff that have evolved over the last several years that have kind of gotten us to this point. And I think the vision forward is starting to become a little bit more clear. But along with that, also the challenges and the obstacles we've got are starting to feel a little more real as well.

So, the next slide. So, I'm probably going to lean on the top two bullet points here. The top two bullet points here.

And excuse me, for those who don't work like in the public policy sector these obviously -- this is going to be very wonky. I'll get past this really quick. But in our sector, we're very used to talking about bills, and political, legislative drivers very much so.

So, SB 1477, both President Picker and

Commissioner McAllister touched on this right before I spoke. This is now the bill that has clarified what our goals are regarding the building sector and how we decarbonize the building sector on site, mostly. So, it's the low-emissions bill.

AB 3232 is also a bill that is asking the State agencies to work together and study the potential for reducing carbon emissions on the building site by using 2030 as our target, and using 1990 as our greenhouse gas emissions baseline.

And we are going to assess both the emissions from the building, as well as contributed emissions that deliver energy to the building.

So, to give you a quick idea of what we're facing here. Direct emissions from building. This refers to the emissions that actually are on site. So, at your house, at your apartment building. If you work at a commercial or warehouse building, these are the total emissions that are being produced onsite because of energy use.

Typically, this relates to combustion, so natural gas being combusted at the building. So, total for the whole State is about 16 percent. That might be slightly high but you get the idea.

This doesn't include electric energy and I'll

get to that in a second. And there's a reason why I'm separating out and trying to just control for natural gas. Because together they create a larger profile for greenhouse gas emissions that are driven by buildings.

So, it produces together, again just on the combustion side, it's about 33 million metric tons of carbon equivalent in 2016. And these are numbers from CARB, our Air Resources Board Agency for the State of California.

Most of those emissions are CO2 emissions, again on-site emissions about 85 percent. The remaining balance of those emissions, methane, NOx, N2O and HFCs. For those who work in the refrigerant sector, that stands for hydrofluorocarbons. It's the refrigerant that we use in our refrigerant systems. So, whether you're using central HVAC, or a heat pump that's what it refers to.

So, this graph, let me walk you through this graph real quick because it's a colorful graph and it actually points to greenhouse gas emissions that are off-site, now, indirectly contributing to the GHG profile of buildings.

So, there's actually two graphs in one, side by side here, there's a 2019 and 2030 graph. On the vertical axis over here, the y-axis, you see the hours

for the day. And across the top, you're going to see the months of the year.

So, let me start on the left-hand side, the 2019 chart. So, what you see here is the carbon emission intensity produced from the electric sector to be able to deliver energy to all our buildings, both residential and commercial alike.

The reason, where you see the green areas, those are GHGs from our electric sector are less intense when we're producing electricity because -- the reason for that is because some of the policies that were touched on right before are driven by the standards that we have, our Renewable Portfolio Standards.

So, a lot of our energy, the green area, the green block you see between the daylight hours are driven because we have cleaner energy on the electric side grid.

Where you see the dark red, those are the times of the day and throughout the year in -- again, this is a 2019 chart, that we are relying on fossil fuels to produce our energy.

On the right-hand side over here is 2030. So, we forecast out using one of our forecast office at the California Energy Commission to understand the 50 percent target, which is now 60 percent after -- this

was done before the legislation passed last year. But this was using a 50 percent target.

So, at 50 percent in 2030, of course our energy's going to become a lot more greener and cleaner on the electric grid, which is good.

The next slide. Let me -- well, let's talk nuts and bolts on what that means, again. This is a 2030 chart blown up.

So, when we look at our greenhouse gas emissions relative to their natural gas -- reliance on natural gas and fossil fuels for energy and power, so there's good news and bad news. The good news is of course, when there's daylight hours and we have a very high RPS now, probably the highest in the country by 2030, we are producing a lot of clean energy, which is great.

That means the lights that are on here in this building right now, any other kind of electric appliance that this building uses or your residential building will use is now relying on green and clean power.

The bad news is the areas where the transition is not as smooth, we're still relying for the most part on fossil fuel and very GHG-intensive power. And so, we would like to change that. But it's going to take some policy leadership. It's going to also take innovation with equipment and technology. And it's also going to

take flexibility for the way we use that power.

So, a lot of this -- so, one of the takeaways you can take from this, I wanted to share real quick, is a lot of this is generation driving our demand and our use of energy. If we're going to try to solve for the GHG carbon problem, we're going to have to be a little bit nimble and we're going to have to have demand drive generation.

Yeah, so let me go back to onsite and the way that we're consuming gas onsite, at the building. Because, again, that's a part of our load. And between natural gas and electricity for onsite load, it's about 50/50. But when we're talking about just natural gas, this is a quick break up -- and I'm going to speed up because we are being timed.

So, most of our natural gas use is being driven, really, by two end uses. You see the big slice of the pie, the red slice, the 44 percent, that's space heating. And I think President Picker was talking about that. That's obviously during the cold months we're still relying on gas furnaces to warm up our houses and our buildings.

And then, the big blue slides you see over here on the right, that's all our water-heating usage.

The next slide. So, we've got a few pathways.

These are very broad and general. And not too specific, but I'll go through them, it's kind of a priority order.

We still are advocating energy efficiency for all of our appliances. The more efficient our appliances are, the less we're going to be relying on so much electrical load and as well as gas load. At the building site, we'll rely on on-source energy.

Electrification. We're going to speak about that a lot today. Moving a lot of our appliances off of fossil fuel, a big end use, and over to electric end use is going to be very smart. It's going to help us meet, if you remember the chart, the 2030 chart. It will help our appliances take advantage of renewable green energy during certain times of the day.

And last is renewable natural gas. This is more of a potential pathway. We're looking at all of them as a portfolio. The potential for this right now is a lot lower and it's not really a viable option for buildings right now. But it presents a lower carbonization profile than our current fossil fuel source right now.

I think that's it. Here's my contact information. But I'm going to transition over.

(Applause.

MS. MAHONE: Can you pull up the next one. Thank you, Heriberto.

While we pull up the next presentation, I will introduce Panama Bartholomy. So, Panama is the Director of the Building Decarbonization Coalition, where he advocates for solutions to reduce pollution from our buildings.

He has worked on energy efficiency project development. And he was previously an advisory on energy and natural resources to Assembly Speaker John Perez. And he was also a Deputy Director at the California Energy Commission in the Efficiency and Renewables Division. And he was also previously an advisor to two CEC Chairwomen, Commissioner Douglas and Commissioner Pfannenstiel. So, take it away, Panama.

MR. PANAMA BARTHOLOMY: Thank you, Amber. And thank you, everybody, for coming. It's great to see so many people here. If it's one thing this discussion needs more of, it's more people involved in it. Any of the policies that we adopt are going to have to be beneficial for California's ratepayers, taxpayers, and workers.

And so, what we need in order to ensure that is that everybody shows up for these sorts of hearings and expresses themselves, so we can make sure we adopt the best policies for California, as Senator Stern so eloquently expressed.

I want to thank the Commissions for holding this session and say good morning to the Commissioners and everyone else here.

I do run an organization called the Building Decarbonization Coalition. We are a coalition of energy providers, manufacturers, builders, workers, financiers, local governments, and non-governmental organizations working together to reduce and eliminate greenhouse gas emissions from the built environment.

Our goal is that by 2045 that buildings play its role in California's overall goal of completely eliminating greenhouse gas emissions and staving off the worst impacts of climate change for California and the planet.

We have come to the feeling within our coalition that the best way to do this is through building electrification. We share this with a number of different studies and reports from groups that have come out over the last year, like Lawrence Berkeley Labs, Rocky Mountain Institute, the Energy Commission's 2050 Pathways Report, Synapse. And then, just recently, last week, Energy Commission's new, Healthy and Robust Future Study, which very eloquently and succinctly put it that we're not going to meet our 2030 goals if natural gas appliances are still in operation. And we must

immediately start with the electrification of all buildings. We must start by 2020 in order to meet our 2030 goals.

And lastly, we're in agreement with the 2018 Integrated Energy Policy Report from the California Energy Commission that very succinctly and directly made the case that electrification is the pathway forward for California to eliminate greenhouse gas emissions from the built environment.

And so, our coalition agrees with these reports, agrees with the findings, and agrees with the State's move and its policy direction.

But I think the Commissions wanted to set up this workshop to talk about choice. And they got Eddie, and then myself, and then George to talk about the different choices that California has in order to reduce greenhouse gas emissions.

And so, what I'm just going to walk through is some of the considerations you may want to take into account when you're making a choice about the fuel source that we use to fuel our buildings or to fuel our State.

So, first and foremost, I'll talk about costs. And let's just with gas, gas infrastructure and our housing crisis in California. So, looking at the costs

of gas infrastructure in California, it costs about, for the laying the pipe, permitting it, and then the actual construction, it costs about $6,000 to $15,000 per home, depending on the area in order to be able to bring service to a residential house in California.

You add in the plumbing inside the house, anywhere from $750 to $2,400. And then, the venting to take all of the gases that come off of the combustion of the gas out of the building, and you have all of the costs of what you have from the choice of putting in gas into your building.

Now, every year, the National Association of Homebuilders puts out a report called Priced Out. And they look at every State and 350 major metropolitan areas across the United States about the impact of increased costs on families' ability to be able to afford to buy a new home.

What they found for California for this year is that for every thousand dollars of cost that we add to a house in California, it prices almost 10,000 families out of the ability to be able to afford it.

So, as we make a choice between our fuel choices and we're choosing to put natural gas into our homes, say we use the low end of all of those different costs, we're talking about $7,000 per home, of additional cost

by putting in natural gas. You already have electricity running to the home, you're going to have that. But by choosing to put in natural gas, we're pricing about 60,000 families out of the ability to be able to afford a home in California. In a state with the housing crisis that we have, this is simply a cost we can't afford.

So, you might say, well, that's all and good with the infrastructure, but what about the appliances. Are these appliances, these high-efficiency appliances all that much more expensive. Well, luckily, California's Building Industry Association last year put out a report, looking at exactly this. And what they found is that electric appliances are the same cost or cheaper than natural gas appliances to put into your building. And that if you're building a new building, all-electric, you have anywhere from a 55 to 60 percent elimination of greenhouse gas emissions from those homes, as compared to putting in gas.

We live in a state where 15 percent of our families live in energy poverty, meaning they spend over 20 percent of their income on their energy bills. Utility bills are the number one reason for payday loans in California.

And so, when you look at a family's ability to

be able to manage their budgets, their monthly budgets and to be able to stay above the line and be able to pay all of their bills, utility bills are playing a critical role in this. Particularly, when we have peaks in natural gas prices in our winter months.

This is a chart showing the last two years of natural gas prices in California. And we import 85 percent of our natural gas in California. We have very little control over the price. Very little control when there's a polar vortex to compete for scarce gas resources. And, of course, as was mentioned already, we have line constraints here in Southern California.

This kind of volatility is not easy for a family to be able to manage. This kind of price volatility is not easy to put in your monthly budget, as you're trying to be able to find a way to pay your bills and buy food for your family.

And this only going to be exacerbated in Southern California if Southern California Gas Company's general rate case request is approved over the next three years. This is a summary chart of SoCalGas's gas rate case for 2019 to 2022, which calls for a 45 percent increase in gas prices over the next three years.

And so, alternative to that and a way to manage it is heat pumps. Finding a way to be able to use heat

pump technologies, which are three to four times more efficient than gas competitors, and allow you to actually manage your energy so that you can heat your water, or cool or heat your house during the middle part of the day, when prices of energy are low, when solar power is high, instead at those peak times.

The second consideration you might look at is healthy. In California, right here in L.A. right now, we are giving -- having this meeting in an air basin that's never been in compliance with the Clean Air Act. The L.A. Basin and the San Joaquin Valley suffer from extreme pollution and a significant amount of that is NOx. Now, NOx is a pollutant that can cause healthy people to get asthma and can cause asthmatics serious attacks.

In California, we have really great power plants at this point. We've been able to put advanced pollution controls on them and we've been able to bring down NOx pollution to about 18 tons a day from power plants.

Our buildings produce six times that amount. The combustion of gas in our buildings produces six times more NOx than all of our power plants combined, and just behind all of our cars combined, across California. That's outside.

When you look inside, and this is a report from Lawrence Berkeley Labs about the impacts of cooking, the indoor air quality impacts of cooking with gas.

What Lawrence Berkeley Labs found is that there's over 12 million Californians that are exposed to unsafe levels of nitrous oxide, carbon monoxide, and formaldehyde from the cooing of gas and the lack of venting in homes across California.

I already talked about nitrous oxides. Formaldehyde is one of the leading causes of childhood leukemia in the world. One in three children that contract it, die from it.

Over 12 million Californians, due to the cooking with gas, and the lack of adequate venting are exposed to dangerous levels that would be unallowable outside, under air quality standards.

And so, instead, looking towards induction cooking, not the old coil cooking that we all think about for cooking, but using magnetic induction cooking, an incredibly safe, incredibly fast, incredibly powerful option for doing your cooking.

Consumer Reports loves induction cooking. They've released their top ranges for 2018 last year. Nine of the top ten were electric. Five of the top ten were all induction cooking. Consumer Reports looks at

durability, usability, performance, cleanability, clearly prefers induction and electric cooking over gas. And if you look at the costs, we're ranging in costs from $990 all the way up to about $2,400 for induction. The top performing gas range at about $3,000, in the top ten.

And finally, climate. So, if we're looking at climate emissions and the reduction of greenhouse gas emissions for buildings, this looks at duel-fuel buildings in the overall building sector for electricity and gas, moving towards 100 percent carbon-free electricity by 2045, we're still be relying on gas and still, therefore, significant greenhouse gas emissions from this sector.

Whereas with electric heating, for the transition we get over to zero emissions for buildings.

This is a study the Energy Commission put out that looked at the supply of biogas and the cost of biogas and using it to replace our natural gas. This shows how much natural gas we were using in our building and industrial sectors in 2015, about 1.6 quadrillion Btus. This shows, if we were able to get extreme amounts of energy efficiency into industry and buildings how much we think we could reduce the natural gas consumption by 2050, and then how much renewable gas we

can produce in California.

We can produce about .2 quadrillion Btus of renewable natural gas here in California.

Say we took 11 percent of the entire nation's biogas supplies, took California's population share, and we can produce about .4 quadrillion Btus of natural gas. We are never going to be able to meet the demand for natural gas in California with renewable natural gas, even if we took it from the rest of the country. And the costs of this are going to be completely unacceptable to any ratepayer, or any politician looking at this option.

The case for natural gas means that we have at least two-thirds of our gas coming from fossil fuels for the foreseeable future. Reliance on renewable natural gas in our buildings ties us into a future of fossil fuel natural gas in our buildings.

I'll finish up here. We released a report discussing these issues and what California should do. Succinctly, Commissioners, we need a very clear message from the Governor and the Commissions about this topic. The industry is waiting. Local governments are waiting. We need clarity about where we're going to go and what California's future is going to be on this.

We laid out some goals that say within two more

code cycles we should be having zero emission residential buildings. In three code cycles, commercial buildings. We need to build consumer awareness, ensure customers are getting good value, ensure that builders and contractors are getting good value, our supply chains are going, and we are aligning all of our State policies.

And so, I will just end here. Electric buildings clearly cheaper, healthier, more climate-friendly, and safer. And we're not alone, but we are behind.

The UK has already adopted a policy that by 2025 no new homes will be heated by gas. The Netherlands, last year, adopted the same policy. They're both on the pathway towards the complete elimination of natural gas. We are no longer leading on this important topic.

We have transformed markets before for the entire world. Through innovative rate design and incentives, we transformed the photovoltaic market and we can do it again with decarbonized buildings. What we need is leadership from the Governor and the Commissions on this topic.

Thank you for your time and I look forward to the conversation.

(Applause)

MS. MAHONE: Thank you, Panama. While we get the next set of slides queued up, I will introduce George Minter. So, George is the Regional Vice President for External Affairs and Environmental Strategy for Southern California Gas Company, where he has worked for many years. He resides in Pasadena and will tell us about what the gas company is thinking. Thank you, George.

MR. MINTER: Thank you very much.

(Applause)

MR. MINTER: Thank you, Commissioners. Thank you, staff. Thank you, working people, the folks that keep our energy industry alive and provide heat and power to all of us here in California.

I was asked to talk about the big picture. So, the big picture is climate change. It's the existential challenge of our time. And climate change is caused by emissions to the atmosphere. Emissions caused primary by the use of energy. And so, looking at the energy and the forms of energy we use is necessary.

The other part of the big picture is that today we have a diverse energy infrastructure that delivers energy, and increasingly cleaner and cleaner energy to all of our consumers. And that's the gas system and the electric system.

But to date, we've only focused on decarbonizing the electric system. And we think today is the time to start focusing now on decarbonizing the gas system. Because eliminating one energy delivery system to over rely on another energy deliver system doesn't make sense, doesn't contribute to future resiliency, particularly in the face of climate events that we see occurring, whether it's a wildfire here in the west or floods in the south.

And so, our vision is that there are many pathways, not just one. That there are many ways to deliver energy, not just one form of energy. And we need to focus on making all forms of energy cleaner, more renewable. Not depletable, more renewable, cleaner at every turn.

And so, we see getting to 2045, we see that we need to use everything, every tool in the toolbox. And that means the gas system, that means the electric system, and that means decarbonizing energy delivered so that there's less carbon in its use.

Our future is not just renewable gas that's been mentioned here today, biomethane, but also hydrogen. Hydrogen production from excess wind and solar. Wind at night, solar in the middle of the day. It's a process called power to gas, which is being utilized to great

effect in the EU. And we see this as a demand that we're going to need to undertake here in California as we grown our -- particularly our solar resources, we're going to need energy storage that's far more capable from a long-term, and from a capacity perspective than batteries. And power to gas-producing hydrogen. And then, using the pipeline delivery system as a way of storing energy will be part of our future.

We need to reach our 2045 goals, but we also need to reach our 2030 goals. We've got to reduce our emissions by 40 percent. That's under SB 32. We've got to address building decarbonization and try to achieve 40 percent reduction in emissions from buildings.

And under SB 100, which gets us to a clean energy future in the long term, by 2030 we need 60 percent of electricity from renewable gas -- excuse me, from renewable electricity.

What's missing? There's nothing here about renewable gas. And yet, as you saw from the CEC and as you saw from the Building Decarbonization Coalition, the use of gas is a significant contributor.

So, let's look at what really is happening. This is from the ARB website, the Air Resources Board. They're in charge of doing the air inventories. They're in charge of implementing AB 32, SB 32. They're the

folks that look at where emissions come from and what we need to do.

And as you can see, GHG emissions come from the transportation sector. That is the larges single source. The next is industry. Which, by the way, uses mostly gas. The next is electric generation. The smallest sector is the residential and commercial building sector and that shows us that it's 12 percent. Not 40, not 30, not 16, 12 percent. And 9 percent of that actually is gas usage. The other 3 percent are refrigerants and other uses.

So, when we're looking at the building sector, we've got to realize that it's among the smallest sectors of GHG emitters into the inventory and into the atmosphere. But the real challenge and the challenge of spending our money wisely is transportation, is electricity.

And if we're serious about buildings which by the way, that's where people use gas. If we're so focused on decarbonizing electricity, how come we're not focused on decarbonizing gas? Because if we decarbonize the energy source, the building sector would decarbonize. That's something that really hasn't been talked about.

But the State of California and the ARB actually is showing leadership on this. And this is really

important to understand. The Scoping Plan is the plan that the ARB lays out, that tells us how we're going to meet the goals to 2030, how we're going to meet the goals for 2045. And in that Scoping Plan, there's a Short-Lived Climate Pollutant Plan. In fact, it makes up a pretty significant chunk of all the emission reductions, almost 35 percent of the emission reductions in the Scoping Plan come from the Short-Lived Climate Pollutant Plan. And almost all of that is about methane capture. Methane. Well, what's natural gas? Natural gas is methane.

Now, we talk about methane and we talk about leakage to the atmosphere, and we all think about the gas system. But the fact is the gas system is a very small contributor to methane in the atmosphere. And as you'll see in a moment, it's our human production and waste stream that contributes most of the methane to the atmosphere. And that's what this bill, passed several years ago, SB 1383, is all about. We have to capture 40 percent of methane and other climate pollutants that are super-pollutants, they have a high global warming potential. Forty percent from the atmosphere.

And what's the state objective? It's to deliver it to the heating sector, to decarbonize the heating sector. Well, where's the heating sector? It's in the

buildings, folks.

So, we actually have a law that requires us to capture methane, put it in the gas system, deliver it as renewable gas to address heating. That's what the law says.

So, where does the methane come from? As you can see, it's dairies, it's agriculture, it's wastewater, it's landfills, it's organic waste. A very small part is the gas system and we're working on the gas system by the way. And the folks here in the room I see, with the blue hats and the blue shirts, are some of the folks who make sure that we reduce those methane emissions from the gas system. What I'm t the gas sector. And that decarbonizing energy allows people to use their equipment and it's easier than switching equipment.

We did a study that basically said, okay, what do we really need to do to achieve the GHG reductions of building decarbonization by the year 2030, when the electric system is 60 percent renewable?

And what we found is less than 20 percent renewable gas in the system achieves the same GHG reduction as 100 percent building decarbonization. And people don't have to do anything and we don't have to spend money switching out appliances.

We need to tell the gas utilities and we need to tell the gas buyers, buy renewable gas. And so, we need to develop the renewable gas pathways.

And the study also looked at what's the cost, the cost effectiveness in terms of GHG reductions? And it tells us it's two or three times more cost effective to address energy decarbonization and reducing emissions from the building sector through decarbonizing not just electricity, but also gas delivery.

Now, the question is how much is out there? And this is just the biomethane pathway, folks. But the CEC did a study with UC Davis that said there's 300 billion cubic feet out there. We deliver a hundred tcf -- excuse me, a single, a 1 Tcf, so that's like 10 hundred Bcf. There's 300 Bcf of resource available. The ARB said, wait a minute, that's available. What's real? What do we think will happen in 2030?

And so, on the other side of the chart, on the left-hand side of the chart is another study done by UC Davis, for the ARB, that says about 100 Bcf will be available by the year 2030, because of the Low Carbon Fuel Standard Program. Which, by the way, the architect is sitting in the audience here. Sam Wade, thank you very much.

Our estimate is between 100 and 200 Bcf, which

is between 10 and 20 percent of our throughput is available here in California. But nationally, and we have to look national, we're going to have a supply of national and the state resources, just like we have wind coming from out of state, just like we have solar coming from out of state.

And so, if you look at what's out there, there's a trillion cubic feet already under production. And if you look at the DOE study, they're looking at ten Tcf expected to be available, potentially, as a supply potential by 2030.

Well, domestic annual consumption is about 28 Tcf. So, 10 Tcf is approaching the 30 percent threshold.

The bottom line is we've got the supply resource in-state and out-of-state to achieve the 20 percent threshold. So, we can achieve 20 percent building -- excuse me, 20 percent RNG supply. And we can achieve the same GHG reduction as 100 percent building electrification. And we can do it in an expedient and cost-effective way.

Consumer adoption is really important. And we see this with the electric vehicles and we'll see it with electric equipment. What is important is if consumers don't have to make a choice they don't want to

make, and we can achieve the outcome in another way by providing renewable gas, we can get to the goals. And we can get to the goals faster and we can get to the goals cheaper.

The CEC did a study with E3 that identified an electrification pathway. And its biggest red flag was consumer adoption. If you don't have to rely on consumer adoption, then you can get to the goal.

The goal is a challenge because cost is a challenge, and we've all already heard the challenge of meeting energy costs and meeting housing costs.

In our service territory, 35 percent of the folks already in our service territory qualify for a low-income rate assistance.

The approach is a balanced approach, preserve consumer choice, minimize disruption, minimize costs, promote system resiliency and strengthen Californians.

Yeah, I see then, we had a 3-minute overage. So, all I'm going to say is end with this, which is that our vision is not only to become the cleanest utility over the long term, but that we're going to meet that 20 percent threshold by 2030. And we announced publicly our intent to achieve 20 percent RNG supply by 2030, and we're going to start with a 5 percent threshold. Thank you.

(Applause)

MS. MAHONE: Thank you to all of our panelists. I guess I'd like to start maybe -- George, since you just presented, so you showed us in one of your slides the goal of getting to 20 percent renewable natural gas by 2030, a big announcement from SoCalGas.

So, 20 percent by 2030 represented about a third of the entire supply available in the United States. So, what does meeting this goal entail, you know, in terms of a new market? Are we talking about, you know, huge imports of biofuels from, you know, across the U.S.? What does this look like?

MR. MINTER: So, 20 percent is 20 percent of through put here in the State of California, that's what we're looking at. And in the case of SoCalGas, 20 percent of our through put would be 200 Bcf. 200 Bcf is easily met with the 100 Bcf supply in California, and already supplies flowing to California that could reach to two, to three, to four hundred Bcf.

And so, your statement was an incorrect paraphrase of my statement. And my statement is that the entire United States could replace its domestic supply, its use, which is 28 Bcf, with the 10 -- excuse me, 28 Tcf, with the 10 Tcf that the DOE study says will be the supply potential out to 2030.

So, RNG is a 20- to 30-percent solution. And folks are right, 20 to 30 percent is not 100. But it's a pretty far pace along towards 100.

And so, what gets us the rest of the way? It isn't just renewable gas and biomethane that gets us to 2030. And if you talk to the scientists at LBL, and LLL, Lawrence Livermore, they'll tell you that gasification technology could take care of woody biomass, and the forest waste, so maybe we could get to 40 to 50 percent biomethane.

But really, the challenge is to think about renewable gas and methane as simply a hydrogen carrier. That's what methane is, it's CH4. It's two H2 hydrogen gas molecules held together and stabilized with a carbon molecule. So, what do we do? We produce hydrogen. And how do we produce hydrogen? And this is a whole longer discussion. But what we're seeing in the EU nations, and now what we're seeing in Japan, and now what we're seeing in North Africa is to co-locate hydrogen production facilities with wind and solar facilities to produce hydrogen to store that excess electrical energy.

We're relying here, in California, on battery storage, which is short term and short volume. But hydrogen storage is huge volume and long term. And so, that gets us the rest of the way. We'll start blending

hydrogen into the gas system and then we'll actually start methanating the hydrogen, adding the carbon. Where does it come from? It comes from carbon capture. All of the scientists are talking about negative carbon, we've got to do carbon capture. And by the way, the only fuel resources that's negative carbon is renewable gas or renewable fuels.

MS. MAHONE: Great. Thank you, George.

MR. MINTER: But carbon capture will allow us the CO2 stream to then methanate hydrogen and stabilize the system.

MS. MAHONE: Great, thank you.

So, my next question is for Panama. So, California is a relatively mild climate, probably compared to, you know, Europe and northern parts of the United States. So, it would seem heat pumps work really well in this State.

So, did that inform your thinking about why electrification in California?

And I guess my other question is around, you know, how do we achieve these high levels of electrification that you're talking about? I mean, we know that buildings are long-lived assets. Heating equipment is long-lived. So, how do we get those levels of adoption that you're talking about?

MR. PANAMA BARTHOLOMY: So, I think one of the things in our favor as we work towards building decarbonization is that our stuff breaks. Our water heaters break. Our heaters break. About every 8 to 12 years our water heater breaks. About every 15 to 20 years our heater breaks. And that presents an opportunity to be able to help people make a choice towards decarbonization. And if we, as a State, can put in place a market environment that makes it more cost beneficial for a resident to put in an all-electric-powered-by-renewable-energy heating source, and we make it more beneficial for the installer or the builder to be able to do that, that's how we're going to be able to increase market share.

Right now, we subsidize fossil fuel appliances with ratepayer things and so we create a -- we put a thumb on the scale towards fossil fuel appliances against all-electric appliances.

And so, we're actually in a backwards state from being able to encourage the movement towards renewable energy-powered, all-electric appliances.

So, the way to do is as my friend Nate, from Ohio, who does a contractor, he says, it's the church of the kitchen table. And it's the homeowner, and it's the contractor, and they're sitting down and they're having

a discussion. And we need to make each of those people sitting down at that kitchen table a winner out of the situation in order to be able to push in building decarbonization.

MS. MAHONE: Great, thank you.

So, then, my next question is, I think, to all of the panelists which is, you know, we've talked about electrification and we've talked about renewable natural gas. Are these things in conflict with each other? Can we do both of them? I mean, what is the role for each, as you see it?

MR. PANAMA BARTHOLOMY: So, this time I'm holding the mic. So, I'll just repeat what I said in my presentation is that even as George said, we're never going to be able to provide all of our natural gas supply from renewable natural gas. That means if we continue on this path towards thinking we're going to get through renewable natural gas, we're tied to fossil gas.

Now, to be clear, renewable natural gas is incredibly important. It's important that we capture it from dairies. It's important that we capture it from our landfills. But this is the most previous form of gas that we have. This is the most expensive and important form of natural gas that we have. And to put

it into our old pipelines, and to be able to then use it and my 80-percent-efficient hot water heater is not the highest and best use of this precious resource.

We need to be using it, as George said, in our transportation sectors, and our freight sectors, and aviation, and other sectors where we're able to better use it than in my 80-percent-efficient gas hot water heater.

MR. MINTER: Well, I'd love to see that happen. I'd love to see the environmental community champion using renewable gas in the freight sector. Because most of the folks that support building decarbonization through a single electrification pathway, also only support electrification of the transportation sector.

I want to correct something you said. I did not say that the renewable gas pathway can't get us to 100 percent. It can and it will because we have to be there by 2045. I said that the biomethane pathway probably gets us 20, 30, 40 percent. It doesn't get us all the way, so we have to do hydrogen production, and we have to stabilize hydrogen. We can probably blend hydrogen up to 10 percent, maybe 15 percent. But eventually, we're going to want to methanate hydrogen to deliver as a renewable gas.

One of the things that I think is important is

to look at where emissions come from. And I had a chart up there which us that transportation's the single biggest challenge. 40 percent of our GHGs come from transportation. 70 percent of that's light- and medium-duty vehicles. All of that needs to be electrified, and we're not close yet, folks.

So, if you really want to talk about cost effectiveness and GHG reduction effectiveness, you've got to electrify the light- and medium-duty transportation sector. That is the biggest value for the decarbonized electron.

The biggest value for the decarbonized molecule, which is renewable gas, is where people use gas every single day for heat in their homes. That's all we're saying.

MS. MAHONE: So, Eddie, did you want to add anything there or --

MR. ROSALES: Oh, this is a great question. It's what we're going to be scoping out in the report we're looking at. And the only thing I would like to add is that the existing building stock, you know, over 12 million residential units, that's just on the residential side, is a big challenge.

So, there's a sense that, yeah, all the options are in front of us.

With regard to electrification, we have not -- the State has not and no other state has, in the country, has set up the infrastructure, the market incentives for consumers to make those choices.

So, I think SB 1477 is giving an injection, a new injection to that side. And I think as it plays out in the next 10 years, hopefully, we can see consumers making choices. You know, and it will be a consumer-driven market more than anything else.

MR. MINTER: Eddie makes a good point, which is the new building sector. And I think that a lot of folks are thinking, well, maybe that's where we really ought to be looking because that's the new creation. And we saw the prices given for line extensions and 7 to 9 thousand dollars as the cost of gas.

But we've also got to realize that the future for decarbonizing electricity is solar rooftop, and solar rooftop's 15 to 20 thousand.

So, the electrification reliance is far more expensive even in the new sector, than delivering renewable gas. 15 to 20 thousand for a solar rooftop, 7 to 9 thousand for a gas pipeline. Both of them will ultimately delivery renewable energy. What makes sense?

MS. MAHONE: Okay. So, with that, I'd like to open it up to questions from the Commissioners, first,

and then we'll go to the audience, if you guys have any.

MR. EARLY: Okay, sure, this is Bryan Early with the California Energy Commission. We'll start with the audience and I'll pass the mic around. And if we can make sure to say your name and your affiliation for the court reporter, yeah.

Sure, and because of time constraints, if we could keep comments to one minute, that would be greatly appreciated. So, maybe enlist some help here to pass the mic around.

MR. ACOSTA: Just incredibly honored to be here. My name is Jerry Acosta. I'm with the Utility Workers Union of American. Incredibly honored to be here and I'll to be really quick and brief.

In the sense that we're fortunate, we've gotten notices of this hearing. We've got -- you know, I could take off from work and come here. And I heard a gentleman, earlier, talk about that he built homes in the Willowbrook, South Central Watts area. Well, that's where I was born, and lived there and work as a gas man.

I think it's important that you take a look at -- you talk about 12 million, 10.5 million people that have natural gas in their homes and the cost of switching over. There's a theory in my neighborhood that you can't green poverty that quickly and there

is a cost to what you're talking about. And the Commission must be transparent with those people, those 10.5 to 12 million people that use natural gas, that want to continue using it. I think it's important to look at cost. I mean it's easy to go from one way to produce electricity and DWP has a certain cost and then 4 to 5 billion dollars more to produce electricity at DWP without natural gas.

So, I think we have to be transparent about cost. And what is it going to do with jobs in our infrastructure? We have 140,000 miles of gas infrastructure. It's not going to go away, folks. I know it's easy to talk about it. I know it's probably the smart discussion to have, but none of this is going to go away. And the transition to real people in the Watts -- I like to be representative of those people. I think it's important and significant, and must be addressed by the Commission.

MR. EARLY: Okay, thank you. I'll shuffle around.

MR. HAKEL: Hi, I'm John Hakel. I'm the Executive Director of a group called the Southern California Partnership for Jobs. We actually have 2,750 contractors and 90,000 union workers. We represent the carpenters, the laborers, and the operators.

And this has been one of the conversations I've had with the workers going what is going to happen to me? I'm a young couple, I'm a minority couple, I want to buy a home. What if? What if, as this rolls out, I cannot afford a home?

Everyone desires the opportunity to own a home. What is the long-term plan for them?

My question is twofold. One, if this goes through, if you have a single source of energy, no one in this room is that naive to believe the prices aren't going to go up. It's just a fact.

(Applause)

MR. HAKEL: It's just a fact. I love what we're doing here, this dialogue has to happen. I applaud everyone for coming to this. My question is, as this gentleman just said, was this notified in the L.A. Times, Pasadena Star, Long Beach? It's the people who have to hear this. This is part of our world. We know what it is, but do they know what's coming down the pike. And I think it's most important that these elected officials know what the taxpayers may or may not have to come into their lives. Thank you.

(Applause)

MS. ROCHA: Hi, my name is Lilly Rocha. I'm the President of the Latino Food Industry Association, and

also on the board of the Latino Restaurant Association, and also a graduate of UC Berkeley. So, I definitely appreciate all the dialogue and understand this.

For our over almost 4,000 members that we have, restaurant owners, chefs, people in the industry, coffee roasters, beer makers, that's what we're looking at. We're looking at the cost and we're looking at some enormous costs. And I believe that we're getting the message out to our members, constituents of yours. We want to know, you know, how is this all going to be paid for? Because I feel like that's where a lot of our members' questions are coming from, and I'd like to be a little bit more knowledgeable on letting them know, you know, how this is all going to happen.

And so, like I said, we have independently looked at some studies and looked at the costs, and the cost is pretty enormous for it. And I, again, I'm not saying -- you know, we're doing a lot of great things with electricity, I'm not saying it's bad. It's just that we definitely need to know and make sure that people know what these enormous costs are for their businesses.

MR. EARLY: Thank you. So, we've taken a couple of questions about cost. I don't know if anyone on the panel wants to respond, or Commissioners, or we can just

keep on.

MR. MINTER: Well, I mean, I'll respond really quickly. And that is that what we're suggesting is there are many pathways. There isn't just the electrification pathway. There's a lot of ways to get to where we need to go. We need to look at deploying electricity where the problems are, like transportation. We need to look at gas supply, which is not renewable, and why not? And perhaps we ought to make it more renewable.

We're suggesting the least-cost pathway today is to require everybody that guys gas, by 2030 to buy 20 percent renewable gas. And that will get us the GHG reductions we need without any of the folks owning a home, or renting a home having to incur a cost to switch out equipment or a new homebuyer to suffer increased costs.

There's other approaches. For example, the Low Carbon Fuel Standard in the transportation sector is an approach that's being suggested by one of the participants in this forum. Sam Wade, formerly from the ARB, who ran the LCFS program, is suggesting we could do this in the transportation sector and this would be a way to jumpstart decarbonizing gas supply.

So, if we're really concerned about cost, we

ought to look at where people -- and this proceeding really does need to look at that. If we're decarbonizing buildings how do we do it? What's the most cost-effective way? What are the pathways? It isn't just one approach.

MR. EARLY: Okay. Thank you, George. Another question here.

MR. CAMPBELL: Hi, my name is David Campbell. I'm Secretary-Treasurer for United Steelworkers Local 675, formerly known as the Oil, Chemical, and Atomic workers. I'm also a former board member for Communities for a Better Environment. And a founding member of Labor Network for Sustainability here in Los Angeles.

As a resident and worker in this area, we're very concerned about air quality. And, obviously, we are one of the sectors, most of my members make transportation fuels, primarily for airlines and light transportation sector.

We're going to get impacted a great deal by changes currently in the legislature on light transportation. We supported AB 32, which was a tough position for us. But our main concern is there has to be a just transition for workers in the communities who are affected by change. So, these jobs that are created by the building decarbonization that we all support,

because we know we have to do it to protect the progeny, the future generations, and make our State and our workplaces the most competitive in the world and maintain our position as the fifth largest economy in the world. We know we have to do it, but there has to be a just transition for workers in their communities.

So, these jobs that are created have to be good-paying, family-supporting jobs that whether I'm an oil worker, or former oil worker, or whether I'm a former gas worker, or whatever, we have jobs to transition to. And without that, we cannot get our members to support the kind of changes that are necessary.

So, those issues are linked and that's why they're important. Thank you.

(Applause)

MR. EARLY: Thank you. Trying to get some locational diversity here so --

MR. CHERRICK: Hi. Kyle, with Pick My Solar. We run an online marketplace that helps homeowners to easily get many bids to add solar and energy storage.

Following up on the cost conversation, I just wanted to let everybody know that it happens to be you can see on our website, through our calculator, it's the first think you see, that the average owner in California, if you put in any address in California and

run the numbers, after paying off a solar system with cash flow positive loan, saves $50,000 over the life of the project. That's money that can be put to your retirement fund, that can go to pay off your house, that can just help make your world a better place, personally, for any family.

And then, you know, I just want to add a personal anecdote that, you know, I started in utility scale, solar development, photovoltaic in California about ten years ago. And ten years ago, we were ecstatic if we could get a contract for a 10- or a 20-megawatt project at 20 cents a kilowatt hour. And we were worried about like, man, are we going to be able to actually build it at the price. That doesn't feel like enough money.

We are literally within three to five years from having one-and-half-cent-per-kilowatt hour solar photovoltaic in California and throughout the State.

So, in terms of costs that's why we see electrifying everything having a lot of benefits for everyone. Thanks.

(Applause)

MR. EARLY: Thank you. Just a quick process note here, we are going to try to end this Q&A at 11:15, on schedule. But we will be opening up at the very end

of the workshop for additional public comments. We want to make sure that public comment gets heard, and especially the people in the overflow room. So, if you're feeling like you don't have an opportunity now, let's make sure to save those questions and bring them all up at the end of the workshop.

So, in no coherent fashion.

MR. SWITALSKI: Thank you, sir. Jon Switalski with Californians for Balanced Energy Solutions. This is a very astute conversation and we appreciate it. And Commissioners and President, appreciate you being here.

But I just want to follow up on a couple of the issues that folks brought up earlier, which I think gets down the base level of access and equity. I mean, we have folks in overflow rooms, don't have a line of sight here, as lovely of a facility as this is.

And as far as I can tell, we don't have any translation services here. And so, I understand that this may be an old format or we're not used to seeing as many faces, but this is a process that has the potential to affect all of us. And so, I think, and I would encourage your consideration to attempt to lower the access barriers here.

And so, with regard to equity, the coalition that I represent has two members in L.A. County that are

nongovernmental organizations, Faith and Community Empowerment in Korea Town, and the Southeast Churches Services Center.

They're concerned about the low-income families that they represent. They help with utility bills. They pay people's utility bills and rent that can't afford it. And so, when we talk about choice, we're doing so from a very privileged position. We're doing so in a public policy, with stats and charts, and that's all well and good. But folks sitting at the kitchen table don't have a choice. They're choosing dinner or they're choosing electricity bills. They're choosing to grovel for help to pay their electricity bills.

So, I think it's encumbent on all of us in this room to take a step back and let's think about this from a human perspective. And at the end of the day, what does this process end with? Unaffordable mandates? Inability to access the workshops and forums?

So, I encourage all of us to kind of think about it from that perspective. Thank you.

(Applause)

MR. EARLY: Thank you. MS. THAKAR your one minute is up for comment or question, please.

And I would also just like to note that we did receive a request for a translator very late on Friday.

Unfortunately, it was too late for us to reserve one. We will keep that in mind for future engagements. So, thank you.

Thanks for your comment. Please?

MR. EDER: Hello. My name is Harvey Eder. I'm speaking for myself and for the Public Solar Power Coalition. We did a study on equity four years ago for the PUC, the Low-Income Solar Equity Program. And for 350 and the reviews on transportation, this was not evaluated along with everything else.

Renewable natural gas. Okay, in the '16 plan for the Air District here, we put a lot of stuff in there about drug-resistant antibiotics. I also want to incorporate in for reference, yesterday's New York Times about antifungals and antibiotics, we included -- that the CDC, ten years ago said there were 23,000 deaths in here. The premature death is valued at $9 million per. A thousand is $9 billion a year. We've got like 4,000 here in South Coast, just from emissions. We totally ignored this. They say by 2050, the World Health Organization says 170,000 or more a year. So, a good percentage of that, right, comes right here in California, and we're totally ignoring this. And they didn't even have to report these deaths until last year.

MS. THAKAR: Thank you, sir.

MR. EDER: And this is just one example. There are a lot of other things.

MR. EARLY: Thank you. I'm trying to get us out of the room so everyone feels --

MR. FLORES: Good morning. Armando Flores with the Valley Industry & Commerce Association, VICA. We represent businesses all throughout the L.A. Region, a number of which have voiced concerns with moving towards a hundred percent electrification. Just for the simple fact that right now what they have is affordable and it's reliable, restaurants and manufacturers.

So, my question is are we looking at real cost, actual reliability, and if these technologies that we're trying to move towards are actually there, yet, and if they're advancing as fast as we are saying they are.

MR. EARLY: Thank you. I feel like I'm neglecting folks up here in the rows.

MR. DAVIS: Milton Davis, Secretary-Treasurer Local 132. Creating a monopoly and eliminating choices has never been good for the common people.

MR. EARLY: They can't hear.

MR. DAVIS: Milton Davis, Secretary-Treasurer, Local 132. I said, developing a monopoly has never been a good thing for the common people.

MR. EARLY: Okay, thank you. A process note,

copies of the presentations will be available online in both the PUC and the CEC documents.

I have a question here from Bruce Severance to George Minter. This question is, if hydrogen is both explosive and a thinner molecule, and more to leaks than natural gas, would it be safe to blend it for dissemination in the aging infrastructure. And then, would it not be safer to use hydrogen for peaker plants?

MR. MINTER: So, hydrogen, like methane, is a gaseous fuel that ignites. Gasoline, diesel, the same thing. So, we're used to that in our energy system.

The challenge with hydrogen is, as the questioner addresses, is how much can you really use in the gas system before you have any concerns? And the science is mixed. In Europe, they're blending at 10 percent. We actually visited some sites, new gas delivery systems where they're blending at 20 percent.

We have a power gas facility at UC Irvine and we're currently blending at a 4 percent rate to learn what does this do to the pipeline system, to the metals, to the connectors, and what does it do to the end uses.

And what we understand is a modern gas system can handle hydrogen and blending hydrogen at a pretty high level. The challenge is what about all the end-use applications. And so, that's when you come to the 10 to

15 percent. We think we can get to 10 or 15 percent.

We actually have a bill in the Legislature today, that followed on Nancy Skinner's hydrogen bill, that asks the question how much can be blended in the pipeline system and shouldn't we be doing it? And calls on the California Science and Technology Commission to do a study and then recommend to the PUC hydrogen blending standards, just as we have biomethane blending standards.

MR. EARLY: Thank you. Okay, we have time for a couple more questions here.

MR. SOTO: Hi, my name is Jorge Soto. I'm an accountant, economist and a Regional Officer for the 132. Thank you very much to all the panel, first of all, for being here. And I'll be very, very brief.

With the exception of Mr. Minter, there were flaws in the constructs of analysis that you did. Specifically, the line item is not $6,000, because I also own a company that does property development, and we're nowhere near that cost.

How can you have 40 percent in excess during peak season and non-peak season. You can't have both of them coexisting.

One very, very quick point that the existence of natural gas and also electrifying is a mutually

exclusive concept. I think both of them can coexist, but it's a matter of facilitating the end objective which is providing one clean glass for the customers, or rather clean energy for the customers, concomitantly with also producing a shift in the amount of GHGs that are being put out into the environment.

So, I think facilitating that process is something that's going to make it a mandate that everyone works together and you don't have such almost unobjective viewpoints that are expounding one specific side, irrespective of whether it's valid or not. You truly have to look at the overall ideals that you're dealing with and predicate your conclusions upon some semblance of reason and logic behind that. Thank you.

(Applause)

MR. EARLY: Thank you. And I think we -- just one more, do you think?

MS. THAKAR: We can do one more.

MR. EARLY: I'll just end with a comment or question from the overflow room, from Jennifer Ganata, for Communities for a Better Environment.

And Jennifer asks: In addition to ensuring just transitions for workers, particularly from those in low-income communities, how do we ensure that individual ratepayer isn't negatively impacted by building

decarbonization? In order to achieve equity, the Commission must reduce the gap between disadvantaged communities and the rest of the State. The Commission must study what are the causes that led to disparities in communities and make planning decisions that reduce disparities, consider environmental and economic impacts of energy resource decisions on disadvantaged communities, create a process with an advisory group to achieve equity.

Okay, so --

MS. THAKAR: Thank you. And with that, we're going to wrap up our first panel. If we could please have an applause for our panel.

(Applause)

MS. THAKAR: Okay, our second panel today is Local Leadership in Building Decarbonization. The panel is going to be -- is going to include our panelist Kathryn Harrison, who's a Councilmember of the City of Berkeley. Obadiah Bartholomy, who's the Energy Efficient R&D and Climate Change Program Manager at SMUD. And Rachel Kuykendall, Senior Program Manager, Sonoma Clean Power.

Okay, if everyone can please take a seat, we're going to keep going, continue with panel two.

Panel two is going to be moderated by Dominique

Hargreaves. Dominique is the Deputy Chief Sustainability Officer for the City of Los Angeles.

Hello, if I could have everyone please take their seats?

(Pause)

VICE CHAIR SCOTT: Okay, everyone, we are having difficulty with people being able to hear through the microphones. We're just doing a quick shift to our new panel, so if you are looking to continue conversation, please step aside so we can start to introduce our new panel.

They will be talking. And then, we're asking everyone to really project because folks listening on the WebEx and in the other room can't hear us. So, we're going to let Nidhi introduce our new panel to us.

MS. THAKAR: Thank you, Commissioner.

Thanks. If everyone would please take a seat, we are going to get started.

Okay, so Dominique Hargreaves is going to be our moderator for our second panel here on Local Leadership and Building Decarbonization. Dominique is the Deputy Chief Sustainability Officer for the City of Los Angeles. Division of Sustainable Buildings for all within this generation keeps her inspired to move sustainability forward in a holistic way.

Dominique studies sustainability rating systems and holds credentials in LEAD, WELL, Envision and Eco District. She is particularly interested in the intersections between high performance, net zero buildings, and health and wellness initiatives.

Prior to joining the Mayor's Office of Sustainability, Dominique served as the Executive Director of the U.S. Green Building Council in Los Angeles, for five years. Thank you.

MS. HARGREAVES: All right, good morning everyone.

MS. THAKAR: Oh, is your mic on?

MS. HARGREAVES: How's that? Not yet. Okay, good morning. Can you hear me? Perfect. Thank you so much.

So, I wanted to talk a little bit about what Los Angeles is doing and I'm really excited about this panel talking about local leadership when it comes to building decarbonization.

So, as the Intergovernmental Panel on Climate Change Report, entitled Global Warming 1.5 Degrees Celsius reiterates: Reaching and sustaining net zero carbon emissions by midcentury is the key to address climate change and avoiding its most catastrophic impacts.

And all across California we've been feeling these impacts in our local communities with high heat days, more asthma rates, wildfires, and debris flow, and it's been very, very difficult for Californians.

So, at the Global Climate Action Summit in San Francisco last year, more than 100 jurisdictions, including California and over 70 big cities that are home to more than 425 million people, we all joined together and made pledges to reach carbon neutrality by midcentury.

This pledge is called Deadline 2020, which calls for carbon-neutral climate plans from 73 of the world's largest cities.

So, our plan in Los Angeles is due to be released at the end of this month. In it, we have looked at the strategies that will lead L.A. to uphold the Paris Climate Agreement, achieve a carbon-neutral city by 2050, while emphasizing equity and good-paying green jobs for Angelinos.

So, when we're looking at reaching carbon neutrality, we fall back on our five zeros. These are strategies around zero carbon buildings, zero carbon energy grid, zero carbon transportation, zero waste, and zero wasted water.

So, with that, I believe we are ready to begin

the panel. And I'm proud to introduce the three panelists that are here today.

First up, we have Councilmember Kathryn Harrison from the City of Berkeley. Councilmember Kate Harrison was first elected in 2017 in a special election, and reelected for a four-year term in fall 2018. She represents District 4 in Berkeley, which includes the downtown where much of the new construction in the city is taking place.

She chairs the Council's Facilities, Infrastructure, Transportation, Environment and Sustainability Committee, a central focus of which is taking action locally to tackle the climate crisis.

Kate co-authored the city's Climate Emergency Declaration, replicated by over 20 cities in California and other states.

As a public sector consultant for the past 19 years, Kate has solved problems in 31 California counties, eight states, and 14 nations. Her firm improves systematic access to justice for the underserved, ranging from Native American foster youth in North Dakota, Defendants without lawyers in Serbia, and people returning to their communities from prison. Her work on equity informs her approach to climate change. Kate's prior work experience includes policy

and executive positions in the State of California, and City and County of San Francisco.

Kate attended UC Berkeley as an undergraduate and received her master's in public policy from the Goldman School of Public Policy.

Welcome Councilmember Kate.

COUNCILMEMBER HARRISON: Thank you very much. Yeah, thank you. While he's looking for that, let me just start by saying that this issue is personal to me in a very specific sense. I own an old home in Berkeley. And it was built by a speculator in 1889, who wanted to bring electricity to Berkeley and he failed. And our house ended up having natural gas connections.

In the 50s, my father-in-law worked in building inspection in Los Angeles and, again, there was a big push for electrification which really didn't succeed.

So, sometimes when we think about this issue of electrification, it feels something like a fad. You know, we've been here before, we've talked about this before. But this time it's really not a fad and it's not going away.

It's our low-income communities and families who are the ones that are most impacted both by the cost of energy, who are impacted by the potential loss of jobs when we make these transitions, but also who are

impacted by the health and climate impacts that we see from what's going on now in our environment.

So, we have to be ever-mindful of that, the equity issues that present to us when we are looking at this issue.

Like every other jurisdiction in California, I think the State, itself, we tried several different approaches to addressing the climate challenge. One has to do, of course, with setting goals. How much are we going to reduce GHGs, by what year? And we've done that in several different iterations.

We've also looked at incentives. We had something called the Green Pathway for our downtown, which tried to say you can be denser if you -- and get permits approval quickly if you do green buildings. That failed. We've not had a single person take us up on that.

We did the Deep Green Building Initiative, also an attempt at incentives for building developers.

We tried mandated information. When people sell their single-family homes, they have to have an energy audit and let the new owners know what the results were. So, we tried the information approach.

None of this has really taken. And I'll talk about our statistics in a minute. And my constituents

are increasingly impatient with the pace of our ability to tackle this climate change and, frankly, really, really afraid.

So, at this point, one thing we are looking at in Berkeley is a building electrification initiative, which I'll talk about in just a minute.

Let me give you a little more on our statistics. We have set these goals over many rounds, as I said, and currently we're about 18 percent behind our 2020 goal. And with the Cal Traffic Fires, unprecedented smoke, drought and heat that we saw from the fires last year in Napa County, which impacted the entire Bay Area, and the current flooding going on throughout the country, and the U.S. Report, I don't think we have a lot of time to wait.

Natural gas is responsible for 27 percent of the total GHG emissions in Berkeley and 73 percent of the building sector GHGs. Every new building locks in significant GHGs for decades. We have 2,200 new dwelling units permitted in the City of Berkeley, due to be built in the next five years, all in my district downtown. These are apartment houses that we need to build also for the climate emergency. It will allow people to live in the inner city, near transit. But to do that, we have to do it green.

What we've done in past attempts to phase out gas have included looking at reach codes through the CEC. But Title 24 hasn't really allowed enough -- it doesn't really address electrification significantly. I'm going to talk more about that later, our current approach.

We also have looked at how we can -- we've requested the CPUC and PG&E do more on incentives for non-gas appliances, so that we can help encourage people to at least look at the two types of appliances equally. And that hasn't been successful because we cannot pass a three-prong test, which most of you are probably aware of.

So, what we're working on now is a new ordinance, that we brought together a coalition of decarbonization advocates and experts to talk about how do we deal with this statutorily. What can we do in the face of the fact that the reach code isn't working for us and the mandates for the three-prong test aren't working for us, what can we do locally?

Before I talk about our ordinance too much, let me just say in that very same house, built in 1889, that was intended to be all-electric, I just went through an experience when my heater died, my gas heater, which has been faithfully pumping out heat, thank you, for

decades. And I had to replace it. And I ended up replacing it with an electric heat pump and it was a terrible experience.

And it was a terrible experience because we are not ready in existing buildings to do this work. Not because the technology doesn't exist, but because the structure of my house makes that really tough.

So, what we tried -- what we are trying to do in Berkeley currently -- and by the way, the heat pump works. It's in, it does work, it is saving energy and it is helping the climate. But it was not an easy process. And I'm a privileged person with the knowledge, and the information, and the income to be able to do this thing, which most people just simply can't do.

So, what we're looking at now, in Berkeley, is phasing out natural gas and encouraging all-electric design in new buildings. In new structures, specifically. It's not intended for renovations to existing buildings. The only place in existing buildings where we phase out gas through the State is that accessory dwelling units don't have to have gas hookups, which they used to have to have. So, as we move towards ADUs, they're becoming more electric as attached to people's homes.

We're doing this relying on the city's police power and our authority to establish and enforce local building codes consistent with State Building, Health and Safety Codes. And I'll talk about our findings in that regard in a minute.

This avoids, will help us avoid the inevitable costs associated with decommissioning the gas infrastructure.

I'm, you know, very concerned as we build new these buildings are going to be facts on the ground for decades, a hundred years. We're building a lot of 18-, 20-story buildings in our downtown, with lots of small apartments. We can't afford to be building them in a way that is less environmentally conscious than it could be.

I think -- but we're also doing this, I want to say, at the same as we're looking to green the grid through the East Bay Community Energy CCA. I'm on the board of that, as our representative for Berkeley, and we're looking to making electricity greener at the same time that we make more buildings electric. So, there's a lot of these things working in tandem.

Let me just skip ahead here. And I can talk more about the authority to do this locally through code in a minute, if people are interested.

So, what are our findings? This slide is a little hard to read. But we're able to make findings that this is necessary because of climatic impacts, because of impacts for geologic events, the likelihood of earthquakes in Berkeley. We have a major gas line running under our high school. And I hate to say this, but our utility's been incredibly unhelpful in getting us an automatic shutoff valve. This has made our neighbors incredibly anxious, given what happened in San Bruno.

So, the issue of safety is paramount in the minds of my constituents. Even more than the cost issue, maybe even more than the climate, it's the safety concerns that people have with natural gas. Right or wrong, they're very afraid.

We also are looking at findings involving health and safety impacts from toxic air quality, indoor stove exhaust, outdoor flue exhaust, and these pipeline explosions.

And we're looking at the economic impacts. I've heard a lot said about economics today, but we know the Rocky Mountain Institute found that for new construction, that avoiding the costs of trenching and plumbing for gas made electric cost-effective for new construction which is, again, our focus.

Also, the energy consultant testimony before the CEC, and a National Resource Defense Council study found that there were cost savings for multi-family. And again, it's most cost-effective if we're building from the ground up.

We're also worried about cost from the point of view that we don't want to strand people with gas assets as our -- at least in Northern California, our utility is facing bankruptcy. We see a lot of these assets being stranded. Those people not building electric are going to be the ones left to pay this gas cost. And that is an equity issue that we have to deal with.

As we put these new apartment buildings, which have better-off people often living in them, on all-electric, those gas costs are getting spread to somebody else. And it is not something I am not aware of, so I'm very concerned about that.

And then, our policy underpinnings include our Climate Emergency Declaration, our Measure G, which is a statement from our voters about concern over the environment. A fossil-free resolution we passed last year, and just prior policies that we set in the city.

I know I have very little time. I'll tell you what our outstanding, big questions are as we explore this. I should say, first, this is not going into

effect tomorrow. What we are doing is holding a series of hearings with multi-family and single-family builders. We're then having hearings with people in the trades, and architects, et cetera, to talk about what the impact is on their work. We're going to have a series of community outreach events with residents to talk about what this might mean.

We're in an unusual situation, perhaps, in the Bay Area on BART. We're not building single-family homes. Okay. Frankly, everything we build is big apartment buildings or condos. So, we're in a different situation in that way.

So, one of our questions as we go through these hearings are -- these are our questions. What's the regulatory pathway? Do we want to do a stand-alone ordinance based on the findings we think we can make? Or, do we want to submit something to the California Buildings Standards Commission, which would say this is how we're changing our building code.

Are there any kinds of buildings where this is not a good idea? You know, some things have discussed with us in terms of things like hospitals, other kinds of facilities where this may just not be feasible.

In that regard, what scope of public interest exemption are we going to have? We will have an

exemption built into the ordinance to say it's in the public interest to not require gas in this -- I mean, getting rid of gas in this building.

When are we going to start? What does it mean for our staff? How do we give our staff the resources they need to address all the questions all of you are going to have when this goes into effect, when you come into our planning department?

And what approaches are we going to take, if any, to existing buildings? I'm not going to go over that as much, just to say, though, one additional measure we promoted is use of the transfer tax, property transfer tax to allow people to make energy improvements to their home. Right now, they're allowed to make seismic safety improvements. I've now recommended that we expand that ordinance to allow people to make energy improvements, so there's a built-in source for homeowners to start the path towards making the existing buildings more energy-efficient, and more GHG-free.

So, thank you very much.

(Applause)

MS. THAKAR: Thank you so much, Councilwoman.

Next up, we will hear from Rachel Kuykendall. And Rachel is Sonoma Clean Power's Programs Manager. And she is responsible for program design and

implementation in the areas of energy efficiency, demand response, electric vehicles and other areas that reduce greenhouse emissions, and support affordable energy for Sonoma Clean Power customers. She currently manages Sonoma Clean Power's Demand Response Program, and the Advanced Energy Rebuild Program which supports homeowners affected by the 2017 North Bay wildfires.

MS. KUYKENDALL: Thank you, everyone. So, my name is Rachel Kuykendall. I work for the CCA up in Sonoma and Mendocino County. So, for you that are local, the equivalent of Clean Power Alliance, our new CCA, which I'm very excited about.

And I am very excited today to be here with our local cities, and SMUD as well, leading the charge in building decarbonization.

But I'm also equally excited to see this really diverse group of people here. This is what it's going to take to make building decarbonization a reality. And with that, I'm going to dive into it.

So, we are currently implementing a program called Advanced Energy Rebuild which is, for the first time, putting the option of building decarbonization on the table for our homeowners rebuilding from the 2017 wildfires. And this is a collaboration between Sonoma Clean Power, PG&E, and the Bay Area Air Quality

Management District.

What I think is really important about this program, as we look to create a program like Build, is this is a collaboration. So, this is something that when we build out Build, no pun intended, we could look at something like layering on to the existing utility energy-efficiency program that already have a built-up trust with these ratepayers.

Our program is currently serving 181 homes. And of those, about 35 percent have made the choice to rebuild all-electric. That actually is more like 50 percent when you consider homes that have only one gas use, such as a fireplace or cooking. So, some real progress up from the 5 or 10 percent that we traditionally see in our service territory.

This also looks at a couple other things that are unique to the program. So, our Duel-Fuel Program, we do require that the homes be prewired for an eventual switch to electric appliances. And this is something PG&E collaborated with us very closely on. So, we do require that, you know, those huge costs that we talk about, 10, 15 years when your appliances break, so that you're prepared for those costs up front when you build your building.

It wouldn't be a presentation for me if we

didn't have data. So, we are starting now to see our first homes come online, which is really exciting. And I think you saw similar charts of this from Panama, earlier. Our climate is pretty mild in comparison and our electricity sources are much cleaner than the statewide average, so we're looking a little flatter.

But you can see here what the GHG impacts are of various choices for homes. Going from the left, from a duel-fuel home to a duel-fuel home with energy efficiency, and the jump to an all-electric home. And this is something, as we start to show this data, really, to our local governments, this has been huge. Just getting the understanding of what the GHG impacts can be of making the switch.

And for some of our jurisdictions, we don't have a lot of building in Sonoma County and this can be 2 to 3 percent of their emissions just by making this switch to look at this as a reach code.

Okay, another chart. And this is an actual home that participate in the program. And this is going to get to a point about building taxes, I think is very important as we start to design these programs.

So, this is pre them losing their home. They used to be a duel-fuel home. And they are, as we go through this, now saving hundreds on their utility bill.

But what is really interested, this was the first week of their home, and you can see this load chart looks a little bit like a certain animal that quacks. And so, you can see this is an issue, if all homes look like this.

And this is just after they installed the battery storage at their home. And you can see this sort of evening peak has actually shifted to midday, which actually makes this home a real resource to us as a utility, because this is when we're generating our clean power

And also, we are planning to do some additional work with this particular participant because they do have a water heater that can be a good third resource, as well as a smart thermostat that we're currently not leveraging for this particular home.

We can't just put these dollars out there and hope that people do this out of the goodness of their heart. So, we offer a few resources that I think are really important as we start to talk about what these programs should look like.

And so, first, we do a number of trainings that we partner with PG&E on, and we do those for homeowners, for builders, for people in the design community. And these people become our advocates out in the community.

They get it. They tell their neighbors. They say, have you heard of this heat pump thing? It's pretty cool.

The other thing that we do and this is actually a really low-cost program that we're now working SCE and SMUD on duplicating in their service territories. But we lend out these portable, little induction cooktops that we bought for like a hundred bucks off Amazon. And we lend them out for two to three weeks, from our office, to get people to try them.

And what's absolutely phenomenal is we do a survey after we lend them out. And just getting people to try these is huge for getting them to understand that this isn't the old electric coil of the past.

So, this might be kind of small. But it's asking: On a scale from 0 to 10, how likely would be to switch to induction after trying it?

And you can see the majority of people, obviously a somewhat self-selecting sample, but are very excited about the induction cooking. We send a follow-up survey a month later. And of these people, 40 percent have made the switch to induction after that.

So, something really easy for those local governments out there that are interested in this to do, to get people familiar with these technologies.

On the retrofit side of things, I'm just going

to touch on this briefly because I think we'll be hearing from others in the next session, including the folks at VEEIC, who are doing a great job of this.

We are still in the really early days. And I recognize what people said, this is infinitely harder than new construction. So, our approach for this, is what we're going to be doing is with funds from the California Energy Commission, opening what we're calling our Advanced Energy Center. And this is a storefront where our customers can actually test out induction cooking, test out the heat pump water heater. Get familiar with these technologies. Because once we find people do test them, they like them.

It will also connect those people with contractors who have been trained and are trusted allies in installing these technologies.

Last but not least, we do connect all of these programs with what we call our Grid-Savvy Program, which is our demand response program, which I alluded to earlier. So, it looks at things like -- we have 2,500 electric vehicle charging stations out there that we've given to folks for free. Again, we touched on transportation and how that can be a huge GHG impact for our cities and counties. We're no different, we're sitting at about 50 percent of our emissions coming from

transportation.

So, if we give people a free EV charger, we can not only encourage them to make the switch to an electric vehicle, but we can also use that as a grid resource. So, what we do is we actually shift that evening charging from like 6:00 p.m., when people get home, to either nighttime or midday.

We're doing the same thing with both heat pump water heaters and thermostats as well, in the future.

And with that, I am going to turn it over and just thank everyone again for this diverse crowd, and excited to talk about these things.

(Applause)

MS. THAKAR: Thank you, Rachel.

Next up we have Obadiah Bartholomy. And he is the Manager of Distributed Energy Strategy at SMUD. His team is responsive for developing enterprise strategy for electric vehicles, building decarbonization, distributed solar and storage, and load flexibility. Obadiah has worked at SMUD for 16 years in research and development, and strategy functions.

He serves as the Vice President of the Board of the Energy Systems Integration Group, an international nonprofit dedicated to addressing technical integration challenges with decarbonizing our energy systems.

He has a bachelor's in mechanical engineering from Cal Poly and a master's in transportation technology and policy from UC Davis. Welcome.

MR. OBADIAH BARTHOLOMY: Thank you. I really appreciate the opportunity to come here and speak to you all. And before I get started, I will just acknowledge a little disclaimer. Bartholomy is not a very common last name and I am Panama's younger brother. And he got the public speaking gene. I went to school to be an engineer.

(Laughter)

MR. OBADIAH BARTHOLOMY: So, all right, with that I'm going to talk about the friendly, community-owned electric provider to the north, SMUD, and our building decarbonization efforts.

And I'm going to start out with our Integrated Resource Plan, which was approved by our board in the fall. Our board, within this Integrated Resource Plan, took a little bit different approach in weighing, really, decisions about continuing to decarbonize our already increasingly carbon-free grid, or to focus investment on some of the sectors that contribute the most greenhouse gas emissions in our region, the transportation and building sectors.

The chart here shows the 5 and a half million

tons of reduction that we're hoping can be accomplished by 2040, in large part through investments that we will make with our customers in these efforts.

The Board weighed a less expensive option, where we were investing in remote renewables to accomplish our decarbonization objectives, just for the electricity system, against an approach to invest locally in transportation and building decarbonization. And, ultimately, decided to commit investment of $1.7 billion into our community and helping our customers save money, live in healthier homes, and ultimately address climate change in a much bigger way.

This chart shows, in the colored chart -- or, colored area of the chart, the contributions in terms of the equivalent electric homes per year that are made up of heat pump space heating, heat pump water heating, and induction technologies.

By 2025, we hope to be retrofitting and building new, the equivalent of 7,000 homes per year in our service territory, and continuing to grow much -- quite rapidly beyond that.

We've committed a significant budget here. As you can see, starting last year we gave out almost a million dollars in incentives to our customers to start to begin this transition. We're expecting to grow that

budget 40X by 2025. Considering SMUD's population, this would be the equivalent of about a billion-dollar-per-year investment at the statewide level. So, really, tremendous commitment by our board to this program.

There are a lot of numbers on this chart, which generally makes me happy, but I'll pause on it for a bit. These are the set of programs that we began launching starting last March, with the new construction programs at the top offering up to $5,000 per home to builders, to go with all-electric.

Our single-family existing program launched in June, offering $10,500 to customers to switch from gas to electric.

These are really significant incentives that we've modeled out to ultimate ensure that the rest of our customers, who are not participating in this program, are held neutral from a rate perspective, when funding these over the life of a measure.

This was, as I mentioned, a significant investment. But when we looked at the carbon emissions that we could achieve with our different efficiency programs, electrification really stands out. We can accomplish three times as much carbon savings per home by electrifying homes, as we can through our most impactful energy-efficiency programs. So, really,

tremendous impact while at the same time keeping our constituents, our customer owners healthier, safer and with significantly reduced electricity bills.

Within the next week or so we're very excited to be seeing a report E3 will be publishing, which took a very in-depth dive into cost effectiveness for building electrification in the residential sector. We funded this in participation with SoCal Edison and with Los Angeles Department of Water and Power. And really saw tremendous benefits across the State, the vast majority of building types seeing significant bill savings over the lifecycle of these measures. So, more details will be coming on that, again within the next week or so. But that kind of information really helps us be comfortable we're doing the right thing on behalf of our customers.

In terms of program uptake, I mentioned these programs for the most part started in 2018. We had a bout seven months of runway last year and saw a couple of hundred appliances switched out in that time frame. In 2019, we are expecting to triple to quadruple most of those program numbers. So, we're seeing significant uptake from our customers and, significantly, this is being done so far with no marketing from SMUD. This is strictly, at this point, our contractors who see the

benefit to their businesses and to their clients, the customers, in affecting these switches.

We have made some significant progress in the new construction front with partners with D.R. Horton and Beazer homes committing to electrify hundreds of new homes that they're building. In the case of Beazer, entire communities without gas infrastructure being put in, resulting in significant savings to the eventual homeowners, as was mentioned earlier in terms of unnecessary infrastructure being avoided.

I mentioned the contractors really being the folks that are out there selling these programs to our customers at this point. They are doing everything from printing fliers, we've seen a billboard rented by a contractor. We have seen home show displays being put up, where contractors are promoting this technology to their customers. We even have one contractor who's installing an all-electric showroom. We've got about 15 contractors engaged on our Home Performance Program, which is a combination of electrification and high-efficiency measures being put in to really ensure a customer's getting maximum comfort, maximum energy savings, and ultimately leverage efficiency to create space on the overall grid to electrify these other sectors.

I'll close on a program we offered to our online survey panelists. We have a couple hundred of those that participate in periodic surveys by SMUD, where we ask them all sorts of questions about the utility program offerings. And so, we asked about 330 or so if they would like to trial a free induction cooktop, similar to the one that Rachel mentioned. This was in December. We got about 287 responses, or a little over 80 percent hit rate. So, this was some self-selection but, really, it was a pretty broad set of our customers. And we saw extremely high positive results from this.

Overall, we saw folks before they tried the pans having a 22 percent positive impression of induction cooktops. Once they used that, that went to 91 percent having a very positive or slightly positive, but over 61 percent being a very positive reaction to the technology.

Amongst the gas stove users, 47 percent of those were much more likely to consider induction in the future. And 57 percent were very likely to recommend induction to a friend. So, similar to kinds of surveys that you see where vast majorities would recommend public transit to other people, there's a little bit of that in here. A slight difference between those two. But, ultimately, very positive results amongst folks who

previously would be not interested in this at all.

I want to close just with some comment about what is enabling these bill savings and what is enabling some of the reason that we're able to offer these incentives.

These technologies that we're working with, heat pumps and induction cooktops, are tremendously efficient. Heat pumps, as was mentioned earlier, are 300 to 400 percent efficient and they're not an exotic technology. Every one of you has a heat pump in your home that's in the form of a refrigerator. Most of you have a heat pump in your home in the form of an air conditioner. This is the same technology being applied in reverse. So, it's an amazing efficiency opportunity and has benefits, as I mentioned, in terms of bill savings and carbon savings.

We also, recently, completed some testing on the induction cooktops with LBNL, specifically induction ranges, and saw tremendous efficiency gains there, as well, over almost double the efficiency amongst the induction cooktops versus the gas ranges. So, that's less heat going into people's kitchen, less cooling that's required. Really, a tremendous opportunity for health and comfort benefits, especially in the commercial cooking space.

So, with that thank you.

(Applause)

MS. HARGREAVES: All right, thank you so much. I want to ask a question about commercial buildings and a question about existing buildings. And when we're talking about decarbonization for buildings, we have so many. How in the world are we going to retrofit, just in L.A. we have 1.1 million existing buildings, most of which are residential?

So, I think I'll direct this question first to the Councilwoman, because I think you briefly touched on existing buildings and what you might explore to decarbonize those. Could you comment on that for us, please?

COUNCILMEMBER HARRISON: The second part of your question was about -- I think it had two parts, commercial buildings and also decarbonizing existing.

Well, I would say among the first things that we need is a recognition by State agencies that we have to put GHG reductions at the same level as cost effectiveness. I think we've had sort of a problem getting over that hurdle. And why that makes it difficult it because then consumers don't get rebates and they're not going to buy appliances in existing homes that will allow them to move towards

electrification.

As I mentioned, we are looking at the transfer tax, which is a great vehicle for when properties change over to use a portion of that to allow people to make energy savings. That's going along with a study of our BESO, our building efficiency standards, which are being upgraded right now. Once we find out more about what the best techniques are, we will allow people with this transfer tax to invest in those best techniques.

Commercial buildings are a unique challenge and our focus has been on residential and on municipal buildings. I should have mentioned that earlier. So, I think that's another avenue is to really think about where the construction is in your area, what the building types are in your area. I live in an area that has less commercial and more residential, so that's been our focus.

Someplace like L.A., with a lot more commercial, you have a harder job, I think, ahead of you. And so, I don't know as much about that piece of it.

Do I have anything else to add? No, I think that's it. I think, I'm really excited to hear about these examples of encouraging consumers by loaning them the induction heat top by having them test things out. I think that's -- we got to get over that.

We have to also help prime the pump economically for the industry and to make sure there are jobs there for people in those industries. We've got to find a way to start moving jobs from the gas sector to the electric sector, which is not an automatic thing that happens overnight, but it's something we all have to be committed to. So, thank you.

MR. OBADIAH BARTHOLOMY: Is this working? Okay. In Sacramento, the commercial building sector represents about 15 percent of the natural gas use and is spread across a multitude of sectors. Fortunately, many of the technology applications are similar or have commercial analog. So, in the heat pump world, variable refrigerant flow presents an opportunity for tremendous efficiency savings and a whole other set of types of commercial buildings for heating, as well. There are significant commercial cooking technologies available.

And just over in Rosemead, SoCal Edison has a fantastic food service cooking technology center that I would recommend, if anyone is questioning or curious about how we will cook in an all-electric future. They have, basically, all of the answers right there in their facility. So, I'd encourage folks to check that out.

And in terms of existing buildings, I'll just say the scale of it is tremendous. We're talking going

from goals that I showed of a thousand to two thousand equivalent homes per year needing to get to 20, 25, 30 thousand homes per year, which is really significant. And it's going to require a workforce that knows that this is the future and knows that it's a better option for their customers, and is helping sell that.

So, I think we're just at the very early stages of what's going to be a long road toward those kinds of numbers.

MS. HARGREAVES: Thank you. Rachel, did you have anything that you would like to comment on about existing buildings or commercial?

MS. KUYKENDALL: Yeah. I think the one thing for existing buildings that we didn't really touch on, but is so important, is getting the contractors to be your advocate. Often, the homeowner is not the one making the decision, necessarily, they just go with their contractor and what they recommend. So, we need to get these things on trucks and we need to get our contractor community familiar with them.

We do need to educate our homeowners so they can be advocates and ask for these things, but we also need to do a parallel education track with our contractors to make sure they're making the recommendations.

COUNCILMEMBER HARRISON: You know, in a place

that has a lot of rental housing, as well, we have a disincentive to move towards this because renters pay utility bills and the owners pay for the materials that go in. So, we don't have the cost savings being benefitting the person who's paying for the up-front investment, and we don't have the people that will benefit from the better health impacts receiving an economic benefit directly, often, for a long time, because they're paying it through their rent over years, and years, and years.

So, we are really struggling with how do we deal with that issue with rental housing. I think it presents a unique circumstance.

MS. HARGREAVES: So, I'm very, very interested in the declaration of the climate emergency. And I think probably everyone in this room is as well. This has, I think, been declared in multiple cities and multiple countries. Could you tell us more and what initiatives are now launching around the climate emergency declaration?

COUNCILMEMBER HARRISON: Thank you. Yes, in 2017 and '18 we declared the climate emergency declaration. And, essentially, it's a statement of principles, but it also tries to set us on a path towards looking at how we're going to achieve these

goals in a much more aggressive way.

One thing Los Angeles has done that I've been very impressed with is the establishment of your Office of Sustainability. You have put funding towards climate change specifically.

And I think that we need to think bureaucratically. What happens in a lot of these cities we have silos; we have the planning department, and the building people, and the transportation people, and the parks department, and they're not all working together. And we really need to focus people in local government. We need people that this is their job to do this.

We have an excellent sustainability staff, but they have no say with the operating departments. They're planners and they're doing a fantastic job, but getting that down to the level of the actual operational level has been our biggest challenge.

MS. HARGREAVES: Great, thank you for that.

And Rachel, you touched on the incentive programs created in response to the wildfires, another type of emergency that has really ravaged our State. Could you share an anecdote, something that you have learned through this launch of the program?

MS. KUYKENDALL: Yeah, so many things. We went into this thinking, I think from a decarbonization stand

point that the cooking was going to be the challenge for people. We have not actually found that's the case. So, fireplaces are very challenging for us. We do, in our service area, have a mandate against woodburning fireplaces. Gas seems to be a lot further along than the electric alternatives at this point.

I'd love to see some help and investment in that industry to push it along and get it to the point where our customers feel really comfortable making that choice. It's not something they've gotten to, yet.

But I will say the one thing that has just surprised me and been so great about this is the homeowners who get it, who are back in their homes now. We had one homeowner in Coffey Park, who just rebuilt in November and hosted Thanksgiving for all his friends, in his induction kitchen. So, they've just become the biggest advocates for the program and it's just encouraging to see. I think there's a tend in disaster times to try to rebuild as quickly as possible. So, how to stop and encourage people to really think about that this is going to be our home for the next, hopefully, 30, 50, forever years. It's just been really great and we look forward to more all-electric homes in the future with this program, and crunching the numbers and seeing what's really coming out of it.

MS. HARGREAVES: Excellent, thank you.

All right, this next question is going to go down to Obadiah, but then we'll come back to all the panelists. And this will be a hard one, so I'll give you a minute to think about it.

We've talked about a lot of challenges with moving markets and, you know, really leading the way to building electrification at the local level. So, the magic question is: If you had a magic wand, what's one thing that you would adjust in our building stock or one thing you would add to your program, if you could have any?

MR. OBADIAH BARTHOLOMY: Right now, for us it's marketing. We are on a big push to move all of our customers to time-of-day rates. We actually just finished that push here in March, as a default rate. And so, our entire attention has been focused on marketing. And I would just say marketing of that time-of-day rate and how to help customers adjust and save money on that rate.

I think building public awareness of heat pump technologies and induction technologies is going to be critical for uptake and not making the contractors explain something that feels completely foreign to their audiences. People are really aware of electric

vehicles, but in terms of these heat pump and induction technologies the awareness is much lower.

So, I think for us right now, from a programmatic perspective that's really the gap.

COUNCILMEMBER HARRISON: I would say for us as a local government, and not a CCA or an energy provider, it's figure how to work within the State system with the requirements currently under the Energy Code, and under the tasks from the CPUC. And working out ways to do that mean that local government can do what it needs to do, but still fulfill the mandates of the State. So, that's the biggest challenge for us at the moment.

MS. KUYKENDALL: Yeah, I was going to say something similar. You know, we're all up here talking about these programs, but they're small, they're pilot programs. And what we really need is to get rid of some of the barriers that are preventing these things from getting to scale.

So, in our service area, PG&E's program can incentivize a gas water heater, but not a heat pump water heater if you have a gas appliance. And that is preventing customers from getting to know these technologies and it's disincentivizing electrification.

And if we want this to be at scale, it needs to come from the top down. It can't be something that us,

very feisty, but small folks up here are trying our hardest to do. We really need help and collaboration from the wider audience here and from California as a whole.

MS. HARGREAVES: Okay, thank you so much. I think we're moving into our question and answer period.

MR. EARLY: Okay, everyone, Bryan Early here again with the Energy Commission. Real quick, until 12:30, right, to do questions. And, hopefully, we can get everyone's comments. But again, for those who aren't able to, we'll be opening it up again at three o'clock. And also, we'll be putting up, towards the end of the day, making sure people understand how they can comment into the docket. At the Energy Commission and the PUC, we really welcome your comments. And then, again, we also welcome if you'd like to comment in the Spanish language, that's totally fine as well.

So, do we have comments or questions from Commissioners?

Okay, yeah, let's just go back to the audience. And I encourage folks to, again, really talk loudly in this mic. So, I guess I'm not talking loud enough, so you call can tell -- let me know if I'm shouting.

And for those who have already made comments, we really encourage you to allow other people to make

comments and stick to one minute, so we can get to as many people in this process as possible, and to say your name so that we can get it recorded here.

MS. LEON GROSSMAN: Thank you. My name is Andrea Leon Grossman. This comment is for Kathryn Harrison.

I think you're absolutely right in terms of safety and gas. I'm originally from Mexico City. I'm an immigrant. My cousin died waiting to be rescued after the earthquake in Mexico. It was because of all the gas leaks the first responders could not do your job. And it happened here, too, in the Montecito area. There was a teenager who had to be dug up with hands for 36 hours.

And this is a matter of life and death. It's not just about just transition, which I fully support. I am terrified about what the gas infrastructure's going to do. I, myself, bought an induction stove after learning that -- after the Aliso Canyon blowout, that the amount of benzine in the gas that we're getting is 9,000 times the amount allowable by the CalEPA. I refused to be poisoned by the gas company. And I really want to make sure that families don't get poisoned because it's not fair.

Again, I love my induction stove. I support a

just transition. I think everyone deserves to be electrified and it's a matter of life and death. Thank you.

(Applause)

MR. EARLY: Thank you.

MR. HARREO: This is for anyone on the Board. My name is John Harreo. I'm an IBEW Union Electrician. I'm also a Board Member for Second Call (phonetic). And a person who has been previously incarcerated. I live in South L.A. and I also build in L.A. And we need building electrification to cut greenhouse gas restrictions or reductions so that those that live in the Basin can also live as long as individuals who live along those coastal cities.

And there's an environmental justice aspect to building electrification and it impacts me every day. And IBEW, we support building electrification.

(Applause)

MR. EARLY: Thank you.

MR. SULLIVAN: Good afternoon, thank you for the opportunity to comment. My name's Joe Sullivan. I work for the National Electrical Contractors Association, which represents approximately 350 electrical contractors that employs approximately 10,000 union electricians.

And what we've seen, we talk about the job creation, because of all the solar, the utility-scale solar caused by the regulations and the tax credits, we have had to hire hundreds and hundreds of apprentices to fill these jobs. These apprentices get five years of training. They don't pay for anything, books, tools. They can work anywhere in the electrical industry, anywhere in the U.S. or Canada. They have full family medical and dental the fourth month and they end with good family-sustaining wages, and excellent career opportunities in a number of different directions.

So, this is creating good jobs. As we electrify buildings, we're going to need to increase the electrical service. We're going to have to bring in more people to the apprenticeship program and the cycle continues. Great jobs.

(Applause)

MR. THOMAS: Art Thomas. I do happen to work for SoCalGas. My question, I guess, would be more towards Obadiah, since he works with SMUD. The question would be as we move or transition to a single-point energy provider system, what does that speak to total infrastructure reliability, resiliency and vulnerabilities?

MR. OBADIAH BARTHOLOMY: So, reliability is

something SMUD takes very seriously. It's one of our core requirements that we must meet, one of our core values for our customers. And as we're moving to electrify additional end uses, I think one of the things that we think about that's going to further increase the importance of electrical reliability. So, I think we're expecting we'll need to increase investment in that.

We also understand, though, that within the gas uses available today only cooking, other than the electronic ignition of it, is something that is able to be done without electricity. So, HVAC systems require electricity for blowing the heat and water heaters require electricity for being able to ignite. And, as well, for on-demand, being able to manage the exhaust flumes that come from that.

So, I think even with a dual gas system, having really high electric reliability is really important. So, I don't think it diminishes, necessarily, the importance of electric system reliability.

MR. THOMAS: Thank you.

MR. HOFFMAN: Hello. Eric Hoffman, President of Utility Workers Union of America, Local 132. I just want to start by saying thank you to everyone for inviting us. We were notified on Wednesday, so we brought 24 of us. That was the most we could round up

in a day and a half. But I promise you that once we have more advance notice in the future, you will see a lot more of us.

As these conversations move forward and these talks of ongoing -- any time you guys want to talk about cutting us, us represented union workers, we're going to do everything we can to make that conversation as uncomfortable for you as we can.

I am -- I cannot believe this persistence that electricity is clean and safe. A town just got incinerated when 90 people just lost their lives because of electricity, not gas.

So, this whole concept that electricity is the answer, I caution those who say so. Natural gas has its problems. We can work with those problems. But we need to work together. I thank you for your time. Thank you.

(Applause)

MR. DURAN: My name's Tony Duran. I don't have a cool title. I'm just a normal dude. I work for the Southern California Gas Company.

One thing that I would like to address is the last panel said that the gas company's infrastructure would be unable to sustain the expansion of California.

I don't know how many times you guys have gone

to your stove or your heater, and turned it on and it doesn't work. The one thing that I grew up with is a thing called rolling blackouts. Those didn't end in 2000 or 2001. As a Bloomberg Report, May 3rd, 2018 said they could possibly be coming back to California. I'll leave that there as food for thought.

My next comment to you is Ms. Harrison. Am I pronouncing it correctly, ma'am? Great. You said that this has failed three times, roughly, maybe it's the education process for citizens of California, but the electrification process has been presented to citizens and has subsequently failed.

One of your bullet points, and I'm reading it verbatim here because I didn't want to get it incorrect, is your proposed ordinance, the third bullet point says: Relies on the City's police power and authority to establish and enforce laws.

It seems to me, ma'am, if you can't get the public to accept it, you're willing to propose a totalitarian police state to force them to and it's just concerning, ma'am. Thank you.

COUNCILMEMBER HARRISON: If I might? These prior efforts, when I was talking about prior efforts, we're talking about in the 1890s. We're talking about in the mid-20th century and we all went to Disneyland

every year and they had the home of the future and all of that.

We didn't have a climate crisis at that time. We didn't have the situation we have currently, right now. And so, it's not fair to align those past efforts with what we're doing currently.

The reason we talk about police powers is because we have the ability as local governments to say these are our authorities to ensure health and safety of our residents. We're allowed to do that.

That is in contrast to us having to go to the CEC and ask for something under Title 24. So, that's the only reference to us using our police powers is a general term that means our ability to set our own health and safety codes.

We've had a lot of the response, I have to tell you, in my community it's been overwhelming positive to this initiative. There's no attempt to go around people or do anything, you know, nefarious, res vi our citizens. So, I think that we've kind of conflated some different topics that I had brought up during the discussion. Thank you.

MR. SHAW: Oh, what's up everybody? My name's Ernie Shaw, Regional Officer for 132, and I'm also a crew foreman as well. The one comment I'd like to make,

you know, it's kind of ridiculous, the Montecito floods, I was there. I worked there personally. I was out there shutting everything off, you know, shutting everything down. That was caused by the floods, by the landslides, from the rains, man. But, you know, and I hooked the (indiscernible), by the way. She wouldn't have had gas without me.

But more importantly, you know, all these decisions, why were all these decisions made up there in Sacramento, and Napa and Sonoma, where it works for you? Why weren't we involved in this decision making for all-electrification, or whatever. What works for you up there, might not work for everybody else down here. Because, you know, you can afford to make those changes, and costs, and pay for everything. And we're struggling down here in SoCal, where it's expensive. Yeah, it's expensive of there, too, but you know, the cost of living is real.

So, you know, I just wanted to say why does it work up there for you, when it doesn't necessarily work down here for us. Thank you.

(Applause)

MR. GOUCHER: Good morning, which I'm a little bit surprised that no one of you spoke about building efficiency, which I believe is one big part of

decarbonization. Because when we talk about improving building appliances efficiency by 10 or 20 percent, well, we can improve the building envelope and reduce the energy need by up to 75 percent. That's a big concern.

And I was speaking out at Pasadena (indiscernible) California, and the board member was. And just one personal comment, is that I'm French as you can hear, is that's one thing that's very important in Europe, it's the embodied energy of buildings. Especially, because the target's 2030 and it's nowhere included. And actually, doing a very energy-efficient building, even in a passive house building with foam insulation is as a meter of (indiscernible) -- as a code building with renewable materials. So, that's two comments that I would like to have your answer about that. My name is Xavier Goucher, American pronunciation.

MR. OBADIAH BARTHOLOMY: Can I offer a quick response on the efficiency and the cost effectiveness question? So, for us, embedding the electrification programs within our efficiency programs and our whole home performance program is our preferred approach so that we're delivering envelope improvements, along with electrification. Again, to recognize the importance of

efficiency, and keeping customer bills low, and also creating space on the electric grid to electrify these other sectors.

On the cost effectiveness, we did find that from not just Northern California, but also Southern California, customers see lifecycle cost savings when electrifying the vast majority of residential homes. So, I would encourage you to read that document that's going to be coming out next week that I mentioned, that E3 will be releasing.

MR. GOUCHER: I mean, I assume you have a cap for ED energy when --

COUNCILMEMBER HARRISON: Yeah, I wanted to say, also, ours is also running in parallel. So, we're looking again -- and this is not happening tomorrow. This electrification process is something we're talking about in Berkeley. But we're doing that at the same time as we're working on upgrading our building efficiency standards and providing money for people to increase their building efficiency, so they do go together. I really see that.

There's a third piece that this goes with, which is greening the grid. All of this is useless if don't make the electricity grid greener. So, really, these things are all working together at the same time.

MR. GOUGHER: That's all for new buildings.

COUNCILMEMBER HARRISON: Yeah.

MS. KUYKENDALL: And I just want to clarify that for our program we do require that people be 20 percent more energy efficient than code, in addition to the electrification.

What I will say is looking at where the code is going, that is getting increasingly more and more difficult as we sort of ramp up our envelope requirements and what my builders will do in terms of exterior insulation.

So, come and chat with all my builders and get them to do that, and then we can make it work.

MR. EARLY: I just want to encourage people, again, to speak in the mic so that the people on WebEx can participate.

And where did my mic end up? Here. Okay, do you have a comment?

MS. COREL: My name is Nicole Corel. I work for the gas company, a member of Local 132. I just had a quick question because we talked a lot about how cost-effective electricity is. And no matter what my point of view is on that, completely different, I'm just curious as to why nobody that has come here today has done a comparison between a house that runs on gas and

electric, and one that runs on all electric. Because I know there's got to be a house that's had at least a one-year, two-year, five-year basis. If electricity is the way to go and it's so cost-effective, why did nobody bring us, you know, data on that showing the difference between gas and electric.

MS. KUYKENDALL: So, a couple of statewide references that I use, that are inclusive of everyone, that I really like, the Statewide Codes and Standards Group just released a really good draft interim study. It's focused on new construction, both residential and commercial, that looks at both the cost to construct all-electrical buildings versus gas buildings, as well as the cost to operate those.

But I will say it's a really nuanced question because it varies a lot. And what we really strive for is where it can hurt the most is actually low-income customers, potentially. So, we want to make sure we're hand-holding with those folks a lot to make sure it's the right decision.

The cost-effectiveness for us requires that those customers go and ask PG&E for an increased electricity baseload, if they're allowed to do if they have electric heating. But that's something that we need to tell them to do, that they won't naturally know

how to do.

So, it is a very nuanced question that is very different depending on where you live. But there are some great statewide resources out there.

COUNCILMEMBER HARRISON: Yeah, and I just want to reiterate. I think that's what we've always looked at is cost-effectiveness and I don't have the studies about which is more cost-effective. But I'm just going to say, again, we also have to think about GHG emissions. We simply do.

And I want to really thank you for your comment about the safety of power lines because, clearly, we've had an enormous issue with that in Northern California. So, you're right, the safety issues go -- cut both ways. So, thanks for that comment.

(Off-mic comment)

MR. OBADIAH BARTHOLOMY: Just a quick comment. From a personal data point, my house is saving between three and four hundred dollars a year, having switched from a gas furnace to an electric heat pump about four years ago. So, from a personal level, I understand the savings potential. That's for a 1929-built, 1,400 square foot house. So, I think the --

(Off-mic comment)

MR. OBADIAH BARTHOLOMY: Yeah, so there is a

small premium associated with switched, it's about $2,500 in Sacramento. And I think we'll be publishing some really robust data across the State that includes regional labor rates, that looks at the installed cost. So, I would encourage you to, again, take a look at that. That was a significant focus of a nearly year-long piece of work that was done to try and address specifically that point.

MS. MOSS: I'm Diane Moss and I have worked for over a decade in the renewable energy advocacy space, the electrification space. I consult in the renewable gas, renewable hydrogen space, as well as electric transportation, a lot of hats, air quality.

And then, in November I had a really opportunity, talk about nuanced questions, to put all of this to the test. When my house burned down in the Woolsey fire, along with thousands of my neighbors, I lost a few of my neighbors. You know what I'm talking about.

And the irony for me, a lot of you know me and what I do, and so you'll get why this is ironic. My neighbors, who were able to survive that fire and save their houses, and my mother who was able to survive in place after coming home from the hospital, and she was able to run her HEPA filters -- it's hard to talk about

this. Because they relied on natural gas as backup gen, and my mom didn't have space on her roof to be able to go off-grid, some people don't -- can't afford it, anyway, we're looking at what we're going to do. And we're going to bring back our heat pumps. We really like them. Not for our heating for our old house, but for our new house, perhaps.

There's a lot here that sounds familiar. And I just think we need to keep in mind, yes, different places have different needs when we do this deep building decarbonization regulatory work. And that resiliency is important.

And diversification is a matter of life and death. I used to be able to pontificate about it in theory. I know am living it. So, I hope that we can really keep that in mind. We need to go renewable, we need to decarbonize absolutely, but we also need to diversify because one system might break down, it can and it will at some point, for some people. Thank you.

MR. EARLY: Thank you.

MR. DOCKERTY: I'm Douglas Docherty. I have a quick question to the three of you. Do any of your municipal governments that you work for have PACE?

COUNCILMEMBER HARRISON: Yes, we have PACA and CARA both. PACE and CARA, both. And one of the things

that we're finding is we've done a terrible job, the utility, our CCA, and us as the cities in letting people know that they can take advantage of these programs.

So, as we're starting to hold workshops about perhaps if people want to opt up to greener levels of clean energy, under our CCA, we're also at these workshops talking about how you can participate.

The thing we're also finding, though, is that we -- in answer to someone earlier, I don't live in a rich community. I live in an area that is rich is in a community that's 60 percent tenants, who make way below the average median income in the Bay Area.

And what we're finding is that there's a level right about the PACE and CARA level that makes it really difficult for people to have any kind of, you know, breaks, et cetera. And they're the people we have to worry about the most because they don't have an ability to participate in these programs. So, that's a nut we have to crack. Thank you.

MS. KUYKENDALL: Oh, I just wanted to add we also do have PACE. It's run through our Sonoma County. The one -- I think PACE is great as a resource. I'd like to see additional, simpler-to-understand programs at lower interest rates, I think, if we're going to spread the message of building decarbonization,

especially to our low-income communities.

MS. GRACIA: Hi, my name is Laura Gracia. I'm with Communities for a Better Environment.

I had two comments and then a question. One of them was around like I heard something earlier about how we weren't in a climate crisis, I don't know, X years ago. And I think that it should be addressed at the oil industry and the government knew about the climate crisis.

And then, so then secondly, someone also mentioned blackouts. And we organize in Wilmington, and Huntington Park, in the South East L.A. cities where blackouts aren't a tenant or homeowner-caused issue. It's because usually of lack of adequacy and infrastructure. Right? So, I think that that should also be recognized that electrification doesn't necessarily mean blackouts.

And then, my question is -- well, electrification is a requirement to address the climate crisis. But I also had a question around how this can affect renters? How you have all seen this played out in the Bay Area and how it can affect renters, specifically -- specifically from being displaced. Landlords will probably incur the costs, and so how do we make sure that renters aren't displaced? Housing is

a really big issue here in Los Angeles, as it is in all of the State, so I wanted to know if you all had any feedback on that?

MS. KUYKENDALL: One thing I've seen that's been really successful, in our Bay REN, the Regional Energy Network in the Bay Area has done this, and I think it's fabulous. They have a multi-family program and what they do is they require that if the landlord wants to do a measure that specifically affects their energy use, they also pair it with things that will affect the tenant, as well. So, they address the split incentive that way.

I will say, as a renter I run into this as well. I wish there was an easy solution. But I think it's going to be the kind of thing that there really needs to be multiple solutions. And I think it's a place we need to work really hard to come up with additional ways to decarbonize those homes.

MR. OBADIAH BARTHOLOMY: And I'll just say for us, we're really targeting replace on burnout. So, when a piece of equipment goes out that the contractor, who gets called, is aware of the program and aware of the benefits to the homeowner in terms of the operating cost savings, but also the incentives that we have available that make that slight cost premium at the outset

actually cost beneficial to the customer.

We are also interested in ways to pair that with financing approaches, whether that be for homeowners or for landlords.

And on the multi-family side, we have enhanced incentives for our low-income multi-family, targeted at the building owner to do entire building retrofits.

MR. GONZALEZ: Good afternoon, everybody. My name is Juan Gonzalez. I'm a SoCalGas employee. But quickly, want to bring into the area to quick points.

Number one, I know from the earlier panel there was a discussion in regards, in terms of comparison of cost. I can assure, as a resident of the City of Anaheim, and I'm a zoned utility, in comparison I know, and I think has been brought a lot by a lot of people is cost. My gas bill is $14. My electric bill is $139. So, that's a comparison in terms of items.

The other item that I wanted to bring to your attention is I know we're in constant focus on the electrical grid. What would it mean to the grid if we go all-electric, if we were to do this, and what are those cost incentives? Because there's going to be modifications on the entire grid if we all go electrical, and who's going to pick up that bill? Thank you.

MR. OBADIAH BARTHOLOMY: To the grid infrastructure question, this is something that SMUD is digging into in significant detail this year. It's part of our Distribution Resource Plan to really understand all the way from the customer panel service drop all the way up the system what the opportunity is and what the challenges are going to be in terms of space on our grid, and infrastructure investment. It's something that can't be ignored, but the opportunity that we see is that most of the loads are going to be wintertime loads, which we're a summer-peaking utility. So, in terms of the overall cost for a customer of the infrastructure, we expect it to go down.

We do see, also, opportunity of using the flexibility inherent in the heat pump technologies and in the heat pump water heaters to actually displace the need for some of the grid storage that we expect to have happen as a result of the 100-percent clean energy targets we've established.

So, I think there are some challenges that need to be paid attention to, certainly, but also a significant opportunity for cost savings and spreading that fixed cost out across more kilowatt hours.

COUNCILMEMBER HARRISON: Yeah, one of our biggest concerns is the actual local capacity of

buildings. We have a lot of old housing stock that simply cannot add more to their existing panels. They don't have the wiring. They don't have any of that. So, that is where -- another reason we came down to the new buildings as being our focus because our older housing stock is going to make that an enormous challenge. But we're going to have to deal with that at some time because it's also a safety issue. We have a lot of people that have plugged in a lot more stuff than they should have, and done a lot more than they should have, and it's a real fire danger for us.

So, I think we need a separate program to deal with that issue that doesn't relate to this even so much, it's more of a safety issue. So, I really appreciate your question. Thank you.

MS. KUYKENDALL: I just want to echo that every time we put in an electric appliance that has the potential for demand response, it has the potential to be the solution. So, we're seeing this now with our electric vehicle charging stations, with our heat pump water heaters, with our thermostats. That's load that we can manage and have it operate when we want it to operate, and that's an asset.

And that's something we can't do as easily with gas. Gas is a very fixed schedule. Typically, when you

use that appliance it's less easy for us, as a utility, to determine when it's operating.

So, obviously, we do need infrastructure upgrades. But we're really excited about working with our customers about them being a solution for this issue, as well.

MS. THAKAR: So, thank you. With that, we are unfortunately at time for panel two. And to keep to our schedule, I'm just going to make a quick housekeeping announcement.

There are some locations to get lunch nearby here. Earth Cafe, on Hewitt Street, sandwiches and salads. Art and Fish on Matteo Street, sushi. Zinc, a vegetarian cafe, also on Matteo Street. And then, there's some others you can, I'm sure, use your smart phone to find.

Please try to walk to lunch, if you can, or car pool. I think there's going to be a little bit of a logjam if you try to get out of the parking lot, so that's just a heads up.

And we are going to reconvene at 1:30, thank you.

(Off the record at 12:33 p.m.)

(On the record at 1:30 p.m.)

MS. THAKAR: Okay, we will go ahead and get

started with our third panel of the day, which is entitled: Proposed Approaches to Implementing SB 1477.

This panel is very much going to be focused on a solutions angle. And with us today, to moderate the panel, we have Rory Cox, who's an analyst in the PUC's Energy Division. Merrian Borgeson, Senior Scientist with NRDC. Howard Merson, who's a consultant to VEIC -- or sorry, excuse me, Consulting Supply Chain Specialist to VEIC. Sean Armstrong, Managing Principal of Redwood Energy. And Kevin Wood, Principal Manager, Engineering Services, with Southern California Edison.

So, I'll introduce our Moderator here, Rory Cox. Rory Cox is a Senior Analyst in the Energy Division, at the California Public Utilities Commission, where he's worked since 2012. He is currently the staff lead for zero net energy and building electrification policies, and utility new construction programs.

In the past, Rory has provided regulatory oversight of industrial and agriculture energy efficiency and water nexus programs. Rory works with the IOUs and other stakeholders on program implementation, regulatory matters, and program evaluation.

Prior to his time at the CPUC, Rory was the California Program Director at Pacific Environment, a

small, nonprofit organization based in San Francisco.

Rory has a master's degree in international relations from San Francisco State University and was a 2010 Fellow with the Together Green Conservation Leadership Program.

And with that, I will turn it over to Rory.

MR. COX: Great, thank you. I hope everyone had a good lunch. And I see not everybody came back. So, I know there's long lines to get lunch around here, so I imagine people will trickle in as we go.

So, this panel is really -- we're kind of, you know, getting a little bit more laser-focused now, with this last session. And it's really about, you know, the question that is facing our two Commissions this year is, you know, how do we best allocate $200 million in funding for this program for decarbonization?

So, the longer-term goal is decarbonizing the electrical system by 2045. That's the long-term goal. But what are we going to do this year to put us on that trajectory and how are we going to spend these funds, which are cap and trade funds, which are designated to reduce greenhouse gas emissions, how do we best spend that funding to get us there?

Now, $200 million sounds like a lot of money, but it's about $17 for every existing household in

California. And that doesn't even count all the new construction that will come online in the next few years.

So, it's really, you know, we have to be very, very strategic with how we think about this. And we are in the process of, you know, looking at what's the best -- what is the best thing to prioritize. And even, maybe more difficult is what are we not going to do? Because we have lots and lots of comments from parties, with all kinds of ideas on what we should do. But in terms of what are we not going to do, because we can't do it all, you know, that's sort of one of the questions that I've put to our panelists.

So, speaking of our panelists, we've got a good group of people who have done a lot of thinking on this. And we have Kevin Wood from SoCal Edison, Merrian Borgeson from National Resources Defense Council, Howard Merson from VEIC Energy. Is that what you call it? Yeah. Sean Armstrong from Redwood Energy.

And we'll start with Kevin. Kevin has over 30 years of experience in the electric utility industry and is currently managing SCE's Customer Engineering organization and leading SCE's Building Electrification Initiative, while recovering from a ski accident. And despite that, you're going to do this standing up.

MS. WOOD: I am going to do this standing up.

MR. COX: Why?

MS. WOOD: But just don't tell my husband I took these five steps without my crutches. He's not appreciative of that. And I'm getting them off -- or, getting off of them this week.

So, thank you to the agencies and Rory for inviting Southern California Edison to this panel. We're really excited to be here to share our perspectives and recommendations on how to do the lean decarbonization in California.

So, our journey on building decarbonization began with the publication of our Clean Power and Electrification Pathway in 2017, which identifies the electrification of space and water heating to be a cost-effective component to reach the State's greenhouse gas reduction goals.

We heard this morning, also, the E3 study for the CEC also identifies electrification of space and water heating as a cost-effective GHG abatement tool.

And we just heard Rory emphasize that the building tech pilots are a good start, but likely not enough. Part of that is we need to be strategic and very thoughtful about focusing this money to the actual barriers that are preventing building decarbonization in

California.

So, I want to share with you some studies that Edison has undertaken in the past year, and some results from those studies that will help us understand the barriers, and some suggestions for moving forward.

And who am I looking to for time? I think over here.

Okay, so a study done by a consulting firm, E3, which is expected to be released next week, identifies that home electrification measures will provide cost savings for most homeowners and developers in the State. So, this is generally good news. This study was jointly commissioned by Edison, LADWP and SMUD, and it covers six climate zones in three home vintages, and for single-family, and multi-family, low-rise multi-family homes.

So, it's really important to remember that these results do not include any incentives, or interventions, or any programs. So, this is just the current state of affairs. And it just helps us understand where we should focus our programs and interventions.

So, you can see for all-electric new construction, a large majority of single-family and low-rise multi-family units or housing will actually see lifecycle savings.

Oh, let me explain lifecycle savings. This is a combination of first cost and energy bills, which is gas and electric bills, over the life of the equipment. So, that's what we mean by lifecycle cost.

Later, I'll drill down a little bit into bills and first costs, separately.

But the large majority see lifecycle savings for all-electric new construction. For retrofits, and we're focusing on retrofits of space and water heating. So, for single-family, the vast majority see lifecycle savings up to about $30 a month.

A little bit of a mixed story in low-rise, multi-family, but you'll see later that there's a good builder lower first cost. There's a little bit of an up-front premium for multi-family construction for some of these technologies.

And, of course, these products, as we've seen earlier today, greenhouse gas emissions reductions. And the great thing about this is you install them today and they get cleaner over time.

Okay, we also had a study done by a research firm, EMI Consulting. And this was a customer awareness study and it shows us that customers appear to be willing to adopt building electrification technologies, when educated. So, I wanted to read a couple of other

interesting data points from that study.

So, customers will gas appliances feel that electric equipment is expensive. This is what they feel. This is what they told us without being prompted. Fuel, it's expensive, costly to run, and difficult to install. However, they also view electric appliances as safer to operate.

For recent purchasers of gas space and water heating, the top reason for purchase of gas is because that's what they previously had, so this was the top reason. So, this kind of indicates to us that, you know, there's opportunity to educate for -- you know, to let customers know, you know, the benefits of clean technologies.

And customers really don't connect gas appliances with GHG emissions at all. It's way down on the list. So, these points and other points in the study help us understand what customers are thinking today and how we can deliver -- create and deliver messages to help them understand the benefits of these electric technologies.

Okay, let's drill down. I'm going to look at new construction, first. So, we've heard today that there's a first-cost savings for builders, so that's not news to you today. In terms of bill savings, about half

of single-family homeowners will see savings, bill savings. About two-thirds of low-rise, multi-family homeowners will see bill savings with all-electric new construction.

And we did some analysis, or E3 did the analysis on, you know, what does that look like? What do the bills look like when we go to high-efficiency appliances or best-in-class appliances? And you can see the bills, even those that aren't naturally lower, do get largely mitigated by the use of the higher-efficiency appliances.

Okay. So, if this is, you know, so cost-effective for builders, why aren't they doing it? Why aren't more of them doing it? So, we need to drill down on that and likely we'll -- we will need to direct some incentives towards the building community.

But there's a lot of work that we can do now, and Edison is already doing some of this. We understand that builders appreciate working with one utility, so that's a big benefit. We think that they appreciate, you know, us helping them through the service planning process to right-size the distribution equipment, that sort of thing, and understand how these electric technologies act on the grid.

You've heard a lot about induction cooktops. We

added an induction cooktop to our lending library. So, that was primarily based on the information from our customer survey that said they lacked knowledge of these electric technologies.

So, going forward, one of the most important things we believe is a robust marketing and outreach campaign. We believe that the builders are experiencing or perceiving some risk that customers do not want all-electric. And so, we really do need to educate customers for that pull, so the builders can feel like their risk is somewhat reduced there.

The incentive structure really needs to focus on high -- directed towards high-efficiency appliances. Again, we've heard a little bit about -- I think the second panel today talked quite a bit about efficiency. This is just such an important piece because the efficiency helps to lower bills and that's really where we need to be.

Manufacturer engagement is really important because we do need to get these efficiencies up. Code is changing 1-1-20. It will be -- I think Rachel mentioned it will be harder and harder to meet code, so we do need to keep pushing the envelope on efficiencies of these appliances.

Okay, I'm going to move on in the interest of

time. Okay, let's talk about retrofits of existing buildings. So, the E3 study results show that all or nearly all single-family and low-rise multi-family homes will see some bill savings. And we know that the first costs are most likely somewhat comparable or maybe a little less to install -- replace a heat pump with -- or replace an existing gas furnace and AC compressor with a heat pump. Heat pump water heaters are a little bit more expensive to install than a gas tankless water heater -- or, sorry, a gas tank water heater. So, we know that we might need to direct some incentives towards some of those first costs.

So, let me see. Oh, for low-rise multi-family -- these are for single-family homes. For low-rise multi-family retrofits there's, as I said before, an up-front cost premium, but these retrofits do generate bill savings. So, the bill savings story is very good and we need to keep an eye on that. And that's going to be very important and especially for low-income customers and disadvantaged communities.

Okay. We're focused on space and water heating, only, so we're not recommending that we ask retrofit customers or current customers to pull out their gas clothes drying or gas cooking. The large focus is on space and water heating.

We're running some pilots. One example I wanted to bring up is that we are already partnering with a couple of programs that are focused on GHG reduction. The South Coast Air Quality Management District's Multi-Family Affordable Housing Electrification Program. We could partner with them and do the energy efficiency piece. So, we want to get weatherization. We want to have the homes be as efficient as possible, again to offset those potential bill increases that might result from electrification. So, it's a partnership. We really want to see that partnership going on.

As with new build, we definitely want to see a robust marketing and outreach campaign. This has been touched on, it's critical that we train and support the workforce.

There's some evidence from our consumer awareness survey that the workforce is actually less open to new electrification technologies, primarily because they just don't have the experience. And they just feel it's a larger risk.

Finally, just 30 seconds, I wanted to -- our approach to this is to try to get the low-hanging fruit. For example, existing solar customers who over-generate. Non-emergency replacements, let's get those going before emergency replacements.

Climate zones of higher cooling loads will actually see a faster payback on bills. And newer homes that don't require electric panel upgrades. There are a few of the areas that we think could be focused on originally.

So, I'll finish up there.

MR. COX: Great. Thanks so much.

(Applause)

MR. COX: All right, next up is Merrian Borgeson from Natural Resources Defense Council, or NRDC. Merrian is a Senior Scientist with NRDC who works closely with policymakers and stakeholders in the Western U.S. to champion stronger climate and energy policies.

So, you've got your Power Point up and all right.

MS. BORGESON: All right, thank you. Thanks for being here everyone, after lunch, and glad to see most of your eyes open.

I just want to make the point that Kevin's presentation really shows that there's all these opportunities where we know it's cost-effective already. We've had this problem for like maybe a hundred years or so, in energy efficiency, where it's like cost-effective, but no one's doing it.

We have to think about this differently than energy-efficiency. If we just think about this as can we give people 50 bucks and have them do the thing that's just 50 bucks more expensive? That's not a way to build a market or get people excited. Right. We actually have to get contractors, builders, the people who are really making decisions about buildings to understand this, embrace this, get excited about this. And that's really different than small, incremental incentives here and there.

So, this is a much larger question than the question of the tech and build programs, which is the focus of this panel today and what I'll talk about. But we basically have $200 million over four years to do something very different to jumpstart a market and have a technology like heat pumps, like a number of other clean technologies that is basically not available in buildings today and say, how do we scale this up to pretty significant levels in a fairly short amount of time. We know that it works. We know that it's used around the world. We know that it's cost-effective in many places already. It's very cost-effective in new buildings. But how do we wisely use this funding?

And as Rory pointed out, it's not that much funding. It's under 20 bucks per home. Obadiah, from

SMUD, this morning said that they're spending about a billion dollars per year equivalent for the whole State of California just in their territory.

And you saw their plan. It was a plan over ten years to spend money in a way that contractors, and manufacturers, and distributors can depend on, and work around, and build their product lines, and do their trainings in relation to.

So, the State of California needs to start thinking big, as well. And this is just the first down payment to get that ball rolling. At least that's how I see these funds with 1477.

Now, there's two programs that this law creates. One is for new buildings. The Building Initiative for Low-Emissions Development. It's focused on new buildings, new residential buildings. And it's to significantly reduce the GHG emissions from these new buildings with direct incentives to the builders and the developers.

So, we have a lot of ideas about how we might design these programs. I just want to draw on a couple examples and give a couple of recommendations based on our experience working across the program, and seeing things that work and don't in programs like this, and in programs like energy efficiency for the last 50 years.

One is this is so important it has to be a statewide program. We don't have localized manufacturers of these products. We don't have localized builders of these products to a large extent.

This picture right here is City Ventures. A lot of people mentioned City Ventures because they're a company in California that built 700 units across the State, solar, all-electric. Isn't it interesting that so many of us use their pictures? Well, there's not that many builders like this.

But you talk to the head of City Ventures and he'll tell you the numbers pencil for them. People love their homes. No, they haven't had a hard time selling the cooktops.

What we don't have is a lot of builders taking the plunge, changing their designs, making sure that they get the right products, and sourcing new products in many cases. That is a significant financial incentive, even if the numbers pencil once you do it.

So, the goal of this program, of the build program should be a statewide program that focuses on getting the industry to have wider experience. Right? It can't just be City Ventures. We need like 50 builders. And we need low-income housing developers who really get this and are ready to do it. And we already

have a few. The good news in California is we have examples for everything that you might want to. We already have examples and we can go visit actual sites.

But it's the experience, getting more and more developers to make that change. And that requires big enough incentives, clear enough incentives. As I mentioned up here, minimize paperwork. They already go through Title 24. Make this an easy part of their Title 24 process. No, ten extra paperwork. So, three, triplicate copies, or whatever. You could actually build it into the way that Title 24 works. And the law is set up to allow that to happen.

I think also setting a minimum target for emissions. Don't make it super complicated. If you get above this bar, you get your incentive. We can have steady, stable incentives for like three years. That's basically all we have to work with, with this program. Make it easy for folks and make sure a wide range of builders actually participate. Not just one, not just two.

We need to ensure that there's direct outreach design and modeling support for low-income developers. Thirty percent of this money can and should, at a minimum, go to low-income developers. We've talked to a lot of low-income developers around the State. Many of

them are ready for this, but they need some of the technical support, the Title 24 modeling, and otherwise, to make sure that they can integrate it into their process. And for them, their processes are longer. They have very complex funding timelines to get low-income housing development built. So, they need extra support. And in our opinion, they need that support from folks who already know who they are, who already know all the low-income developers. Who aren't -- isn't an agency who's just like, hey, how about you talk to us, now? Now, you can actually hire and directly contract with an entity that knows these guys already and can work with them closely.

And again, we need to work with the builders and low-income developers at every step. So, that's for the build program for new buildings.

The second program, TECH, Technology and Equipment for Clean Heating. So, this is for technologies in buildings, that are super-low emissions, particularly space and water heating. It's a particular definition within the law that this bill is focused on.

And these interventions can be done through upstream and midstream engagements. That means with manufacturers, with distributors, with retailers, contractor and vendor training, and consumer education.

So, again, this needs to be a statewide program. This needs to be a coherent program. We, again, don't have local manufacturers. There's manufacturers, a few of them, that we can reach out to and work with. There needs to be a program that they can reach out to directly, that it's not -- you know, they don't have tons of staff to go to every locality to engage locally. We need to make sure that they are able to engage with one entity that's thinking about statewide market transformation in our State.

I think that you can combine sort of comprehensive planning looking across the markets, and figuring out in space and water heating where is there the most opportunity for some newer technologies that are ready to go, but not yet commercial, or not yet widely available, and combine that with some quick start pilots.

And you could ask an independent administrator, or an administrator of this tech program to come up with some ideas, some creative ideas for quick start ideas so you get stuff off the ground in three to six months, with some of the longer planning that will be required for any building decarbonization framework that we want in this State.

Again, we need to focus on engagement with

manufacturers, distributors and contractors. It will be important to educate the public, ultimately. And I want the public to be educated. But what I don't want is my mom to hear about this program, call up her contractor, and the guy to say that's illegal, or that's not possible, or I don't do that. So, that is not the experience you want.

What you want to do is you want to build the market enough and support the contractors who are ready and able to do this with the right messaging, at the right moment.

I've some home performance programs in the energy-efficiency space across the country actually help the contractors with marketing dollars. So that they, as long as they're promoting the right messages and the produces that are incentive, they can actually do their marketing. Imagine that, the people who can offer that product doing the marketing to the people who they can actually give it to immediately. New York is a state that has done this very successfully for a while.

And I think another thing with TECH is that e can actually have a very strong equity focus in this program. There is not a carve-out in the TECH program for low-income. But we can say, like the Commission can say, or whoever is in charge of the program, and say,

we're going to try to get at least 30 percent of those funds to low-income customers. There is a ton of need in the low-income, multi-family space to make sure that the right products and technologies are actually developed and designed for multi-family buildings.

There's a lot of electric resistance heat in low-income rental units. There's ways to target some of these incentives and to work with the folks who either provide low-income housing, for example, who have existing buildings, or to look at specific technologies that tend to be more relevant in low-income households, and make sure that we target at least several of those technologies or opportunities.

And another thing to consider is what can we learn from the CSI program? In that program, we reported some of the cost of installation for solar. Can we do that in some way in this program, so that we are able to start to get a sense around where does it cost more or less and make sure the prices stay reasonable. We definitely have had a few localities go first, and contractors will quote like $10,000 for a hot water heater. That means that they don't want to install the hot water heater, by the way. So, they have to want to install the hot water heater.

But we can make sure that we start to get some

data from these programs so we can help to drive the market, so that we get reasonably-priced equipment into these homes.

My final slide is just that this program needs to create the foundation for 2045. We need coherent planning and dependable programs for at least -- I estimate like three years. Right, we have about a year to plan and get our act together, then three years of putting a program out in the street. If we just do one-off pilots, like if you have ten pilots that just like are thrown out on the streets of California, I don't think we'll learn as much as if we have a coherent planning process that both does some quick start options, and really targets, strategically, which products and which markets are going to make the most sense from a climate perspective.

Second, I suggest a task force to help oversee this. The New Solar Homes Partnership Program had a task force that involved stakeholders and industry to sort of help guide those programs. This is an appropriate role for this, as well, where you can have manufacturers, builders and other key stakeholders. Get informal. You know, it wouldn't be like -- you know, it wouldn't be advice you have to follow, but it would be an appointed group to make sure this is meeting the

needs of this market development work that we need to do, so that there's another way for industry stakeholders to really engage that's not a formal process at the PUC, or the CEC, which can be overwhelming for some.

And I think we need to start thinking now about longer-term funding. Like I mentioned, in SMUD's territory, they have a ten-year time horizon. Folks know what to expect. We need to be thinking of how do we get funding for this type of work beyond these four years.

And with that I will just say we can do this, so we can have cold beer, and warm baths, and provided with a non-polluting fuel source. So, thank you very much.

(Applause)

MR. COX: All right. So, our next speaker -- so, you know, we would like to have bragging rights in California about various clean energy things that we were the first to do lots of things. But, really, when it comes to this decarbonization kind of work, and heat pumps in particular, you know, we're not the first. Other states have done it.

And that's why we invited Howard. So, Howard is here. He probably gets the award for traveling the farthest. He is from VEIC, which used to stand for

Vermont Energy. Anyway, it gives you a tip of how far he traveled.

But he's a Managing Consultant and Supply Chain Specialist from VEIC. He has more than 20 years of supply chain expertise, starting with his involvement in his family's business, which was purchased by Rexall as it's first U.S. acquisition.

At VEIC since 2012, he has designed and managed several supply channel platforms, rapidly obtaining nearly 100 percent of market share in the regions where he operates for targeted products of energy-efficiency programs, to promote to their repairs.

So, with that, Howard, take it away.

MR. MERSON: Good afternoon. It's a privilege and honor to be discussing this important topic today, with you.

I want to quickly review the supply chain. And so, you can see the value stream of how it flows from manufacturers to end users, and some of the roles and responsibilities with the various layers.

At the same time, I'm sure many of you are familiar with the supply chain, itself. But maybe what you're not aware is that the flow, it really doesn't matter as far as the technologies, it's consistent from one technology to the next.

At VEIC, we follow a supply chain strategy. It's 11 steps. And today we're going to be covering 4 of the 11 steps. Numbers 6 and 9, just so you understand what SMIT stands for, that's sales, marketing, inventory and training. And we'll go more into the details of what SMIT is later in the presentation.

But by following a strong chain strategy, we can accelerate decarbonization in California and have market transformation with respective technologies.

The distributors value proposition, or the supply chains value proposition. This is for heat pump water heaters and the slide, or the numbers came directly from a distributor in the northeast. And it's a comparison of a baseline product to heat pump water heaters.

And what's important with this is that when you look at the gross profit dollars, which is the difference between the resale cost and distributor's cost, when the baseline is $82 per unit. On the heat pump water heater, it's $204 per unit. That's 150 percent difference of $122.

And when I go in and have presentation with the senior level management of various distribution firms or manufacturers and reps, their eyes are usually glazing

over as I'm going through my presentation until this slide, and then they start calling other folks into the room.

Because from a business development perspective, you cannot have a more effective way of bringing 150 percent difference on a product sale that was going to take place anyway, by merely moving from baseline to energy efficient.

In California, at 50,000 units a year, and I think that's conservative, and I'll show you why in a minute, that's $6.1 million of gross profit dollars in the supply chain as a result of moving to heat pump water heaters.

Mapping the supply chain. It's really important that we understand the relationship between manufacturers and reps, their alliances with distributors, and the distributors' alliance and customer base with installers and contractors.

This is a research that I was involved with a project with the Northwest Energy Efficiency Alliance, NEEA, that represents four states, Montana, Idaho, Washington, and Oregon, and 13 and a half million people. When we surveyed the marketplace, 55 companies in 270 locations. But here's what's important. The top four companies, which is 7 percent of the 55, that's 55

percent of the location market share.

The next five, so, now we're at the top nine, 16 percent representing 74 percent. The 80/20 rule front and center.

It's important that we're strategic with our engagement with the supply chain. We want to have the all-inclusive, but we need to go to the leadership first, have the leadership embrace our strategies, and then the marketplace will follow.

Sales market inventory and training, SMIT. You can see the three steps as far as the overall SMIT approach. What's relevant is the request for information to the manufacturers and reps. And we have various forms of the requests for information, or RFI, but here's a marketing plan, an inventory plan.

Oh, here's what happens is that the manufacturing rep and some distributors will respond back. We had a hundred percent participation, by the way, when we go out into the marketplace with this. But they'll respond back. And then, we require a four- to six-hour meeting in Vermont, one-off. And I can assure you that with the supply chain manufacturers and reps, visiting Vermont in the middle of winter was not a very prominent -- they were not keen on the idea.

But after we finished our four- to six-hour

sessions as far as the strategy, what is your strategy supply chain and we compared notes, and our objective was how can we collaborate, one hundred percent came back and said, this is the way we need to go to the market. We will participate with you on a go-forward basis. And this is how you cause market transformation.

Let's go into market transformation. In Vermont, we have two different service delivery models. One is a downstream program that goes to the home improvement centers, such as Lowe's and Home Depot. And the other is an instant rebate program going through wholesale distribution. All of the research shows that it should be a 50/50 split between the two.

The only difference between the two programs, and I'm going to show you the results, the only different between the two, the incentives are the same, si that the downstream program was introduced nine months earlier than the instant rebate program. And the other aspect of it is that the downstream program did not go through the SMIT process.

But here are the results. For every 10 units sold in Vermont and installed, 9 are going through the wholesale distribution channel.

Once again, the research showed it should be 50/50. Why is it, for 9 out of 10, going through

wholesale distribution? It was the instant rebates. That was the reason, having access to incentives immediately.

Why? Because the average U.S. household, their savings is between $400 and $4,000, depending on what research you're looking over. So, having access to incentives is what drives market transformation.

I'll give you a little bit of the metrics in Vermont. We're only .2 percent of the population, but we're 3.6 percent of heat pump water heater uptake. That's a 1,700 percent difference.

Now, in an almost 40 million population in California, can you imagine the impact that California will have, not only in the states, but globally? We need California for market transformation. Decarbonization is key for these types of products and decarbonization overall.

Some other metrics. In the U.S., we have a 1.25 percent penetration rate on baseline products. In Vermont, we're at 60 percent. That's a 4,700 percent difference.

Let's look at air source heat pumps. We were involved with research throughout, you know, the northeast or New England as far as the penetration rates of air source heat pumps.

Let's key in on the installation rates in homes. In Vermont, we're at 1.26 percent annual penetration rates of Air Source heat pumps. Let's compare, I'm not picking on Connecticut or New York, but let's compare. We're 1,160 percent over Connecticut and 2,000 percent over New York.

And here's the various service delivery models. What's the difference? It's having a strategy. It's having an approach in the marketplace that's going to be effective and working through the supply chain.

Zero energy modular. We're very active in this space, at VIC. And we also have a very robust strategy as var as ZEM.

And you can see what happens with an effective ZEM strategy. You can transform the construction industry and decarbonization at scale. And you can see some of the other highlights of what happens by having a strong strategy up front.

It's important that we recognize, as we go into the supply chains and the channels, and I mentioned in the beginning as far as the technologies, as far as going from manufacturers to end users is essentially the same.

So, I want to key in on electrical lighting, wholesalers, the supply channel. Next year, LED

standards go into effect and we have a lot of inherent relationships with that aspect of the supply chain. Let's not give up the relationships because of LED standards. And, instead, let's broaden and widen the breadth of our engagement. Electrical distributors are involved with electric vehicle charging stations. They're involved with heat pump technology, ductless mini-splits, and VRS, and VRVs, and heat pump water heaters. Because of their customer base, electricians are demanding that they have this in inventory, so they're supporting it.

And then, you combine with connected devices and let's look -- we currently have the 200-amp load center upgrades. So, there's a lot of reasons to combine our strategies with the electrical lighting supply chain with HVAC refrigeration, and with the plumbing supply chain.

So, I want to thank you for your time. It's been a pleasure sharing some ideas from the northeast. And at the same time remember, if you have a strong supply chain strategy, you can accelerate decarbonization and also have market transformation with respect to technologies. Thank you and have a good rest of your day.

(Applause)

MR. COX: Thank you, Howard, that has definitely given us a lot to chew on there and it's great to have your first hand experience in this, and expertise.

And speaking of first-hand experience, our next speaker is Sean Armstrong from Redwood Energy. He's the Managing Principal at Redwood Energy, a leading zero carbon, affordable housing design firm.

Before cofounding Redwood Energy, Sean spent six years as a design and construction project manager for a top ten affordable housing developer in the U.S., and is professionally trained in construction cost estimation. So, welcome, Sean.

MR. ARMSTRONG: Thank you very much. Okay, so, I've been in the industry since 2005. I only work on low-income housing. I've worked on about 250 apartment complexes, serving more than 7,000 low-income households.

And what you're seeing here, this is a nice subdivision of 48 homes in Selma, for farmworker families. I do a lot of farmworker families.

So, I want to go back in history. 1953, Ronald Regan got hired to head the last electrification/decarbonization program. He promoted clean, nuclear energy. He got to hang out with Marilyn Monroe. He had a top ten television show for eight

years. He only got fired because in his first divorce he did a self-dealing financial deal that blew up on him eight years later, so he lost his job. He claimed it was the Tennessee Valley Authority, because he called them communists, but it was actually his divorce.

(Laughter)

MR. ARMSTRONG: So, they had a fantastic jingle: We're better electrically. And they ran this show once a week, showing people the commercial breaks, which was clean nuclear power. Ronald Regan was big into clean and nuclear power.

And then, clean household appliances, which is how they described them, and luxury.

So, we don't have to run a program. We can see that in the south, now that 60 percent of all new homes are all-electric. The reason why is because it costs less to build. It's not a decarbonization of any sort. It is savvy developers who can cut $3,000 to $25,000 a unit. It depends upon how far the gas line has to go, depends upon the size of the house, it depends on the market, but it is always cheaper.

So, what I've heard, but not yet investigated, is that almost 100 percent of apartment complexes in Atlanta, Georgia are being built all-electric now. I'm not saying they're efficient. I'm saying they're all-

electric. There is a distinction because we get more efficiency out of California policy than what they'll have in the south.

And what you see in California. This is a document, by the way, of market share growth. The market share of all-electric started growing again in 1993. It stopped in '73, with the OPEC oil embargo. There had been a nonstop growth since '52. It stops in '73. It picks up in '93. It's been going nonstop since then. You are in the middle of an electrification revolution right now that's been going on for 26 years.

Now, in California as well, all-electric has been gaining market share since 2010 in almost every county, with a couple of exceptions.

Oops, wrong direction. My bad. Okay, here's the reason why. There's the California studies. So, you have Lawrence Berkeley National Lab saying there's a .3 to .9 percent leak. And all in yellow are the leaks. In green, starting you have a furnace that SoCalGas's Navigant study is saying it's one to three thousand dollars more expensive to put in gas/one to three grand cheaper to do all-electric.

And you can see in green, the water heater's the same price, according to SoCalGas. SoCalGas says an electric dryer's going to save you money, an electric

stove's going to save you money.

PG&E and SoCalGas both point out that you have -- under CPUC proceedings, that they put in two years ago, that there's like $16,000 in lateral connection and then, you have to do the lateral -- and sorry, the piece of low-pressure distribution in front of the house, in the street, which is a cost that's given to the house. It's not something that's rate-based. That's something you pay to develop, if you're developing. That's 141 to 156 dollars per linear foot. So, you're talking six to seven thousand dollars -- seven to eight thousand dollars, pardon me, for 50 linear feet. You might have a lot that's a hundred feet wide, as an example.

That cost of 25 to 30 thousand dollars, that's what you pay in California, to the left. Well, I don't have the cost in the $3.2 million per mile of a high pressure, the storage tanks, the extraction wells. They have prices, but they're not included in. It costs about 25 grand more to put in an all -- a gas/electric hybrid home. You can save that, if you don't.

And as I said -- I was introduced as a professional in construction cost estimating. I've had to bid out projects that were 30 percent over budget and I've electrified them as a way to get them on budget. That's how I've saved many affordable housing

developments, particularly in rural areas where gas connections cost even more.

Nationally, it is cheaper by 30 percent to go all-electric on the utility bills. Not every state. It's a hodgepodge in California with 126 utilities. But nationally, this is what it looks like, 30 percent less expensive to do a high-performance heat pump water heater versus the highest performance gas water heater you can buy. That's how electricity versus gas prices for usage are in the United States.

And so, in the majority in the state, in the United States, it's cheaper to go all-electric and efficient.

So, I'm going to show you some projects. This is in Oxnard. We've gotten nice work from the Building Industry Association because we've cut costs so significantly that we're able to do this low-income, farmworker family housing development in Oxnard and have it look like that. It's done off the back of the solar array and the utility bills. That's how we brought almost a million dollars of extra money into this development.

This one, similarly, it got some extra awards. Farmworker families. It has a gigantic central heat pump water heater that does HVAC, so heating, and

cooling, and domestic hot water as a cost-saving measure of about two grand per door.

This project got the grand prize, the United Nations World Habitat Award. We had to go to Kuala Lumpur to pick up the award. It was the first time that permanent farmworker family housing had been built in Yolo County. It was done with the cost of $1.2 million in savings over the 15 years, of a solar array and all-electric. The project is financed off the back of the solar array.

Lacking that, we did not have enough money to get this project done. That's why we got an award, both from the Department of Energy and from the United Nations is because it was done off the back of solar plus electric.

This is an 11-story, all-electric passive house, 500 units of low-income senior housing I'm doing on the Washington, D.C. Beltway. So, it's going to have a five-story tall solar array on the side of the parking garage. And it's being done, once again, to make money. This is a net profit -- this is how we're going to do low-income housing on D.C. Beltway, a very expensive market, is by reducing costs, first.

This is an existing project in National City. Utility bills went from $100 for tenants, down to $5 a

month. The entire thing's electric, 100 percent solar-powered, 326 families that got benefits.

These are developments, once again, with the USDA, as farm work -- sorry, low-income families, low-income seniors, low-income families once again, as opposed to farmworker families.

All of these are examples of projects where the solar plus the electrification package brought in 300 to a million dollars more. It was an important part of the financing.

This is that subdivision I showed in the first picture. Once again, these are attractive homes. There's nothing different about them, really. I mean, you wouldn't know, per se.

These are cute little cottages in Fort Bragg. That's how we got this through the entitlement process in Fort Bragg to do low-income seniors. So, 26 little cottages, a hundred percent solar powered. Every low-income tenant gets about $200 back from PG&E every year. We overestimated the senior citizen's consumption because they don't cook and they don't take showers.

(Laughter)

MR. ARMSTRONG: That's all of you, by the way. So, yeah, they're like 20 percent over budget and they get 200 bucks back a year. And it's adorable to talk

with these people. Three of them have bought electric used cars because it saves them hundreds of dollars a month to have an electric used car that they plug into the free electricity here. So, even if they're paying for it, there would be a savings. But it's an immediate, there's free driving if you get an electric car here.

These are 14 all-electric tiny homes that just got put up for homeless Veterans in Santa Rosa. Just so you know, there's 450 homeless Veterans with vouchers and we were able to build 14.

So, this is a big, cool thing. And, of course, we save money on every single one of these tiny homes by going all-electric. There's a choice they had to extend the gas or not. We cut the price of the gas out, this thing was still almost a hundred grand over budget, and electrifying was part of the solution.

So, this is what it can look like, those tiny homes I just showed you. Now, this is a heat pump -- and I just want to get behind -- (off-mic) -- that pulls through the wall. This is the cheapest way you can do HVAC for, say, like a thousand square foot home. So, a one-ton heat pump that's retrofit ready. It goes into a 120-volt outlet. It uses half as much electricity as a hairdryer and it heats an entire home. This is the

heater that I use for my house, like a one-ton heat pump. Mine looks like the one to the right, but it's all the same guts inside.

The reason why this is $3,000 a zone is because it's all done in the factory. All the work. It's just one box and you hang it on the wall, and you plug it in. As soon as you have to run a refrigerant line, and set a cement pad, and run an electrical line, and go on and on, and on, for split systems prices double.

You know, I'm in there also cheaper. That's a packaged one, just like in the beginning. Everything's in the guts of that box. And then, you run ducts off of the top of it. So, not having a systems-split saves thousands of dollars of installation.

The next most expensive, about 18 grand, which is what you're going to have for a traditional, like an air conditioner with ducting, or a reversable air conditioning with ducting.

So, I've found that the least-cost system that can be installed, period, bar none, no other way to do it cheaper, no matter what your fuel uses are, is a packaged terminal heat pump. That's the low-cost HVAC system, end, stop, the cheapest.

Central versus individual tanks. In yellow, that is what an individual heat pump water heater does,

the amount of electricity it takes. And electric resistance tank is the one that's overlaid, so you can see the difference between a heat pump and electric resistance. To the right are all different ways of doing central heat pumps. And I want you to see how small the yellow is compared to any efficient way that you do a central heat pump.

Individual systems are far more efficient. So, when I'm doing zero net carbon, 6- to 11-story tall construction, I have to look at the domestic hot water as the number one energy use, and then I have to cut it in half so I can go another three stories up. It's important. I have these down corridor hallways as opposed to a big, central system, on an 11-story tall building. Because there's massive energy savings, as well as construction cost savings.

This is what a retrofit-ready water heater can look like. Here we go. Two slides left, promise you. So, that looks like an on-demand gas water heater, it holds 30 gallons. Once again, it uses half the energy of a hair dryer and it heats all the water for a house. Ariston owns HTP, HTP's an American company, and they're bringing them over in the next year. So, we can just plug them in to any outlet in a house and run plumbing for it. It's under a thousand bucks. It's got a COP of

3.

Last, to focus back on this, this -- there are low and reasonably priced electric resistance and induction stoves that are higher quality than any gas stove that's being rated out there. They're affordable. And as a person who's got two cancer survivors in my family, the issue of formaldehyde being the number one source that's coming off of gas stoves, that freaked me out when I learned that, and I stopped letting my kids cook on the gas stoves. I didn't want them huffing gas, like gasified plastic, essentially. Plastic is made out of natural gas. Put it in reverse.

So, that's the end of my slide deck. I just want to say this is how we do low-income housing all over California. It always saves money. It's always an important part of how we build it in the first place. If you force us to put gas in, you raise costs and you put less housing out of the State of California. Okay.

MR. COX: Great.

(Applause)

MR. COX: Thanks, Sean. I want to direct my first question to you, actually, and you get to keep going. So, you seem to be doing pretty well with the current regulatory and incentive structure that's out there. I mean, you seem to be doing quite a bit.

MR. ARMSTRONG: Doing a lot.

MR. COX: And, yet, we have the Build Program, which is there's a 30-percent requirement for low-income housing on there. So, you've been able to all this stuff. What else can we do and build with that funding?

MR. ARMSTRONG: Well, I encourage you to focus on retrofits. Is that an option with it?

MR. COX: Yeah.

MR. ARMSTRONG: Okay, then I --

MR. COX: Wait, actually, no, sorry. Sorry, Build, it's not. It's new construction.

MR. ARMSTRONG: Okay, it's new construction. I'm a renegade in this field. Like, you know, we use the Title 24 software in ways that are less approved than others. And that is because PG&E has been forcing us, in every single way they could, to make us use gas. So, there are regulatory barriers that most people bump into that we work around. And so, there's work to be done there.

And I would say just generally in this State that the practice of all-electric construction -- we're a 90-percent gas-delivered state. Ninety percent of our homes are gas. In the rest of the country, it's 50 percent on average. We're one of the worst states in the Union in not having gas. And people are just

ignorant. They don't k now what's going on outside of California. We're parochial in our understanding. And we look at the south as a bunch of dumb hicks, instead of the leaders of our country in electrification.

Like, we are not thinking about the situation correctly, generally, and it's the thinking that gets in the way.

So, if you throw a bunch of money at getting people to change their practices, like they should have already for their own benefit, then good. Because it's not easy.

MR. COX: Is it a matter of education of the low-income housing building industry, do you think?

MR. ARMSTRONG: Yeah.

MR. COX: Okay.

MR. ARMSTRONG: To put it out there, you know, every year the Tax Credit Authority, under the Treasurer, sets up new policies to incentivize particular types of housing, family housing, efficiency goals. So, they have built a glide path zero to energy and that's why we have the most zero to energy of any housing type is in low-income housing. It's because the policies have been in place since 2005 to support it.

So, if you were to push the Treasurer's Office to mandate or additionally incentivize, that would

actually be a very powerful way to make low-income housing become all-electric, without any spending money, per se.

MR. COX: Uh-hum.

MR. ARMSTRONG: And then, if you were to help with the buy-down, perhaps, on a central heat pump water heater. That is the only technology that's usually more expensive and a hard push. Because nowadays, most apartment complexes are built all-electric except for the water heater. People are really freaked out about gas fires in the stoves, because so many low-income senior citizens will like leave it on, and then up goes the apartment.

So, there's a lot of safety issues around why we're not putting gas into apartments anymore. It's just the water heater.

MR. COX: Uh-hum.

MS. BORGESON: And I would just add, I mean, this is a good question generally. Like if it costs less, why do we need the money? And I would say that if we could use half the money and clone you, that might be another solution. But since we can't do that -- I mean, Sean, he shows you all these nice pictures, but he worked really hard to work around every single little wiggle room that he could get to make these pencil. And

it can't be that hard for your average developer, it just can't, if you want us to take off.

So, part of what we need is this, having many more people have this experience. Many more developers being like, oh, this actually works. And we also have to make sure that it doesn't -- it's not as hard as it has been for Sean to make it work right.

So, that's why we need Bill to like kind of kick us off, get the experience more broadly, look at some of the barriers that we do have around building new, all-electric, super-efficient buildings and then, yeah, we won't have to subsidize it forever. That's the good news. But we're not there, yet.

MR. COX: The next question is for Howard. How can the TECH Program best balance the need for quick wins, with setting the foundation for long-term success and transformation of the market?

MR. MERSON: Thanks Rory. I would say as far as the TECH Program -- let me just make sure that I have my thoughts straight here. First, we need to invest in the supply channel. And it's important that we understand the value proposition. And I went through, earlier, about the 150-percent difference, $112 per unit.

That's just the beginning. There's other technologies we found it's 244-percent, 300-percent

difference. So, we need to understand the value proposition as we go into the supply chain.

We need to understand the supply chain's profit model. It's based on a formula that we have utilized throughout our involvement across the country. But the one I like is a performance metric and it's RONA, return on net assets.

Return on net assets, I went over the top side of it. The formula's net income, divided by accounts receivables, plus inventory, and deduct out the accounts payable. So, the net income I hit a little bit and that was as far as the gross margins, but that translates into net income dollars.

But if we go deeper, how do we turn inventory. We can't have inventory just remain idle because it's an investment. So, we turn it by collaborative sales and marketing, product and program training, and ensure that the incentives are properly messaged into the marketplace. And when we do that, the supply chain will buy into the process because their return on net assets, which is a key performance metric as I mentioned earlier, will go up.

And so, then that leverages the supply chain and we start having all of these market actors that are involved with the program.

Then, we need to be smart. We can't over-ask the amount of questions that are involved. We need to optimize data collection.

Our first program that we introduced in Vermont, I said, how many data collection points do we need in order to meet the regulatory requirements. And internally, they said 40. And I said, there's not a chance. I said, you know what, go to the grocery store and check out. And before you check out, just envision everybody being asked 40 questions before they can check out. So, let's go back in and let's relook at this.

Then, okay, they came back a week later and it wasn't 30, 20. Fourteen data collection points. So, that's been our standard on a go-forward basis. And we optimized it. I forced our U&B departments hand and they came back with 14 data collection points.

So, all in all, I think that this is where we start and then we grow from there. But we build a platform and then we have incremental growth. Thank you.

MR. COX: All right, thanks.

So, this is just -- you can just pass the microphone around for this one, I'm going to ask it for each of you. What shouldn't we do? What should we de-prioritize? Because as I said that's one of the big --

you know, we have lots of ideas of what we should do. But when we're trying to think of, you know, what is best use of those funds right now, and I'm not talking about the long term and I'm not talking about what other actors can do, I'm just talking about our $50 million a year that we get for these two programs.

I have my nomination that I'm going to be a little bit provocative with, which is that, you know, marketing, education and outreach, it takes a lot of money to get the general public aware of things.

And yet, what we've heard a few times today, in various forms, is how important the midstream market really is. Which is to say the contractors. I think Panama called it the church of the kitchen table, or something like that.

And they are the ones that are really the -- you know, when your water heater goes out, they're the ones that are going to sell you the water heater. You don't generally go to Home Depot and buy it. A contractor comes in and puts it in.

So, I'm kind of like thinking, when we think about how to allocate these funds, you know, do we need to educate the public? So, that's one thing that I'm kind of like thinking I don't know. But I wanted to ask you that question, as well as any other things that we

maybe need to not spend the funding on.

MS. WOOD: Okay, I'll go first. So, I know you asked us what we could deprioritize, but I'm going to push back on you, on your item. So, you know, just what we've found from our consumer awareness studies that we just need to educate customers. And I don't really think it will take that much.

I mean, Sean pointed out that, you know, the rest of the country is more like 50 percent. I mean, Europe, they're very used to these. So, there's not anything fundamentally different in Californians' DNA that we don't like electric cooking. I mean, there's just not. So, I think it won't take too much and I don't think it will be that expensive.

But I think it's needed for both the Build and the TECH program because I think builders, with the exception of Sean, are reluctant. And why are they reluctant? Because there's a risk. And there shouldn't be, there shouldn't be that perceived risk. So, I would say don't de-prioritize customer communications campaign.

I mean, one thing that we can think about doing is, you know, prioritize the low-hanging fruit, like I was talking about earlier, so there's lots of wins. I mean, a win we can do with our existing Energy

Efficiency Program is electric resistance to heat pump. That is a no brainer. And we can do that without Build and TECH. We should be doing a lot of that. There's a lot more of those kinds of partnership programs that we can be doing. So, we should get those going and then prioritize the low-hanging fruit.

MR. MERSON: I just would say that if we focus on build efforts and low-cost coordination, and then with building codes we just allow the codes and encourage it's all-electric.

And then reserve most 1477 funding for TECH. So, that's my thoughts as far as the prioritization and what we do and don't focus on.

MR. ARMSTRONG: So, as we saw, the amount of gas that gets used by the domestic hot water and HVAC are the two big line items. But the hardest things to do are the electric fireplaces and the electric stoves. Those are the two items that people resist the most. So, I've spent the most energy trying to find fireplaces that produce steam that's lit by LED lights, so that people will stop -- because I had an affordable housing project in Pasadena, where I got all the electricity -- all of the gas out, except for the ceremonial fireplace. And I had to make the pitch like this is low-income housing. Someone's going to complain if you guys make a

bonfire in the middle -- in low-income housing and install a $20,000 gas line to get it there.

But this problem I've found is like the symbolic, emotional ties to burning things is the hardest part.

(Laughter)

MR. ARMSTRONG: It's like I don't care as much about money as I do about my family recipes. Don't take away my gas stove.

I don't care about saving money at Christmas time, I'm going to buy $800 worth of presents and I'd like to open them in front of a fireplace.

That is, I've found, to be the challenges. Especially, not in low-income housing, where you can just work with one developer who will make some choices for people. But when you have to worry about everyone else's choices affecting it.

So, I would say what we should deemphasize is the things that people don't care about because they're hidden behind closets, and emphasize the things that have the most emotional resonance, so that we don't get hung up on angry arguments over things that people love.

MS. BORGESON: I guess, I mean I don't disagree with anything you guys have said. We're going to have to do all of these things.

With $200 million over four years, I don't see the potential for a mass market campaign. And I do worry a lot about people going out and asking for something that's not available.

So, to me, it's really about timing. It's not that do we do these things? Yes, we have to figure out the gas fireplace question. Yes, we have to get people to love induction cooking, which we think they will, but they've just never tried it before.

Yes, we're going to have to get people to understand -- actually, we should not have to get people to understand a heat pump and how it works. Let's not do that. Let's not have an education campaign that educates people. It's just, like you get hot water and hot air when you need it.

So, but I think where we need to start is by having the suppliers, the folks who interact, either the builders, themselves, the low-income developers or the contractors get bought in and have a business model that actually works for them to sell these products. They actually have to know what they are and have to rethink how they do sales, so that then we can have a marketing campaign that really takes off.

And I think it's going to take two to four years to get that in place, before we could really have a

massive marketing campaign. Not that we don't eventually need to do it.

MR. COX: So, I think that we're going to Commissioner questions. Yes, Commissioner Picker?

PRESIDENT PICKER: I can talk loud. Don't worry.

(Off-mic)

PRESIDENT PICKER: To heck with them. So, I think a lot about the certification agencies. Are they staying up to date on this? Are they starting to really track? Again, this comes out of naivete, because I'm from California and I don't see how it's applied in other states.

You know, are you finding that the manufacturers are actually applying the standards correctly?

MR. ARMSTRONG: What standards do you mean?

PRESIDENT PICKER: So, you know, the International Electric Physical Commission, IEEE, sets standards that then you can actual measure the overall effectiveness of a technology. It's similar to EMV, only it happens at the global level.

They all started with 60 cycles in North America, and 50 cycles in the U.S., but then they began to apply this across the board. It's why you know your refrigerator is going to work on 60 cycles.

So, here, are we certain that when we get an appliance that people are actually going to get the kinds of services that they're buying for that, at the levels that are predicted?

MR. ARMSTRONG: If I understand correctly, I'm imagining for instance a product that I'm trying to help bring in for heat pumps.

PRESIDENT PICKER: Right.

MR. ARMSTRONG: It's a 50hz cycle, 230-vot product over there. So, I'm seeing the having to go through Universal Laboratories and have it -- you know, the entire thing, the energy's rectified and it comes through. And then, it also has to go through the Department of Energy for efficiency.

So, my experience so far has been that there's quite a number of thresholds of examination.

MS. BORGESON: Yes, I think that's right. And these products are widely available all over the world.

And other groups, besides California, like in the northwest, they've been working on product specs for a long time, so we can easily borrow, and we have already borrowed some of their work. So, yeah, I don't think that's a problem.

PRESIDENT PICKER: Okay.

MS. BORGESON: We've found manufacturers

basically say, just like show us that there will be a market here over at least several years, and we can like ship more, but we need to see that there's actually a demand for it.

MR. ARMSTRONG: To add to that, I've interviewed the Japanese manufacturers a number of times since they have efficiencies at about 30 to 50 percent greater than American products. And I said, why aren't they here. Daikin, why aren't they here, Mitsubishi. And they say, Americans don't care about efficiency.

And I'm like, well, we're in California. And they're like, even Californians just don't care. And that seems to be a big impediment is that we might think we're doing something amazing in California, but we're behind in -- we're not nearly as interested as Japanese people are. Just demonstrative by rebates, and government programs, just go down the list. We're not that awesome.

(Laughter)

MR. MERSON: I just would say that when we introduced our air source heat pump program in Vermont, we went to the manufacturers, and we went to the C suite level as far as eligibility requirements. And we had a manufacturer at that level sign off. And that's where we started.

But I think all of the other points, as far as testing laboratories, there's a significant -- (off-mic) -- I'm about to finish, anyway. But there's a significant amount of testing protocols that are in place, now. But there are several strategies that we could utilize in California.

But as I said, when we started out in Vermont, we did not have any testing as far as in laboratories at that time, so we went to the manufacturers and asked for the sign off, and they did.

MS. WOOD: I'll just add a somewhat related item that the Building Decarbonization Coalition is conducting a stakeholder engagement around retrofit-ready heat pump water heaters, so that would involve certification and with all the manufacturers. And, again, it's really important to get the manufacturers involved.

COMMISSIONER SHIROMA: Okay, thanks. Genevieve Shiroma, CPUC. This question is for Kevin. Perhaps for Obadiah.

In the vein that repetition is really import to really understand and get something, this study that's coming out that was cosponsored by Edison, LADWP, and SMUD, what action items do you foresee arising from the release of that study?

MS. WOOD: Yeah, mostly -- can you hear me? You know, mostly it points to the areas that we need to focus programs and incentives. So, that's -- you know, it will give us a laser focus on different vintages.

So, for example, believe it or not, older vintages of homes have more of an opportunity for savings, for lower those customer's bills. So, that's just one data point that we'd like to focus on, and that's what will come out of this study.

We looked at six different climate zones, different utility rates, and vintages of homes. So, it will help us laser focus, kind of to Rory's point earlier, around priorities to get -- you know, to get the most bang for our buck early.

COMMISSIONER MCALLISTER: So, let's see. I have a question, I guess, most for Vermont. But, you know, there's been a little bit of a suggestion about the need to integrate various technologies, and I'm talking about new construction, but I want to put a little finer point on it.

So, like in Vermont, you know, their shell is king, right. It's cold there and you want to really have a tight, thick wall. You know, that's -- your long-life investment is the physical thing that you're building. And that allows you to potentially downsize

your mechanical, if you make a better shell.

Then also, when we're talking about gas versus electricity, when you have a really tight shell the differences actually emerge more strongly in terms of indoor air quality.

So, I guess, I want to see if sort of that issue has been something that makes all this more saleable in Vermont or, you know, the need to integrate and just have a better three-dimensional thing that people have a higher sense of comfort and performance matters in the marketplace?

MR. MERSON: It matters. This is working now, right, after I dropped it?

It does matter. Weatherization, and sealing, and tightness of the homes or buildings was a major emphasis when we introduced our air source heat pump program in 2014. Q/A, as far as installs, ensuring that just verifying quality installs was essential as part of our verification process.

But you're right, what comes first? Is it the chicken or the egg? Do you sell or do you go in with the technology first? And it really has to be all of the above.

We are moving more and more into weatherization and sealing, but it has always been a part of our

strategy since we launched our initial ductless mini-slip program in 2014.

MR. EARLY: Okay, so -- okay, I think we're going to transition into public comment, but I wanted to ask the Commissioners, first, if any of you wanted to make closing remarks before?

VICE CHAIR SCOTT: I think our speakers (off-mic) --

MR. EARLY: Yes. Yeah, certainly, I want to thank all of our speakers before we transition to public comment. Let folks know and encourage them to file into the dockets, and the instructions for how to do so are in the notice. Again, this is a joint PUC and CEC workshop and so, if you could file into both dockets, if that's not too burdensome, that would be great to get it on the record, both.

COMMISSIONER SHIROMA: Okay. I wanted to echo all of that and to say thank you. And just some people know that I was recently an elected board member on the SMUD Board, up in Sacramento County. I spent 20 years there. Ran for election five times. And one of the things that I experienced at that time, and I'm speaking in particular to our labor friends, okay. I was privileged to serve on a board where everything that we did, okay, we looked at what did it mean for the

economy? What did it mean for our customers? What did it mean for our employees? And what did it mean for job creation and job growth?

And we looked at, as we were making in changes in technology what would that mean for partnering with our community colleges and the apprenticeship programs for training.

So, I imagine that same sort of philosophy will continue on in efforts that the State makes. And I think Senator Stern did speak to that, as well. So, thank you.

VICE CHAIR SCOTT: Thanks. I just did want to say thank you so much to all of our excellent speakers today for bringing their expertise, and their energy, and information. And also, to all of our engaged stakeholders.

And I do want to make sure that you heard the point that Bryan made. Maybe we can figure out how to pull up the link for you. But we do have an open docket, which gives much more time to provide longer comments, written comments, and we do read those. We've been listening very closely to everything that folks have said to us today, but warmly welcome getting written comments as well.

So, I just wanted to say thanks to everyone for

a really good day.

MS. THAKAR: And before we transition into public comment, which will be public comment both for this panel and the prior panels, if you didn't have a chance to speak, I also want to thank the Los Angeles Clean Tech Incubator for hosting today, in this wonderful space. Matt Peterson and their staff, they worked incredibly hard to accommodate us.

And one more housekeeping announcement, please be patient. Once we're done with public comment and you're leaving the parking lot, you may have to wait a little bit to get your car out since there is only one entrance and one exit.

MR. EARLY: Great, okay. So, I'm going to start over on this end and maybe make a sweep around the room in terms of public comment. And then, maybe I'll ask Tiffany to see if there are any remaining questions on WebEx that need to get answered.

So, remember to keep it to one minute, say your name, and speak directly and loudly into the microphone. So, here we go.

MR. PORTILLO: Thank you. My name's Luiz Portillo. I'm with the Inland Empire Economic Partnership.

You know, one of the common themes I've heard

throughout the day is really a discussion on cost and its impact. I just want us to be cognizant that for all of these programs, as great as they are, they're being paid for by someone. And it's being paid for by customers, by residents, by businesses to fund it.

And so, you know, the question was asked, what should we not do? And I guess there's two things that come to mind. Maybe somebody can maybe help me better understand why we should be doing them, which is why are we applying subsidies to those that don't need it? A couple of things that come to mind are, you know, the Energy Commission recently adopted a requirement that all new homes be required to install rooftop solar.

Why are we providing affluent individuals, and if you can afford a new home in California, you are affluent, with a subsidy to do what the law already requires you to do? Especially when a lot of that subsidy is being provided by people who are worse off economically? Why are we providing anybody who lives in a home that's valued over a million dollars with any kind of incentive? They can afford it. You mean to tell me you can't do that?

So, I would say, you know, if I can get your thoughts as to why we should be -- why shouldn't we be excluding those people from those types of programs?

And then, also focusing our efforts on those programs that really are going to give us the most bang for our buck. Right now, about 55 percent of our energy comes from zero net, zero emission sources. So, in my mind, energy efficiency task programs, while you may reduce energy use by 20 percent, would that money have been better spent, say, taking a diesel truck off the road? So.

MR. DOCHERTY: I'm just curious. In Vermont, on air source heat pumps there's no requirements for backup? So, you have a ductless mini-split or an outside air source heat pump. I know there was a study done, I believe -- oh, I'm sorry, Douglas Docherty.

I know there was a study done to look at the efficiencies of air source heat pumps, I believe in Connecticut. And when they went out to do the study, they couldn't do the study because the air source heat pumps were under six feet of snow.

So, I'm just wondering, there's no backup on an air source heat pump in Vermont?

MR. MERSON: There's not. But most of the installs in Vermont are retrofit, they're supplemental heat and air to existing systems.

MR. DOCKERTY: So, they keep their gas furnace?

MR. MERSON: On the existing. Now, with new

construction, we're seeing a significant uptake with heat pump only.

MR. DOCKERTY: With no backup?

MR. MERSON: That's correct.

MR. DOCKERTY: Okay, thank you.

MR. ARMSTRONG: I'm sure it's understood that no backup, other than electric resistance on those heat pumps.

MR. DOCKERTY: Right.

MR. ARMSTRONG: Right. Okay, just so you guys are clear, there's all-electric, heat pump-driven homes above the Artic Circle. There's a whole bunch of them. Habitat is an organization that designs and builds all-electric above the Artic Circle in Canada and Alaska.

MR. LEE: Hello, Min Lee for L.A. County, speaking on behalf of a local government. I would encourage the Commission to consider approaches similar to what the previous administration, in Washington, D.C., took around trying to incentivize states to take policy action. And in our case here, the State encouraging local governments to take policy actions that may be even more aggressive than Title 24, via like a waist to the top type approach, which has been shown to work very effectively and cost effectively, with limited resources. Thank you.

MR. FORTUNATO: Good afternoon. My name is Robert Fortunato. I'm the owner and builder of the Green Idea House. We built one of the first net zero energy, zero carbon case study houses that was built for less cost than standard construction, with standard construction materials and off-the-shelf technologies.

And I'd like to thank you, Commissioners, because you're setting the 2020 goal that all new residential construction be net zero energy actually inspired me. So, thank you for that.

So, I wanted to let you know, seven years later the house has worked perfectly. We actually carry our utility bill around to show all-electric absolutely worked perfectly. And you're welcome to pass that down.

(Laughter)

MR. FORTUNATO: No, it's right there. And we had some of the best engineers working on it in the country, for this project. And quite frankly, when I said to them that we wanted to cap off the gas line, they were very nervous. They didn't think we would meet the goal.

And after the fact, we actually over-produced by two and a half megawatt hours a year, and so we have two electric cars. It runs the two electric cars, the house, and we're still net zero energy.

So, Southern California Edison, the utility, still pays us about $100 a year back as a result. So, it all works. It all worked seven years ago, it certainly works better today. Thank you.

MR. HUNT: Good afternoon. My name is Ken Hunt. I'd like to thank the Commissions for allowing us to even take part in a panel like this, and the panelists, as well.

I'm a member of the International Union of Operating Engineers and we represent about 18,000 working men and women across the State of California. I'm a union member, but I'm also a Southern California Gas and Southern California Edison ratepayer. And as such, I feel obligated to voice my support for a little more balanced energy solutions.

I know that everybody here's been talking about electrification. And, you know, with my educational background, it's hard for me to sit up here and argue with you. I just am not equipped to do that.

However, I do get an electric bill and I do get a gas bill. And I can tell you that my electric bill, on a monthly basis, is about two to three times higher than my gas bill.

You guys may know why, but I know what I have to pay every month. And so, for me, I have children and I

have grandchildren. And as much as I want to support the fight against climate change by reducing greenhouse gases, I have to consider the methods we all decide to support and what impact they'll ultimately have on my family, and my children, and grandchildren.

I don't believe that eliminating the use of natural gas is the answer. I do know that, you know, as a ratepayer here we all have to consider not only how we can afford to pay for these things, but what effect it has on our families.

I just don't think that limiting our choices of energy sources will be less affordable. I think it will also be less reliable. We're already choiceless when it comes to our electrical energy source. But please, don't empower Southern California Edison and other electrical provides across the State to further limit our choice, reliability and affordability for energy by not considering all energy solutions to achieve carbon neutrality. Thank you.

(Applause)

MS. LEON GROSSMAN: Hi. My name is Andrea Leon Grossman. I'm also a ratepayer of both SoCalGas and DWP. And I'm a huge advocate for electrification. My SoCalGas bill is usually smaller than my DWP bill, but not always. My DWP bill sometimes is $4.00 a month.

And that's with two electric vehicles, and induction stove, and array of other electric appliances.

We do have an existential threat with climate change. Again, it's a matter of death and life. And we do have a choice in terms of who gets solar and solar companies. We do have a choice. And we do have, really, options. We do not need gas. We do not need to be poisoned by the gas. And climate change is here. It's real. It's now. And we need to act quickly. Thank you.

(Applause)

MR. EARLY: Anyone else on this -- anyone on this side? Oh, did you want to -- I think, since you've already commented -- well, here, we can do a quick one then, any who have already commented.

MR. ADER: I'm Harvey Ader, with the Public Solar Power Coalition. One thing I want to incorporate into the record here, this book: The Uninhabitable Earth, Life After Warming, by David Wallace Wells, that came out earlier this year, says basically that the rate of increase of climate change in three reports, the state, the federal, and the international that came out this summer, it's a lot worse that we thought. That we burned over the last 30 years, half of the fossil fuels that we used in the history. And we've done nothing.

Okay, we should be looking at district heating and cooling. It's going to get hotter. It's going to get a lot hotter. The fires, you know, the floods, all this, it's not going away. And we've got to look at thermal and the efficiency of thermal is much higher than PV.

Okay, we've got to look at them and we've got to look at cost effectiveness, and we've got to look at the equity issues. Every contract that goes out in this state, for solar and renewables, has got to have equity built in it for low- and middle-income people. And that's got to be -- we ought to go to the Legislature right now, when it's committees, and get this stuff done, and jawbone it. And there's a lot of different things we've got to look at.

Anyway, I've got my minute. But they had several people from the gas company who had a dozen folks. Anyway.

MR. EARLY: Thank you.

MR. DINALL: Hi. Ralph Dinall with Goodling's Institute. Since about 2008, we've been working with California on policies related to zero net energy buildings. We track them nationally. We've seen, since 2012 -- sorry, 2010, a 700 percent growth rate in ZNE buildings. Those buildings, the vast majority of them

are all-electric and they reduce energy use by 50 to 70 percent.

So, we have a successful program here. In fact, California is a national leader. Half of the buildings we track, there are about 560 buildings nationally, half of them are actually in California.

So, what I'd like to encourage is building on the success of that program. Don't leave ZNE by the wayside. It is a decarbonization effort and I think we could build on that success and establish programs and policies building on the shoulders of that.

There are a lot of other programs running right now that can be quickly switched to be, basically, decarbonization programs. The Behind-The-Meter Water Heating Savings Program, $6 million rolling out right now can be a heat pump/water heater program. So, build on the success that we have and the programs we have today to rapidly scale. Thanks.

MR. SWITALSKI: Thank you, sir. Jon Switalski, Californian's for Balanced Energy Solutions. Thanks again to the Commission and to the panel. I do just want to take issue with a couple of the insinuations or regional comparisons that were laid out here, as if the southern part of the U.S. is way ahead and that we should be envious of the work that they're doing on

electrification, or building decarbonization.

The reality of that is not true and I don't think we should be laying out false comparisons. And the fact that California is a leader in electrification and in building decarbonization.

The electricity infrastructure exists in the southern part of the U.S. because, as was stated earlier, the infrastructure costs are cheaper. Electricity costs are cheaper because of coal. That's the reality. Not because of renewables, because of coal. I mean, the NRDC is very effective, but not in Alabama, not in Mississippi.

And so, we shouldn't be, in a serious debate, setting up these false comparisons and leading people to conclusions that are not borne out in fact.

Again, thanks to the Commission. And these equity issues, these cost issues are very real. I would encourage a workshop, multiple workshops specifically on those. So, thank you.

MR. ARMSTRONG: Electric resistance as a growth node is not efficient. But if it's powered by hydro, if it's powered by any other renewable fuels, then regardless of its efficiency, it's decarbonized. In the south, if you're using a heat pump, even with a hundred percent coal, and no grid in the United States is a

hundred percent fossil fuels. About as bad as it gets is 92 percent. But even in the worst of all the states, if you used heat pumps, you'd have less net carbon emissions than if you were using the best gas.

So, electrification on any grid in the United States is an improvement if it's efficient. And if it's not efficient, then it has to be paired with more renewables. And that would be, I think, the more clear statement that I'd like to make.

MS. FASTILLA: My name is Anabella Fastilla and I work for a nonprofit organization that represents immigrants, vulnerable communities here in Los Angeles, and as well in the Coachella Valley.

I just wanted to share I have been involved for many years trying to protect public spaces, public lands. And I just wanted to say that this is a very complicated topic, I become involved in learning more about energy. And I just wanted to thank the Commission for bringing those forums. But it's not usual that immigrants or the immigrant community is in these spaces.

And what I wanted to share with you is that I live in an area where we really care about the environment. But sometimes it's, you know, horrible. And the place where I live, I live in Compton. We

cannot see solar panels and all these technologies that we have been discussing. It's not that we don't want it, but we need to be realistic that it's really like a challenge.

And as I am discussing -- as I am learning and I am learning from all of you guys, I just wanted to let you know that we are looking into the possibility of having the gas company, the electricity, and as well the different sectors to really work in collaboration so you can get the best solutions for all of us, and take into account the workers, but as well the immigrant communities, and the most vulnerable communities. But sometimes we don't have that spaces where we can express and voice what we want. And appreciate, as well, the fact that the Commission is looking to having those spaces in translation, where we can fully understand and we can fully participate.

MR. EARLY: Thank you.

(Applause)

MR. DE LA CRUZ: Good afternoon. My name is Carlo De La Cruz and I'm with the Sierra Club. I want to thank both Commissions for traveling down to Southern California and visiting us, where a majority of the population of the State lives. That's not a bias. I've spent ten years in the Bay Area, as a resident, and I

love it up there as well.

But I think the reason why Southern California is so important for these issues is because not only is the innovation happening here, as we can see in this space, but also the air quality issues are what are paramount.

I think it's really interesting. I traditionally work on air quality issues and transportation with the Sierra Club and, really, it's really fascinating and a learning experience to come here because the conversation is valuable and necessary and, yet, I don't hear the words "zero emission" enough. And I think that's a really important marker because we really need to not only understand the climate impacts, but the local health impacts of local air quality concerns.

And as we've heard from the previous speakers, it is not just about carbon as a lifecycle, but it is also about the end use climate impacts. And I really want to encourage the Commission that as we think about cost and choice that we make sure that it is a level playing field for all-electrification options, especially those that allow for greater indoor quality in terms of our air contaminants.

And we need to prioritize technologies that

truly bring us zero emission and bring us true air quality benefits indoor and out. Thank you.

(Applause)

MR. SEVERANCE: Thank you for the presentation today. I just wanted to comment, briefly, that one idea that I've seen that I find inspirational, Holmes Homes presented at RMI this last fall, has to do with inclusive financing. And pilot programs in the south have achieved 40 percent acceptance rates in rental properties and LMI markets. And the basic offer is that the utility's getting green dollars, green bond dollars and walking in with a proposition that they're going to quality the property to go cash positive after about $10,000 to $12,000 worth of improvements. And they're not requiring the resident to obtain a loan or sign for anything that would expose them to risk.

And the acceptance level goes through the roof when we eliminate risk to the residence.

I would just really encourage the Commissioners to take a hard look at that model and look for ways to make that work within the structure and infrastructure challenges that the IOUs have relative to on-tariff billing practices, et cetera.

If there's a way to resolve those differences, we would save billions of dollars a year and create

rapid transformation, create an incentive for rapid transformation that would not require rebates. It would eliminate the need for rebates and it would pay for itself. It's a win/win for all parties.

So, if folks would please be directed to that model and take a close look at it, and look for ways to resolve the differences, thank you.

Oh, my name is Bruce Severance, sorry. Yeah.

MR. EARLY: Okay, Tiffany, do we have any questions from WebEx who'd like to -- if we have time?

MS. MATEO: This question is from Nick Dear, on WebEx. As a building energy professional, one of the barriers we encounter is builders want to build mid- and high-rise all-electric apartment buildings, but are prevented by building code due to nonres, Title 24 limitations.

Will this impact Build?

MS. BORGESON: Hello. Yes, it will impact Build. As Sean has demonstrated, you can get around some of these things but it, right now, is not easy, especially with the modeling software to do multi-family buildings. And this is something the CEC is acutely aware of. I know that they're working on it. So, hopefully, that will be ready in time for the launch of the Build program.

MR. ARMSTRONG: Yeah, I want to add to that, that it's heartbreaking to have clients want to do the right thing and then have software, in the State of California where there's Silicon Valley, to have software not work would be the impediment to saving the world. It's just it boggles my mind. And so, if there's an extra million dollars to give to Neal Kruis of Big Ladder, which is the software development company for the Energy Commission, we don't have VRFs. We can't do central heat pump water heaters. These are like main technologies that happen in the big cities for all the mid- and high-rises. So, yeah, Nick, I know who you are. You're so on, right on there. Like we need some help with a couple of small/big software issues.

I guess the question is are you guys going to put any money towards that, solving the software? It's true.

(Laughter)

MS. MATEO: The next question from David Kay, on WebEx. SB 1477 funding starts July 1st this year, which is in less than three months. When will the first project using these funds break ground? Who will be reporting back to the CEC once construction starts? And how will the CEC regulate costs, homes treated and carbon savings?

MR. COX: TBD. Sorry, we're working as fast as we can on it. I mean, Commissioner, do you want to offer any -- put out any timeline of, you know, anything?

PRESIDENT PICKER: I'm sorry, I hate to say it, but the only timeline I know is that the Governor's 60-day plan is going out Friday. I have about 40 pages edit this afternoon, after I get out of this meeting, and two conference calls.

COMMISSIONER MCALLISTER: So, this is Commissioner McAllister. So, there is an active two-agency, you know, collaboration going on to try to figure out the deals of this -- the rules, and sort of the overall deal with the implementation of this program that is actively happening. And part of the goal of this workshop is to, you know, get the questions out there and encourage people to submit comments such that it helps us get to the point that you're describing. So that we actually have a program that's very clear, that's, you know, implementable and that the marketplace can run with. So, if you have ideas about how you believe the CPUC and the Energy Commission, you know, ought to craft this program then, by all means, right up on the screen here are the links to submit comments under both of our dockets.

MR. COX: Yeah, I just want to underscore I am part of that collaboration and I just wanted to underscore that we are working actively on it. I'm pretty much spending my entire, you know, time on it at work. So, you know, this is a new program, and there's a lot of complicated things. And we had something like 30 comments come in from different parties of, you know, 10 or more pages each. So, you know, these things take a while to sort of grind through.

But we're actively working on it, but we're not ready to, you know, promise any dates right now.

COMMISSIONER MCALLISTER: While I'm at it, I actually wanted to respond to some of the requests for bilingual treatment. (Speaking Spanish)

(Applause)

MR. SCHRAEDER: Hi. My name is Andy Schrader. I work for Los Angeles City Councilmember Paul Koretz, who represents 250,000 people here in Los Angeles. Thank you to both Commissions for having this hearing here today, very important issues.

If you haven't evacuated your two-year-old and your four-year-old from one of the fires, then you don't really know climate change up close. I had to evacuate mine from the Woolsey fire back in December -- or, back in November. And so, we know what it's like.

We became really interested in methane leaks back in 2015, when the Journal of Atmospheric Chemistry and Physics came out with a study saying that the methane leaks in Los Angeles were 60 -- in the Basin were 61 percent higher than expected.

So, number one, we would love to see some of the decarbonization occur within the pipeline system and check out what is causing these leaks.

Number two, when the SoCalGas, Aliso Canyon blowout occurred, we found out just how dangerous the methane gas can be.

So, we're definitely in favor of more incentives for full electrification as soon as possible. But also, we want to encourage job training for workers, any workers that are displaced or affected. It's very important to take care of this workforce who were, until recently, really heroes for keeping the lights on, and the heaters on, and all of that, so we must take care them as well. Thank you.

(Applause)

MR. EARLY: Okay, so is there any additional public comment? Okay.

MR. SINGLETON: Hi, everybody, Kito Singleton, President UWUA Local 522, SoCalGas. We're the bad guys.

I'd like to thank everybody for showing up. And

I'd especially like to thank the councilman for bringing up something. I represent a lot of demographics. I live in Compton. I'm less than a mile from the 710 Freeway. Less than a mile from the Alameda Corridor. So, I am in the middle of one of the worst areas for pollution. I'm a minority. I'm in a low-income neighborhood, so the environmental disproportionately affects the low-income.

My concern today is that I've heard all kinds of programs and incentives for the supply side, for the builders. I heard mentioned that we need to educate the homeowners on programs. We know about the programs, but when you're getting $10,000 back on solar that's going to cost you 20 grand, and you're hoping your kid gets a scholarship, or your kid is turning down schools because they can't afford to go to college, then a $10,000 rebate isn't anything. I'm going to keep it clean.

So, get rid of the rebates. You need to pay for it flat out. And we're not talking about just low-income. It's great, the money for the low-income. Going all-electric, cleaning the environment. Hey, I'm a Green New Deal supporter. Love Bernie, love the ALC. But at the same time, you've got to consider the middle class that's struggling to get by nowadays. They've got to make decisions. And believe me, going all-electric,

paying all that money out of pocket just to have a higher electric bill is not on the table for somebody who's trying to figure out how their going to pay their house note, keep their insurance, put their kids in college.

Also, you know, again, what are you going to do with the workers? You know, we're union. We make pretty decent living. You're talking about eliminating our livelihood and I haven't heard, until the councilman, anybody mention training. Nobody's mentioning numbers. You know, you're talking about we're going to create good jobs. What are you paying an hour? What are your benefits? You know, are you offering a pension? Some of us are lucky to still have a pension, you know. What are your 401K plans? Give us some numbers.

Because I can tell you right now, the people I represent, they're not going for it. What they don't know is that you guys are taking away options. Because everybody I talk to about this, the first thing out of their mouth is they can't do this. And I have to educate them, it's already being done.

(Applause)

MR. EARLY: Thank you. Any --

MS. GANATA: Hi. My name's Jennifer Ganata,

from Communities for a Better Environment. I think I wrote a comment earlier.

So, one of the things I also did want to bring up is the equity piece, again, because I think a lot of folks in our communities, CBs, out in east Oakland, Richmond. I'm down here in L.A. and Southeast L.A. I work in Wilmington. So, a lot of the communities that you just spoke about.

And I just want for the Commissioners to know that like we do need to actually prioritize the low-income communities. I'm hearing a lot of things about building. And while I think that's great, but we have to think about how does that also -- how do we make sure we don't displace people? How do we make sure that communities get to still be the communities that they are and benefit from a lot of this new, different technology?

And that's one of those things where I think for a lot of the, maybe low-income communities and communities of color, the environmental justice community is basically the front-line community, is how do you get them at the table? How do you hear from them? Because I think when you benefit those communities, you're going to benefit everybody. It's not a trickle-down situation, right? Like this is a

situation where we have to think about that we're making decisions for the future. How do we ensure that people are being heard when we're doing these different programs?

(Applause)

MR. EARLY: Thank you. Any additional public comment.

Yeah, Sean?

MR. ARMSTRONG: I'd like to add. So, I don't usually put this in my presentation because it's kind of intense, but my mother-in-law died in the Santa Rosa fires. And so, all the conversations that come forward around who suffers the most, like is it going to be the workers, who is it that needs the most, there are some people who are dead. Like a couple of hundred of them from climate change.

Going to the wake, holding my wife while she cried, talking with the grandchildren that now don't have a grandma. You know, if government isn't here to save us from a wildfire that's going to kill us, I'm not sure what the government's here for. Like if it isn't life and death oriented -- thank you for nodding, because you can see like this is really intense when someone dies from climate change.

So, I hope you guys work with all due speed.

Because on the Maslow's Hierarchy of Needs, not dying in a fire is on the freaking top.

MR. EARLY: Thank you. Any additional public comment?

Any closing remarks from Commissioners.

COMMISSIONER SHIROMA: I just wanted to share that President Picker appointed me to the Low-Income Oversight Board, which advises the Commission on the programs that are available for discounts, and what have you, for our low-income communities. And our next meeting is going to be in Compton on Monday, June 24th. And so, we'll be sure to get the information there for folks who want to join us for that discussion and presentation. All right, thanks.

MR. EARLY: Okay. Well, thanks everyone. Again, instructions are posted on how to comment. And we're asking on the Energy Commission side for stuff to be submitted to the docket by April 22nd.

So, thank you all for your participation very much and this meeting is adjourned.

(Thereupon, the Workshop was adjourned at 1:47 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.

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IN WITNESS WHEREOF, I have hereunto set my hand this 17th day of September, 2019.

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IN WITNESS WHEREOF, I have hereunto set my hand this 17th day of May, 2019.

Barbara Little
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