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CALIFORNIA ENERGY COMMISSION

In the Matter of:

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2018 IEPR COMMISSIONER WORKSHOP

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET

FIRST FLOOR, ART ROSENFELD HEARING ROOM

SACRAMENTO, CALIFORNIA

THURSDAY, JUNE 7, 2018

10:00 A.M.

Reported by:
Gigi Lastra

APPEARANCES

COMMISSIONERS

David Hochschild, California Energy Commission

Andrew McAllister, California Energy Commission

Michael Murza, California Energy Commission,
Advisor to Chair Robert Weisenmiller

ENERGY COMMISSION STAFF

Heather Raitt, IEPR Project Manager

PRESENTERS

Topic 1: Combining Existing Buildings Energy Efficiency (EBEE) Action Plan and Doubling Energy Efficiency by 2030 reports

Michael Kenney, California Energy Commission

Topic 2: SB 350 Doubling Energy Efficiency Savings Programs – IOUs and POUs

Anne Fisher, Moderator, California Energy Commission
Cynthia Rogers, Moderator, California Energy Commission
Alison LaBonte, California Public Utilities Commission
David Jacot, Los Angeles Department of Water and Power
Michael Callahan, Marin Clean Energy
Halley Fitzpatrick, Pacific Gas and Electric
Athena Besa, San Diego Gas and Electric
Ryan Bullard, Southern California Edison
Erin Brooks, Southern California Gas Company

Topic 3: Behavior and Market Transformation

Nicholas Janusch, Moderator, California Energy Commission
Sam Borgeson (via WebEx), Convergence Data Analytics

APPEARANCES

Topic 4: Industrial and Agricultural Efficiency Savings

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Colleen Breitenstein, Pacific Gas and Electric
Athena Besa, San Diego Gas and Electric
Erin Brooks, Southern California Gas Company
Don Kazama, California Energy Commission

Topic 5: Conservation Voltage Reduction (CVR) Technology

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Michelle Nall, Glendale Water and Power
Bryan Pham, Southern California Edison
Russ Griffith, Pacific Gas and Electric

Topic 6: Account for GHG Savings from Efficiency Programs

Shucheng Liu, California Independent System Operator
Angela Tanghetti, California Energy Commission
Gavin McCormick, Watt Time

PUBLIC COMMENT

Chris Walker, California Association of Sheet Metal and Air Conditioning Contractors

Monit Chabra

Brett Barrow, National Electrical Contractors Association

Randy Young, Joint Commission Environmental Energy Policy

Dion Abril, Western State Council of Sheet Metal Workers

Barbara Hernesman, Western HVAC Performance Alliance

Mark Hall, Local Clean Energy Alliance

Todd O'Connor. Clear Result

Valerie Winn, Pacific Gas and Electric Company

AGENDA

P R O C E E D I N G S

9:59 A.M.

SACRAMENTO, CALIFORNIA, THURSDAY, JUNE 7, 2018

MS. RAITT: Good morning everybody. Welcome to today's IEPR Commissioner Workshop on Doubling Energy Efficiency Savings. I'm Heather Raitt, the IEPR Program Manager.

The usually housekeeping items. If there's an emergency, please follow Staff out the side doors into Roosevelt park, which is across the street diagonally from the building.

Today's workshop is being broadcast through our WebEx conferencing system -- (coughs) excuse me -- and is being recorded. And we'll also -- so we'll have an audio recording posted in about a week, and a written transcript in about a month.

We do have a very full agenda today, so I'd like to remind our speakers to stay within your allotted time limits, and we'll be giving you little signs when you have a two-minute warning.

And at the end of the day, we will have an opportunity for public comments, but we'll hold that until the end of the day because our

agenda is so full. And there will be an opportunity for three minutes per person. And when that time comes, if folks in the room could come to the podium in the middle of the room there and identify yourself for the court reporter.

And also for our panelists, just a reminder, as you're speaking today, if you could remind everybody, for the folks on WebEx, your names, so that folks on WebEx can follow along.

Meeting materials today are available at the entrance to the hearing room, and also posted on our website. And public comments, written comments, are due on June 21st. And we certainly welcome written comments on today's topic.

And with that, I'll turn it over to the Commissioners for opening remarks. Thank you.

COMMISSIONER HOCHSCHILD: Good morning everyone. David Hochschild. Thank you for being here. And thanks to Staff for organizing, and all the stakeholders for participating in this important discussion this morning.

The energy efficiency is at the top of the loading order for the state for a reason. The most important megawatts are the ones that we

don't use. And we're pushing the envelope in the United States on this policy. The Governor, when he worked with the legislature to establish this goal of doubling energy efficiency savings is really setting the state on a course to be a global leader on this.

And I want to point out, we are having, in September, the Global Climate Action Summit. Over 3,000 credentialed guests from around the world are coming to engage on climate policy. As part of that, we are releasing Volume 1 of the IEPR, which is just telling the success stories of clean energy, efficiency, clean transportation. That just has been put out for public comment. The comments are due on that on Friday --

MS. RAITT: The 12th.

COMMISSIONER HOCHSCHILD: -- the 12th.

MS. RAITT: Yes.

COMMISSIONER HOCHSCHILD: So for folks who haven't had a chance to look at that, we welcome your feedback. The goal is to get that document done in time for the Climate Summit and tell the energy policy success story as best we can.

I want to introduce Commissioner Andrew McAllister and just to reiterate my gratitude for Commissioner McAllister's incredible leadership on this issue. Over the whole five-and-a-half years I've had the opportunity to work with him, he has been passionate and focused and relentless and successful. And what we did last month with the new code, including the solar mandate on Title 24 had reverberations all over the country. So I'm really, really glad to have Commissioner McAllister here at the Commission and here, leading this discussion today.

COMMISSIONER MCALLISTER: All right. Thanks, Commissioner Hochschild.

We have a packed agenda, and I certainly -- my brand is that I tend to sort of talk maybe a little too much, but -- so I'll try, you know, bite my tongue and mitigate that a little bit.

But I want to -- so Commissioner Hochschild is absolutely right, I am passionate about energy efficiency. And I think partly my task along the way here with energy efficiency and other topics, you know, but it's really to keep it real, okay? In order to get where we

need to go a lot of projects have to take place. They have to take place on the ground in real buildings, actual people, contractors, you know, professionals, designers, building owners, they all, you know, they all have to be aligned and they all have to actually do things. They have to get up in the morning and go do this work; right?

And so we need to structure our policies and we need to inform ourselves as, you know, advisors to the legislature, as policy implementers to get out of the way where we're not the best and, you know, highest sort of -- where we're not really needed in a particular, you know, link in that chain.

But more importantly, even, I would say, is get the policies right so that the incentives are there, so that people up and down, you know, the supply chain and the implementation chain can actually do the work that needs to be done. And so we want to promote that, incentivize that and get our policies all aligned. And that's not just in this discussion today, but a lot of the themes that we need to work through are on the agenda today.

So, you know, energy efficiency is changing. It is not just about saving kilowatt hours and therms any old time in any old way. We have a distribution grid. We have a transmission grid. We have a whole energy system that is, you know, becoming as, you know, I think the -- maybe it's really cliché, but it really needs to be more like an orchestra with many, many, really, literally millions of instruments playing in harmony.

And so as the demand side really surges in importance, as the distribution and grid itself becomes a focus of policy and action and investment, energy efficiency and its close corollary, demand response, and all the technology that we can bring to bear today in 2018 and beyond going forward on both of those topics, and over time, they're really becoming one topic, is really important. I mean, I think we can lead here in California. We are leading.

Referring to the Climate Action Summit, we are actually aiming -- so, you know, the sort of touting of California's success I think is, you know, one aspect and it's certainly a great leverage point for that. It's also a leverage

point to kind of redefine some metrics. We're going to have the world looking at us in September. And this idea that the shift, really, that's needed from an energy -- a set of energy metrics, it's really a set of emissions metrics, is something that we're working towards really kind of going big with on in September.

And this goes along with the emphasis on distribution networks. You know, if we're really focused on carbon, the when of generation, the when of us really matters, really more than the where, even. And so I think the, you know, how we do energy efficiency really has a time element to it that's relatively new. And we've got to sort of modernize the way we think about this and the metrics we use.

So that's a little bit of a heads-up. And I think the conversation of how buildings consume and how generation happens, whether it's at the building level or some larger scale, really is going to, you know, incorporate really centrally now a temporal element. The when really matters. So that way we can balance our supply and our demand, and that's the optimal course in terms of cost-effective ways of

developing and operating our systems.

So anyway, we'll get into some of these topics through the course of the day. I want to thank everyone for being here and certainly look forward to all the comments and the questions and the written comments. I hope everybody is moved by the discussion today to submit written comments, as well, and really develop the record. We need solutions. Doubling energy efficiency is not easy. I think we all can acknowledge that. But we have an innovation culture and we can develop those solutions and, when we can, highlight the policy changes that need to take place to really align the incentive that I said.

So anyway, high hopes for today. And thanks again for everybody being here. And I'm looking forward to the conversation.

We have Mike Murza from Chair Weisenmiller's Office, and I'll pass the mike to him.

MR. MURZA: Thank you, Commissioner McAllister. I'll be brief so we can get started.

On behalf of the Chair, I'd like to thank Staff for all of their hard work in getting us to where we so far, and thanking the members of the

public for everything they've done to get us where we are, as well.

As Commissioner McAllister noted, we've been a leader in energy efficiency for decades. And so doubling that is going to be a pretty heavy lift, and so it's really going to take a collaborative effort from all the different stakeholders and actors. And so we really appreciate you taking your time here to bring your expertise to the table.

So with that, I'm looking forward to the progress we make today.

MS. RAITT: Great. So our first speaker is Michael Kenney from the Energy Commission.

(Off mike colloquy)

MR. KENNEY: Good morning. I'm Michael Kenney from the Efficiency Division here in the Existing Buildings Office. So today, I'm here to talk to you about our new Action Plan, which is going to bring together all the disparate Energy Efficiency Plans we have floating through the Energy Commission, so it's called the Statewide Energy Efficiency Savings Action Plan.

So a little bit of background about what are we actually combining through this report?

So in 2015, we released our Existing Buildings Energy Efficiency Action Plan, and in 2016 the update. These were reports that were mandated under AB 758. And those documents acted as a ten-year roadmap to what we were hoping to accomplish through energy efficiency within existing buildings. And that report is due to be updated in 2019.

More recently, we had Senate Bill 350 which mandated us to set targets to achieve the accumulative doubling of energy efficiency, which is why we're all here today. And we released that initial report last fall, the Senate Bill 350 Doubling Energy Efficiency by 2030 Report. And that report is also scheduled to be updated next year.

And so the goal is, since these two efforts have a significant amount of overlap, both dealing with advancing energy efficiency across the state, to combine these efforts. And we're also looking to combine the energy efficiency components from our Low-Income Barrier Study, as well as, for those of you who were here at our last week IEPR, the Clean Energy Low-Income Multifamily Buildings Action Plan which is

focused on the multifamily sector. So all these reports, as I said, are working towards the same goal.

So these reports, we would expect to update -- or this combined report, we would expect to update biannually, and in off years be reporting through the IEPR any key updates. And the quantification component of energy savings that we have in SB 350, we would be carrying on through this new combined report. And where that fits in, I'll get into.

So the structure of this new report would be very similar to our 2015 Existing Buildings Action Plan. So we'll have our, you know, introduction, kind of vision and framework of the plan, we'll be hitting on the regulatory and policy updates that have occurred recently and that, you know, we're looking to move forward with, and then our goals. And so these are the energy efficiency goals that we're kind of setting for ourselves to reach 2030 doubling, as well as tackling the multiple barriers that exist across, you know, different sectors with relation to energy efficiency. And then the fourth chapter would be implementation, so for the

entities that are going to be getting us down the road, and what sort of timeline do we expect these things to happen on.

So the specific goals are also similar to the 2015 Action Plan.

So our first goal is the government leadership in energy efficiency. So we're looking at what are government entities doing to move the ball forward on energy efficiency? What programs are they operating within that? Can we quantify the savings attributed to those programs? What policies or missions are also ongoing that are going to help us get to our goals?

Our second goal would be data-driven decision making, so this is a discussion on the importance of energy data to improving our energy efficiency programs and to making sure that people who need to have access to energy data are able to get it to the perfect granularity for them to make the decisions they need to make.

Our third goal, so increased innovation and performance, this is keyed in on utilities and more largely, non-government programs. So what is happening across utility companies,

community choice aggregators, regional energy networks? What sort of energy efficiency program initiatives are they putting forward? And what are the quantified savings we can attribute to those? And what are they going to be doing in the future to help us get to the doubling of energy efficiency?

Our fourth goal would be recognized value of energy efficiency upgrades, so trying to properly value energy efficiency in the marketplace. It's looking at programs that are rating or assessing energy efficiency measures, trying to make sure that energy efficiency is on equal footing with other components in the marketplace.

And our fifth goal would be affordable and accessible energy efficiency solutions, so this is focused in on energy efficiency financing. So how do we increase the capital available in the energy efficiency market across sectors? What are the barriers that people are facing to performing energy efficiency upgrades, or just in general, not being able to maybe go as far as they would want to go? And so what are the possibilities there and how can we quantify

the savings attributed to that, that will help us reach our goal?

So what I'm looking for, for feedback from stakeholders today, we're planning to release an early draft of this Action Plan in early 2019 and kind of take it on the road, so to do a series of workshops across the state to engage the stakeholders and get additional feedback as we prepare this Action Plan. So what we'd like to hear from you, you know, to submit your ideas to the docket, you know, where should we go and who should be participating?

Additionally, we've posted a draft outline of this plan to the docket. So if people could go and review this and just let us know, are we omitting anything? Are there any critical components that we've overlooked as we go out and start to prepare this Action Plan?

So, you know, we're really trying to get out in front of this as we have, you know, these major goals to hit. And we'd like to be as holistic as we can in this approach for the plan since energy efficiency isn't going to just happen on its own.

So please submit your ideas to the

docket, and we'll save questions for the end of the workshop.

Thank you.

MS. RAITT: Thank you, Michael.

So next, we have a panel. And it's going to be moderated by Anne Fisher and Cynthia Rogers. Also, Anne Fisher has a presentation.

(Off mike colloquy)

MS. FISHER: Good morning. My name is Anne Fisher with the Energy Assessments Division. Today's Topic 2, SB 350 Doubling Energy Efficiency Savings Program section will feature speakers from the California Public Utilities Commission, four IOUS, Los Angeles Department of Water and Power, and Marin Clean Energy.

The doubling of energy efficiency goals is not possible without working together with stakeholders across this state to share ideas, set goals and spark innovation. Today our speakers will be sharing their experiences on topics such as the Energy Efficiency Business Plans, which were adopted last week by the CPUC, the role of behavioral programs and energy efficiency portfolios, and strategies to spur market transformation, and evolving need to track

impacts of efficiency programs on disadvantaged communities.

After the presentations, we will have a panel discussion to further explore the topics.

And without further ado, I will ask Heather to introduce our first speaker.

Thank you.

MS. RAITT: Thanks.

So first, if Alison LaBonte from the CPUC could join us?

(Off mike colloquy)

MR. LABONTE: Thank you, and thank you to the Commissioner, the California Energy Commission staff and my fellow panelists. I am happy to be here. I am the Supervisor for Residential Energy Efficiency and Portfolio Approval with the California Public Utilities Commission in the Energy Division. And I want to thank the team. I'm a new member on the team, and so I definitely leaned a lot on my team members to pull this together, as well as Paula Grinling (phonetic), who (indiscernible) is coordinating with the California Energy Commission on goal setting.

So just to set the high level here, of

course, the goal setting effort was in reaction to our objective with the SB 350 Doubling Energy Efficiency Savings. We, as the CPUC collaborated with the CEC to translate, well, what does that mean for the contributions that the CPUC regulated program administrators for energy efficiency, and that includes the investor-owned utilities, as well as community choice aggregators and regional energy network program administrators. What is their role in meeting in this overall doubling energy efficiency savings goals? And that's shown here in our light gray, the bottom wedge of this graphic.

And I also want to note that our activities regulated under the CPUC also support some of these other regs, advocating for codes and standards, which is under CEC, as well as demonstrating new and high risk, but high-opportunity ways of tapping into energy efficiency savings in the market, and that those demonstrations could potentially lead to other programs in these other wedges, leveraging our learnings.

So the format or the outline for this slide, the presentation I'll be making, is I just

want to orient to, you know, how do we translate from an overall vision that SB 350 sets, all the way down to the on-the-ground implementation by our program administrators. And along the way, we have built in metrics for tracking progress and then learnings that we can gain from using those metrics, and the program administrators implementing on the ground to feedback and to updating our goals and leveraging from each other. So that's sort of the overview outline of this presentation.

A little bit on the process side for how CPUC cycles with setting goals and then updating those goals after we implement for a few years.

We start by, every two years, the California Public Utilities Commission has a Potential and Goals Study. And that's where we determine, you know, overall there's a technical potential to tap into, but then there's an economic potential subset of that, and then a further subset is the market potential. And in -- after setting what those quantities are, then the Commission, in a decision, has adopted the market potential as the total energy efficiency savings that we see as aggressive yet achievable

for our program administrators to meet.

And so in adopting the market potential, we also break down to each program administrator what share of that total market potential each program administrator is responsible to step up and meet. Then the program administrators come to us with here's their forecast savings, how that compares to the decision that states what they have to meet and what it's going to cost to get there, basically taking the budget, the costs and the savings gives us the understanding of how cost effective will this portfolio that each program administrator is putting forward be?

And finally, we evaluate and verify what savings were achieved, and that's going to help us to feedback and did we meet our goals? How cost effective were our strategies towards meeting those goals? And then how can we learn and improve on our strategies and our programs that we're running? And that's where we really -- I mean, all of these areas, we have touchpoints with the CEC, but we definitely want to make sure in that that's a critical touchpoint to be updating and informing each other among the agencies.

One other thing I need to mention with this prior slide is it's going to get a little bit more complicated as far as touchpoints with other planning activities at the CPUC. And as many of you are likely aware, the SB 350 also requires first steps forward, that we need to do integrated resource planning. And for those that don't know, that's just basically an optimization effort where each program administrator brings forward assets or resources that they procure for both, you know, renewable energy supply, as well as things that occur.

In the loading order, you know, the first thing is to reduce energy efficiency, as the Commissioner noted. And so we're going to have to make sure that energy efficiency is counted and considered in this optimization problem of the integrated resources planning. And so we're basically going to be feeding inputs to that integrated resource planning efforts, as well as taking outputs in that interplay with our goal setting for future years.

So what's been going on in policy at the bigger picture level at the CPUC?

We have -- since SB 350, there's some

things that are the same at the policy level, and there's definitely some things that are new and some things that are the same. You know, a long -- for a long time, CPUC has held that we have to have -- be running programs in energy efficiency that are cost effective. And while the SB 350 bumps up what are goals in energy efficiency savings, we still have to get to the cost effective side. And so that's going to mean, you know, new challenges, and we better be tapping into new strategies and new ideas to meeting those challenges.

So in more recent time, with the business plans just last week getting approved or under the decision, we are taking some of the more recent strategies to really tap into those opportunities for saving, while still be cost effective, namely being our third-party solicitations to put -- have the program administrators put out to parties outside, designing really creative ways of bringing in energy efficiency savings in a cost effective way. And additionally, statewide implementation, trying to reduce some of the overhead or administrative by bringing programs where it

makes sense for them to be implemented over the state.

So those are just a couple of high-level ways of doing things new to reach the SB 350 goals and see be cost effective. And I'll mention more granular ideas a bit further in the slides.

So here we have, translating again from what is our CEC and SB 350 goals? What are those goals? And then how are we going to meet them with our CPUC-regulated entities? And basically here, the blue line, is what are the annual targets? So the earlier graphic I showed was cumulative. And then this is just annually. And then the by-sector bar chart is what do our business plans forecast to achieve over the next cycle, which is -- our business plan cycle goes through 2025. And the forecasts in total is the orange line. And if you look back in time, you can see that we've had forecasts and actual verified savings that exceeded our forecasts, so that looks pretty good for the electric sector. Maybe we're going to be well above our CEC savings goal on the electric sector side.

There's some opportunity -- or what you

see here is the strategies that are being proposed by the program administrators. We have growth in residential and commercial, and a little bit of growth in the other sectors in the early years.

And on the gas side the story is a little bit different. You'll see that there's a much smaller margin between our forecast and what we have to achieve on the savings by the CEC target. And then when you look backwards at the most recent EM&V, the study that came out showing our verified savings versus the forecast, verified fell very short of our forecasted saving goals. And in order to address that, you know, we did ask the utilities or the program administrators to come back to us and tell us what they would do to meet these goals. And in the business plan, we approved a higher budget to meet by -- for SoCalGas in order to have an ability for them to meet their savings goals. And both --

COMMISSIONER MCALLISTER: Can I ask a quick question --

MR. LABONTE: Yes.

COMMISSIONER MCALLISTER: -- just a clarifying question?

So the CEC savings goals was, just to be clear here, reflects the goal for the PUC-IOU programs as expressed in that doubling report; right? So --

MR. LABONTE: Yes.

COMMISSIONER MCALLISTER: Okay. So just to remind everyone, that is -- it's not a doubling of historical PUC, it's -- I think it was a 1.5, or something like that.

And so sort of a sub-conversation of the whole doubling discussion has been, you know, how can we get truly, you know, higher, more out of the -- you know, with this cost effectiveness constraint that you mentioned, you know, it's challenging to get evermore out of the same dollars.

But I just wanted to remind people that that 1.5, you know, the existing portfolio, you know, wasn't counted on to double its piece, but rather to multiple by 1.5, which left sort of a larger relative gap for the overall doubling goal.

And so one of the things we really need to work on, as you say, I think getting -- figuring out innovative ways to make even better

use of the ratepayer funds in the portfolio.

MR. LABONTE: Great. Thank you.

So I'm actually going to move on and then wrap up, probably, yeah, very soon because I'm overtime.

Some of the opportunities that we're looking into or have already launched to really achieve -- or fill that gap are on this slide, market transformation, which is a framework to allow longer-term strategies for achieving savings that push the bounds of what our current CPUC's policy allows as far as deemed savings and opens up a little bit for tapping into new savings from emerging technologies, as well as new mechanisms.

And the same with the normalized metered energy consumption. And I think each of the program administrators is going to speak to what are they doing? What are their strategies in these areas where they're, you know, basically leveraging the new, the policy changes in order to tap into some of those new opportunities with both, you know, incentive structures, new incentive structures that they've put in place, as well as new ways of reaching customers and

tapping into stranded savings? So we're doing a lot there. I'll let the program administrators go into that further, what exactly they're doing.

And then I did just want to make a mention to we're treating the metrics. That's critical that we've got common metrics across all the program administrators that we can learn from them along the way what the values are that are coming in under these metrics to continuously improve learning from each other, and then also sharing with the California Energy Commission on the programs for the other players that can help meet this overall doubling energy efficiency. And specifically, there are metrics on the customer bases, the customer segments that are called out that we want to pay particular attention to in the SB 350, the hard-to-reach markets or the hard-to-reach customers in the disadvantaged communities.

So I'll wrap up there with noting, yes, we are -- we have challenges ahead and we're looking forward to continuing to coordinate with the CEC and others in this space to meet those challenges.

MS. RAITT: Thanks very much, Alison.

So next, we have David Jacot from the Los Angeles Department of Water and Power.

(Off mike colloquy)

MR. JACOT: Okay, good morning everyone. I'm actually going to do this seated. I got a little bit of a gout flareup last week. Walking is okay, but standing, not for any length of time. So good morning, Commissioners.

So I'm David Jacot, Director of Efficiency Solutions for Los Angeles Department of Water and Power. I'm going to talk a little bit about our efforts here. Very quickly, I'll be going through why energy efficiency is important to the Department, and beyond just simply meeting goals, like SB 350, which we're certainly on track to do, our sustained effort to do that through 2020 and beyond, and a little bit on our non-energy benefits we look at, as well as equity. I know that's a big focus of today's discussion.

A few examples of successful energy efficiency programs. Also, an update on where we are in terms of behavioral and market transformation programs. And then I'll close with a discussion, for those of you who aren't

aware, we have a clean tech incubator in Los Angeles. It's at the La Kretz Innovation Campus in Downtown L.A. in the Arts District. And I'll talk about how we're leveraging that to support our larger energy efficiency efforts.

Oops. Yeah. Hang on. Okay. Sorry about that.

So why energy efficiency for L.A.?

This chart is an interesting one that really tells quite a story on GHG reduction and where our focus is going to be in energy efficiency and in our larger decarbonization efforts. You know, we've got to push to bring more and more renewables on the line, but only 19 percent of California GHG comes from the electric power generation sector now. So even if we take that all the way to zero, we still have 81 percent of emissions, which obviously does not meet the AB 32 targets.

So we're looking at, you know, we're looking at expecting a significant amount of electrification, specifically in transportation. There's been a recent push on the residential end use side, as well, but there's a lot less potential there. The transportation sector is

enormous in terms of the GHG reduction potential that can come from electrification.

And so we see that electrification as an opportunity and a challenge at the same time. It's going to be providing quite a bit more load, which from a revenue standpoint is good, from a rate stabilization standpoint is good in terms of having more kWh to spread fixed infrastructure costs across. But from the standpoint of meeting that load, especially as we move to decarbonization degeneration mix and go to more and more renewables, introduces a lot, you know, a lot more challenges, especially the time-of-use issues that Commissioner McAllister mentioned earlier.

So we're looking and we're working very, very closely with our other distributed energy resource groups inside the utility, and we're working to integrate those resources, energy efficiency, demand response, solar, distributed solar, and that's individual solar, rooftop solar, community solar, ground mount, electric vehicle charging, and distributed battery storage. And so the proper and strategic integration of those resources will be absolutely

key to accommodating more and more renewables on the grid as the grid grows bigger and bigger.

So, for example, we've done rough numbers on transportation electrification. If we get to where all the light-duty passenger vehicles in the City of Los Angeles are electrified and they're charging in the city, plus the commuters coming into the city, we've got a nighttime population of 4 million and a daytime population of 5.5, that doubles our load. We retail twice as much gigawatt hours under that scenario as we currently do today.

So if you're 50 percent renewable, we're not yet, but say we're 50 percent renewable on today's load, we're only 25 percent when you consider that level of load growth due to transportation electrification.

So energy efficiency is first in loading order for good reason, it makes everything else smaller. So as you integrate these other distributed energy resources, as well as the utility-scale resources, obviously, they work hand in hand, they have to, energy efficiency foundationally enables this to work because it simply just makes, like I said, everything

smaller, which helps on the costs, obviously.

Okay, so a lot of the numbers here. The bottom line, we set a 15 percent cumulative target between 2010 and 2020. We're well on track to make that. We've been ramping up our programs from a low of $37 million spent in 2011-2012 to on track for about $170 million this year. And then that funding level stays relatively constant going forward. And then after 2020, we'll start to ramp up again as we get into that ten-year period.

COMMISSIONER MCALLISTER: Say, David, can I ask a quick question?

MR. JACOT: Sure.

COMMISSIONER MCALLISTER: Have you done some scenario analysis in terms of looking at these load shifting opportunities and how much they would cost to realize versus, you know, some of the alternatives if those don't happen, such as, you know, having to essentially rebuild much of your distribution grid?

MR. JACOT: We have. We've done a Distributed Energy Resources Integration Study that specifically looked at a business-as-usual case. In other words, everything just kind of

continues as it is with minimal, if any, coordination, and an optimized scenario. And the optimized scenario did call for, you know, some policy shifts which may or may not be realistic. One of them was less distributed solar, so we'll see what happens.

But we did identify that with proper integration we could cut the incremental cost of what we think the rates are going to be in 2030. So if we just let business as usual take its course, we wind up with one rate scenario. And then if you try and strategically optimize the deployment, both locationally and in the absolute magnitude of the various distribution energy resources, we found an incremental case that was about 40 percent less than the business-as-usual case. And there are other scenarios built into that, as well.

COMMISSIONER MCALLISTER: Well, great. Thanks.

MR. JACOT: So onward to 2027 and beyond, we just completed a potentials study last week for the 2017 to 2017 time period. That's an outgrowth of AB 2021 which directs the POUs to -- we used to be every three years, now we're every

four years, set a ten-year rolling target that at least hits ten percent. We've been pegging it at 15 percent cumulative across the time period.

We took it all the way out to 2030, just because so much other planning is done out to 2030, as well as SB 350. That those numbers, are very fuzzy. It's kind of like a flashlight in the fog; the beam spreads and things get fuzzier the further they are out. We're actually planning to build in-house capacity to do our own potentials studies and do them on an annual basis, so we can feed them right into our IRP at the same time. But bottom line, if that pace continues, a 15 percent pace is about 400 gigawatt hours a year, and gets us to another 15 percent by 2027.

We put a lot of focus on the non-energy benefits, as well. We have guiding principles we adopted by in 2012. You know, City of Los Angeles is collecting quite a bit of money from our customers, our ratepayers, our citizens, to spend on energy efficiency. So we have some, you know, non-energy benefits from a policy standpoint that we want to achieve. Chief among them is equity of access to our programs. There

should be something for everybody. You know, cost effectiveness, I can just go in and work with the port and work with the airport and maybe the school district and make the goals off of that, but that doesn't satisfy the policy imperative to provide efficiency opportunities for everyone.

I'm getting a two-minute warning, so I'm going to pick up the pace he a little bit.

We're also very focused on job creation. We did a study with UCLA that we're updating, 16 jobs for $1 million invested. It's very labor intensive, less capital intensive and more labor intensive.

Equity. So we adopted equity metrics at LADWP. So we start with the CalEnviroScreen and then we -- to determine areas of most need. And then we've built in these equity metrics in these five -- into these four categories, water and power infrastructure investment, customer incentive programs, procurement, contracting and employment. And we've got about 15 of these metrics, which we then use GIS mapping to see how we're doing across the city. Now, this one is a composite, but we can do this for any of those

programs and any of those metrics. This is a composite specifically of customer participation in various energy efficiency programs. You can see where the hotspots are of participation and nonparticipation.

Okay, in the interest of time, on the programs, I'll talk about a couple of them, and then I'll talk about what we're not doing.

So residential LED distribution, we just completed giving -- distributing door to door two 75 watt-equivalent LEDs to every household in Los Angeles. We completed that yesterday, I believe. And so that's a nice outreach opportunity. We have the basic programs that everybody's familiar with, express lighting, custom, direct install. Our own facilities walk our talk. We have an excellent partnership with SoCal Gas, about 17 joint programs we administer. And that's helped us bring in -- plug some holes in our portfolio, new construction, residential and commercial, and some other areas to allow us to serve all the markets and segments and customers in the city.

Now on behavioral, we are a little bit behind, and I'll tell you. We don't have AMI and we don't see AMI anytime soon. We want it. We

plan on it. It's in our five-year strategic plan, both water and power. But, you know, as some of you might now, we had a tricky billing system rollout a few years ago that has consumed our IT resources ever since. And now we're needing to upgrade that, for cyber security which, of course, is, you know, paramount important, so that is going to push us out a little bit on AMI. We don't really have an ETA at this point, I would say sometime in the 2020s, which doesn't sound very optimistic, but we'll see. We'll see what happens there. But without AMI, we're limited, you know, to what we can do. There's still things we can do and we will do them, but, you know, we don't have the real-time information that can really take advantage of some of the new platforms and technologies that are coming out.

The good news is by being so late to that party, when we do get there, it will be a mature field, both from a cost standpoint and, clearly, what works and what doesn't. So we'll be able to catch up very quickly.

Finally, I'll talk about our La Kretz Innovation Campus and how it really reinforces

the emerging technologies side of energy efficiency. And that's how we get those out-here (phonetic) savings and get those out-here savings up in the ten-year target cycle because we need to have those technologies in the pipeline coming in, so it' a business incubator. It's not necessarily a tech incubator, but it helps companies that already have a product get through the certification process and have a business plan and find some financing, et cetera, to help them grow there, and just general business management assistance.

So the incubator assists with the technology incubation and emerging technology products in the companies. It helps them become -- you know, grow in the market and get commercialized. And then because we're there as well, we actually have staff there, we assist with building those into our energy efficiency programs, providing incentives to help drive market adoption. The unique thing about having a business incubator attached to utility is we provide a tremendous market, both our own facilities, which are vast, as well as access to our customers which run the gambit of all

segments. And so that's a very, very unique thing that I don't think there's any other partner incubator that has that.

And then because we do extensive evaluation measurement and verification of our program savings to make sure that the savings are real and we can count on them as a resource, we also get that feedback back to those companies. You know, you think your product is saving this. This is what we're finding. And that assists the next -- that's the virtuous cycle -- that assists the next iteration of those product lines and services.

That's all. I think we're holding questions to the end. Okay. Great.

Thanks everyone.

MS. RAITT: Thank you. So next is Michael Callahan from Marin Clean Energy.

And you have to hit the page up or down.

MR. CALLAHAN: Great. Thank you.

Good morning. My name is Michael Callahan. I'm a Regulatory Attorney for Marin Clean Energy. And we are a local not-for-profit electricity provider. We're actually a governmental entity. I'm a public servant.

And you can see that solar field in the background. That's MCE Solar I. It's a project we got built and we're going to take ownership of as soon as the tax credits are fully taken advantage of, and that's in our service area. It's on a brownfield site in Richmond, California, so local power for our customers.

Our mission is to address climate change by reducing greenhouse gas emissions through renewable energy, stable, competitive rates, local economic and workforce benefits, and energy efficiency. And just, I'm going to run through a little bit of education about CCA, because I always like to take the opportunity, but the I'll move over to the business plan and energy efficiency programs.

This is a graphic that shows that MCE is focused on the generation, while PG&E still does the transmission and distribution for the electricity our customers use.

As a bit of a timeline, we formed in 2008, started service in 2010, and we're currently serving over 450,000 customer accounts.

This is a map of our service area. You can see, we're serving the entirety of Marin

County and all of the jurisdictions within it, the same for Napa County, much of Contra Costa County, and in Solano County, we're serving the City of Benicia, 33 member communities that are represented by a board of directors that are made up of locally-elected officials from those jurisdictions. And you see it's 27 board members versus 33 communities because Napa County has delegated all of its authority for its jurisdictions to one board member.

We have energy efficiency programs. That's what we're here to talk about today. This just gives you a quick snapshot of some of the history of MCE. And we focus also -- sorry -- we focus also on water savings, so not strictly electricity. We actually also have funding for gas efficiency within our energy efficiency programs, as opposed to sort of the partnership model that some of the other program administrators have in California.

So I'm going to talk about some highlights for MCE's recently approved business plan.

First, it's a comprehensive portfolio, which is a new thing for MCE and for CCA's

generally. That means we're looking to serve more than just residential and commercial sectors. We're looking at industrial and agricultural. We have an expanded workforce component. And we're looking to do resource and non-resource offerings across all the sectors.

One thing that I think is particularly interesting about the business plan is the focus on a customer-centric approach. And we're doing that through a single point of contact model that I think is a little different from how it's been done before. We're focusing there, it's not a referral, but it's sort of how our folks are trained in-house to be able to help customers access our energy efficiency programs, but also other program administrator's energy efficiency programs where we don't have an offering. And even beyond energy efficiency, a full spectrum of demand-side resources, rooftop solar, battery storage, even health and safety. So we're looking for sort of an integrated set of offerings that work for a customer built off that platform of energy efficiency.

Another interesting piece that I find is that we have a declining incentives model within

the business plan and it's a little bit modeled after the California Solar Initiative where, you know, emerging technologies, you may need to have higher rebates. But for those technologies that have good penetration, you can bring the rebates down and rely more on the relationship and the technical assistance to get projects done. So it's a way to reduce costs for the programs over time.

I'm going to go now through sort of each sector and talk about some of the offerings we're planning to put forward.

First, in the residential sector, we focused on single family and multifamily, but for both we're looking to provide targeted single measure rebates, as well a standalone direct install program, stepping into new construction with a focus on zero-net energy, including behavioral programs, in addition, information automation, so folks have what they need and may not need to engage in order to save energy. And in single family, we're looking at a comprehensive retrofit program, as well as continuing to leverage the Energy Savings Assistance Program funding with the general EE

funding. MCE has a pilot through the Energy Savings Assistance Program which is low-income energy efficiency, our income-qualified program. And we are working to integrate the delivery of those two funding streams, so we'll continue that in the residential space.

In commercial, we're looking to expand the offerings small commercials tend to get beyond lighting. We want those folks to have deeper opportunities to get energy efficiency and, again, other resources, like water savings. And for MCE, we're looking to serve large commercial customers for the first time. Previously, we had been focused on small commercial customers.

We're really excited about the opportunity that meter-based savings presents, particularly the normalized metered energy consumption, or NMEC, and we'd like to incorporate that when feasible. In addition, focusing on new construction in commercial.

For agricultural and industrial sectors, these are, as I mentioned, new sectors for MCE. And we'll focus on the traditional measures, such as pumping for irrigation, and the strategic

energy management for industrial, but we also want to make sure that sort of each customer has a project that works for them. That may mean bringing in our multifamily program to help with farmworker housing in an agricultural customer site, or starting with one-off rebates for industrial customers to build their relationship and get a foot in the door.

In terms of stepping outside of the sectors, behavioral and market transformation, the customer transformation concept we have, which ties in the sort of customer-centric approach in building a relationship over time and the declining incentives, is based on market transformation studies, the fact that customers don't need, necessarily, rebates in order to get projects done.

We, in the past, have had a My Energy Portal and a Home Energy Reports Program, but we're looking for new opportunities to do innovative things. And we think one big opportunity for market transformation is around heat pumps. We think there's a lot of opportunity there in terms of electrification and reducing greenhouse gas emissions, and a lot of

work to be done upstream and with contractors in terms of getting that deployed more broadly.

In terms of disadvantaged communities and targeting and serving disadvantaged communities, it's worth noting that those are folks that are lower income and have higher environmental pollution in their area. And we have those within MCE's service area. Many CCA's have disadvantaged communities in their service area.

And one of the things that we don't want to get lost in terms of the focus on disadvantaged communities is that it's not a perfect fit, there's some holes in the CalEnviroScreen tool, folks that are still facing, you know, low-income challenges and challenges with health and safety issues that may not show up as a disadvantaged community. So I think it's important to take a little bit of a broader look while you're still trying to serve that community.

And in terms of the Multifamily Program that we have today, we're sort of integrating with that a low-income families and tenants, or LIFT Pilot, and that's the Energy Savings Assistance Program funding I mentioned earlier.

And that's working on a number of things, but part of that is to help define a hidden community of folks which are folks that have difficulty or challenges engaging with our energy efficiency programs and try to collect data on barriers that those folks are seeing.

And some of the data that we're collecting there, folks that have enrolled and have received information in a language other than English or have been engaged through a CDO, a community-based organization, some of the barriers we're seeing now relate to the income verification process. We're also planning to collect information around non-energy benefits through pre- and post-surveys on comfort, quality of life, and understanding of the installed technology.

And finally, I'm going to talk about some methods of measuring energy efficiency in terms of disadvantaged communities and hard-to-reach customers.

And I think, you know, all of the program administrators who recently had business plans approved through the CPUC are working to finalize the metrics, and we're likely to use a common set

of metrics. But I think one sort of theme that I would like to throw out there is just to try to keep metrics consistent between general income folks and low-income or disadvantaged communities to avoid creating silos. You may need some additional metrics to make sure your reaching certain populations, but we should try to keep things as consistent among folks as possible.

And in terms of doubling energy efficiency, one of the things that I'm really interested in is helping to get our policy, our metrics, our cost effectiveness looking at unified metric between gas and electricity, Btu equivalent or a net Btu-type metric that could incorporate the hourly impacts of efficiency, should look at the greenhouse gas emissions and grid benefits, so capturing that part of the value, not strictly the energy savings. And I think that helps really unlock the efficiency we can get through electrification. And, of course, the value there grows as our grid becomes greener.

So that concludes my presentation. Looking forward to discussion.

COMMISSIONER MCALLISTER: Heather, can I

ask one quick question?

So you said that feasibility of NMEC was -- so you said you want to do it, but you can't until it's quote feasible. What do you mean by feasible? What's the barrier there?

MR. CALLAHAN: Well, I think that the CPUC is looking at out to do NMEC and has approved an approach for the industrial sector. And that approach adds steps to the current customer review process, which is maybe important but a bit burdensome. And so I think we're looking for, you know, as an approach gets finalized for other sectors, that it's useful and easy to implement, particularly for smaller customers.

MS. RAITT: Thanks. Next is Halley Fitzpatrick from PG&E.

MR. FITZPATRICK: Hello, this is Halley Fitzpatrick from PG&E, and I'd like to thank the Commission for inviting us here today to talk about our business plan and how -- and our general efforts to achieve the State's SB 350 goals.

So a quick summary of what we're going to talk about, what I'll be sharing today is the

highlights of a very high-level summary of our business plans and the strategies that we're pursuing to achieve 350 goals, as well as a little bit of a closer look at some specific market transformation and behavioral activities that we're doing. And I'll wrap it up with a summary of our disadvantaged community efforts.

So to start, for me, when I first heard about the -- that we were expected -- we were now charged with doubling energy efficiency, I tried to think of some analogy, like what does that mean? And Commissioner McAllister mentioned an analogy earlier about an orchestra, and I think this one's probably a little bit similar. And I thought about telling someone to jump twice as high as they can jump. So we were already jumping as high as we can, now jump twice as high.

And that was, initially, that was my reaction was, well, of course, we can't do that. But then after some reflection and you think about it, we're asked to jump twice as high, not that same day, but we have some ramping period, some time to jump higher.

So what would someone do if they wanted

to jump twice as high in the future as they could today? They might change their diet. They might change their training regimen. And I they might get a new pair of shoes, say.

So it's going to take a -- it's going to take a few things. There's no one trick to jumping twice as high as you ever have in your life.

So for PG&E, how we're going to attempt to jump twice as high is also with three key strategies, and those are maximizing the value of EE as a grid resource, wisely deploying our customers' investments in energy efficiency, and also streamlining our portfolio. So I'll go into a little bit more detail on each one of those briefly.

So we really need to advance EE and double EE. We really need to develop it as a cost-effective grid resource that is integrated with other distributed energy resources. Sometimes that might mean competing with them. Sometimes it might be cooperating with them. But in all cases, integrating better with distributed energy resources.

Some examples of that in the past that

we've had in the past that are our test bed, so to speak, is we've had several PVSM (phonetic) initiatives. These are very localized energy efficiency and -- excuse me -- demand response-type programs in areas that have grid constraints.

Oh, and obvious ones that are right up there, actually, is, and they were mentioned earlier, is looking at new opportunities with normalized metered energy consumption and pay-for-performance methods to make the EE savings much more tangible and real, and therefore more competitive among DERs.

The second one is widely deploying our customers' investments and being a little bit more strategic with the funds that we have. And I think one of the biggest things, one of the biggest changes that we see that's going to happen over time, it won't happen overnight, is moving away from a portfolio that's very heavily reliant on widget-based rebates and having set dollar transactions for certain devices, and moving towards other models that use financing, other types of financial incentives or non-financial incentives to move the needle,

including looking at ways to deploy outside capital investment, private capital investment.

And lastly, we're streamlining our portfolio. Historically, we've had over 100 different programs at any given time which, in some cases, can be confusing for our customers, and in many cases, inefficient for us to be running two parallel, very similar programs. So we're looking to have a more streamlined portfolio that's more customer centric, likely with less individual programs.

And another huge thing we're doing there, along with the other IOUs, or other PAs, I should probably say, is nurturing and further developing our statewide programs and recognizing that some programs really work better if they're more extremely consistent throughout the entire state, such as new construction programs, for example.

So a second -- so that's the ultra-high level.

To zoom in ever so slightly, this is our wheel of -- our business plan wheel that's kind of famous and plastered all around our offices, and it's really driving how we think about bringing energy efficiency to our customers. And

I'll quickly go around the wheel for you today.

In the commercial sector, a real key thing is we're looking at targeted value propositions for those specific subsegments within the commercial sector, looking at new -- and kind of especially looking at new incentives, financial and non-financial models.

In the public sector the real focus there is looking at stranded potential and aging infrastructure of our public buildings.

And in the industrial sector, some of the things that we're really excited about, and it's a statewide effort, is the Strategic Energy Management Program, which we're hoping is going to challenge a number of challenges -- going to overcome a number of challenges that we've seen in the industrial sector for achieving energy efficiency.

And agricultural, similarly, we're looking at strategic partnerships and looking at not only saving energy, but also saving water.

And lastly, in the residential sector, we're looking at new -- especially excited about new targeting methods to have household level targeting to find out where the real -- to

accelerate our interventions into the houses that have the most opportunities.

And then tying that all together is something we call the cross-cutting sector, and these are different interventions and strategies that go across all customer sectors. And it kind of adds to the streamlining of our portfolio as these types of efforts are best done at the portfolio level, not just necessarily just at the customer sector level. I'll leave it at that.

So I'm going to talk briefly about some market transformation, one of our exciting market transformation programs. This is called the Retail Products Platform, or RPP. And this program is interesting because -- I have two minutes left -- it's very interesting. I'm going to speak very briefly about it.

How do we drive change in the marketplace in large retailers in California when those large retailers have a national and, likely, a global presence? So for that, we need to up-level and work with our sister utilities across the country to really drive change in how those retailers look at stocking their shelves, because they don't -- sometimes they do but many times they

don't want a special decision about a unique skew (phonetic) that's only available in California, so we need to think bigger.

Another really exciting program for us is a behavioral program that's called Home Energy Reports, or HER. And this is -- the premise of this one is about people's tendency to want to keep up with the Joneses, so we send customer's materials to tell them how much energy they use compared to efficient homes or compared to their neighbors in hopes that that drives change, but it's not so much in hopes because we have evaluations for these programs now and detailed evaluations that's shows that these actually really do drive change.

And we're now on a couple iterations, a couple years in -- a few years into this program, such that now we're looking at targeting specific customers and looking, in some cases, the same notification might drive seven customers to decease their energy use, but it might drive someone else to increase their energy use. So how do we address that customer that was a negative saver? What kind of different flyer should we send them so that they actually save?

And I'll close with disadvantaged communities. This is, obviously, a hot topic and a part of SB 350. One of the first things that one needs to do when thinking about disadvantaged communities is learning where they -- where these communities are and who these customers are and how many of them. And here's a quick sample, a plot of where these customers exist in our service territory. The interesting thing here is that there's over 1 million customers. This is 20 percent of PG&E's customers are disadvantaged customers. So we've done a lot of analysis to try to pinpoint that and help us identify them even more and look for trends.

One interesting trend is that there's a lot of overlap between those customers that are in disadvantaged communities and those customers that are eligible for our CARE Program. And one, I think, exciting thing is that of the CARE-eligible customers in our disadvantaged communities, 99 percent of them are already enrolled in CARE, which I think is a great start. But we obviously still have a lot of work to do beyond just enrolling people in the CARE Program.

PG&E's overall disadvantaged communities

strategy, one of the very first -- a key part of the strategy in developing an enterprise vision is just getting the right people together and the right -- in the same organization to have, essentially, a laser focus on addressing the needs of disadvantaged communities with new programs and other interventions, so we have a new organization with a Director of Disadvantaged Communities now that was recently put in place several -- a few months ago.

The second level is increasing our collaboration with not-for-profit organizations to grow community partnerships.

And lastly, a key part of the overall strategy is making sure that we're tracking our progress and achieving a real measurable impact in these communities.

So I'll close with a summary of some of those metrics that we're currently looking at for energy efficiency and that are in the approved business plans now, but are still -- have some fine tuning listed there. I won't read them for you. And also, there's looking at the different disadvantaged communities metrics and other programs, such as how much ESAP, Energy Savings

Assistance Program, a low-income program, participation there is in that area, as well as electric vehicles and solar penetration.

I think, thank you for your time.

MS. RAITT: Thanks very much.

So next is Athena Besa from San Diego Gas and Electric.

MS. BESA: Good morning, Commissioners and all of you guests today. Thank you for inviting us to speak on our energy efficiency business plan for the future. I'm Athena Besa with SDG&E, and I am the Senior Energy Efficiency Project Manager.

So in general, we look at the business plan as an opportunity to hone in our energy efficiency to actually help in contributing to getting California's preferred resource to be more cost effective and to actually reach a lot more customers and deliver more savings.

So one of the things of these five items here that we have that we're focused on are to develop a single platform so that we can focus customers into -- a they journey through their energy efficiency. A lot of you know that customers start thinking about energy efficiency,

but it's not an instantaneous decision, nor is an instantaneous purchase the end of their journey. So we keep -- we have to keep nurturing them so that we can actually harvest all of these energy efficiency savings that we're looking for.

The other thing, too, is continuously improving customer engagement and experience. Sometimes customers don't have a good experience and it turns them off energy efficiency. And they all -- for other -- there's plenty of other distributed energy resources. And so they would tend to skip energy efficiency and move towards other distributed energy resource opportunities, which may or may not be, in the grand scheme of things , the best option.

Okay, so this is a general overview of the statistics in our business plan filing. We have, on the average, $160 million that we intend to carry forward until 2025. We, at this point, don't anticipate that we would require additional funds to see us through the end of 2025, which is what the goal is the Commission gave us. And so if you look at it over time for SDG&E, we start up high at 236 gigawatt hours, but in the long run we come down to about 214 gigawatt hours.

What one of the interesting things about the business plan is that there's a push towards a lot more statewide activity. And I think Halley talked about it in terms of their retail platform experience, for example, that a lot of it is going on across the state and across the country. And so if we leverage these types of programs, we could probably get a better bang for our dollar.

So the next of the slides, which you all have in your presentation, actually provide a profile of the different sectors that we have in our portfolio. It has statistics about how many customers we have, what percentage of consumption and end uses they have, and different types of future ideas that we have to address this. I will focus only on the first three which is the residential, and the commercial, and the public sector, which for SDG&E is the majority of its customers. And then for those of you who stay this afternoon, we'll focus -- I will talk about our industrial an ag sector.

So our residential sector is the majority of our customer base. So we have over a million residential customers and they're primarily

divided between single family and multifamily. As you can see, that 32 percent of our EE spending is on this sector, and they use about 36 percent of our consumption.

So when we look at them for the future, most of the end-use opportunity starts declining. The plug loads are forecasted to grow. But then again, with the advent of a lot of self-generation the potential starts declining from that perspective since we -- energy efficiency programs only impact the savings that come from the grid, not from distributed resources. So a lot of -- SDG&E has a large saturation of solar customers. And another opportunity is, really, for increasing load on our grid is our increase in electric vehicles.

So one of the things that we're looking at, really, is home management systems. So if you look at it moving forward -- did I do it right? Yes.

So in the past, we depend on rebates, like Halley was saying, single transactions, rebates and so forth. But really, the opportunity for residential customers, and I think the potentials study does indicate this, is

there's a lot of potential in behavioral programs. And so we are looking to expand our behavioral programs.

One of the things that we recommended in response to the Commission's reconsideration of the evaluation methodologies that they're using is currently behavioral programs require you to be valuating them using an experimental design, which then means we have to maintain a control group. As Halley has said, we've done this program for a few years and there are savings.

So we are recommending that we no longer need to have an experimental design, but rather allow as many customers to participate in the program so that we could actually increase the potential for savings from that perspective.

Another interesting thing about behavior programs, which we probably should spend a little time understanding, is the lifecycle of the savings. Currently, it only has a one-year life cycle, which means we have to keep maintaining these types of customers over time so that we maintain the savings that are accruing from behavior programs. But there are early studies that have shown that potentially it is beyond a

one-year life cycle for behavior savings. So that's another way to look at opportunities to leverage meeting our SB 350 goal. Okay.

Our commercial market is our next biggest market. So we have about 100-plus million customers on the residential side, and we have about 230 to 250 customers. And I remember one of our directors who was doing our business services, she always characterized the market that we look at as commercial as it's anywhere from the military, which is the naval bases, all the way down to a nail salon, for example. So this is the mix of customers that we have. Most of SDG&E's commercial customers are really small customers. So we have about 85 percent of our customers are under 20 kW. And the majority of our businesses are either wholesale, retail, office, and hospitality and other services.

So one of the things that we're looking towards for this particular market is the whole-building approach. One of the things that we want to leverage is benchmarking, as driven by AB 802. So a lot of the business customers, plus some multifamily customers, will be required to do benchmarking at certain points in time.

And since they have to interact with the utility, it provides us with a good indication of where our commercial customers are as we interact with them. And then we use that as an opportunity to start working with them and developing an energy action plan that will take over time so that they can actually also improve their benchmarking standing, but also look at energy efficiency opportunities over time.

And then as probably most of you know, for office and this type of commercial buildings, 75 percent of the total savings potential comes from either a whole building, a whole-building approach, or lighting. So with the increase in codes for lighting, it becomes a lot more challenging for us to find opportunities for lighting. So we look forward to maybe, potentially, new technologies for lighting that will give us a leap in achieving energy savings. And then continuing to work on the whole-building approach.

One of the things that we want to focus on, and I think Halley alluded to this, also, is a concerted effort to work with customers in a single fashion in the sense that we nurture them

over time, we develop plans with them, and we look to check in with them every so often so that we can make sure that, you know, they're on their track to get to energy efficiency, but also at the same time tweak it as they make changes to their own business models.

Okay, I think I talked about that.

And so the -- a new sector is the public sector. The public sector used to actually be classified under the commercial sector based on the NECS (phonetic) codes. But because they are -- they have enough characteristics that are significantly different than the normal commercial customer, that you would probably want to provide a little more focus on them.

So again, one of the biggest public customers that SDG&E has is the Navy. So they're a federal agency and they have their own way of doing business that we have to address. Then we have the state agencies. Then moving down the line, we will have all the different local governmental agencies that we work with. So when we work with our public agency, it's a combination of providing them with incentives and rebates, technical assistance and so forth. But

at the same time, especially for local government agencies who have Climate Action Plans, we have partnerships which are focused primarily on them working towards their Climate Action Plan goals. Okay.

So as we move forward with the public sector, we will want to understand better how each of these areas work. So the federal -- SDG&E has had a longstanding relationship with its federal military installation over time since the '90s, and we've been very successful with that. Currently, we have local government partnership with major -- our county and the major cities of our county. And so we've made a lot of progress on their Climate Action Plans. And then we have the different institutional partnerships that we have with the UC, CSU, and other state agencies. So we're going to continue to focus on this.

Overarching on this whole business plan, as I said, is the third-party implementor. So we talked about maybe looking at, and I think Alison mentioned this, looking at streamlining administration costs, avoid duplication of costs to increase the cost effectiveness of portfolios.

And so hopefully with the combination of statewide programs and third-party implementation, we can actually look forward to an increased cost effective portfolio to deliver these savings, since we do have a lot of challenges in terms of meeting cost effectiveness.

So again, if you go through the rest of the slides, they're about the industrial and the ag sector, which I'll cover later on. So hopefully I caught you up.

Thank you.

MS. RAITT: Great. Thanks. Great.

Next is Ryan Bullard from Southern California Edison, excuse me.

(Colloquy)

MR. BULLARD: Hello. I'm Ryan Bullard. I am a Senior Adviser with the DSM Planning and Integration Group with Southern California Edison. Thank you to the Commissioners and all the stakeholders for being here today to talk a little bit about the energy efficiency business plans.

I just was given an instruction I ignored. Okay.

This slide, I will not spend much time on. We're Southern California Edison. We're in the bottom half of the state, minus SDG&E down there. And this slide is really to kind of focus on the fact that, you know, we've been doing energy efficiency for a significant period of time and have delivered a lot of energy efficiency savings.

But I think the important -- oh, wrong button -- note is that these business plans are really sort of the next evolution in providing energy efficiency savings for a lot of our customers in the State of California. So we're glad to see that the business plans were just approved in the -- I think it was like last week, funding through 2025. So I'll kind of go over the general overview of the business plan here in the next four or five slides and the major drivers that are going into affecting Edison's business plan.

I think that the top bullet here that we all have kind of touched on before is the idea of achieving cost effective energy efficiency savings. And a lot of the major touch points and strategies within the business plan focus on

streamlining a number of offerings, utilizing more cost efficient delivery pathways where possible, but also leveraging the AMI data, now that we're getting our arms around it a little bit better for either meter-based measurement, but also targeting to see -- make sure we're talking to the customers that have the opportunity for energy efficiency savings, rather than knocking on doors of people who don't need it.

As a result of this, and not just as a function of how codes and standards or baselines have changed, I think that there's another side of consideration here that the avoided cost benefits associated with energy efficiency have changed dramatically since this portfolio was started. The 2018 Potential Goals Study saw avoided cost benefits drop by over 30 percent associated with this, which provides extreme pressures on cost effectiveness challenges.

And as a result of that and the other existing market condition, we're probably going to see very dramatic shifts in the composition of the portfolios over time. I think Athena touched on this a little bit earlier; right? But

specific -- or especially Edison's focus on lighting technologies, definitely going to see a decrease in that across the portfolio, not just in the residential sector, but also the commercial sector, as well.

There's obviously this increasing focus on behavioral retrocommissioning and operational offerings and figuring out how those can work side by side with other widget-based solutions and how we can deal with the accounting issues associated with that.

So another point is about how cost effectiveness is really impacting, when you look at this from a portfolio perspective about non-resource or market transformational activities, we sort of have one bucket of funds that judge -- is judged for cost effectiveness, and as we look at market transformation in our low-resource activities, how those sort of interact and affect our Resource Acquisition Cost Effectiveness Program.

So at the end of the day, these are about customer-facing programs. And obviously the biggest thing that should be taken into consideration is the customer shift to time-of-

use rates, how can we use these programs to educate them, support them and give them the bill management tools that they need?

But as Alison touched on, the EE potential goals is only one portion of SB 350 and the energy efficiency side of the -- from what the IOUs are going to be doing. Edison has also released its Clean Power and Electrification Pathway that kind of provided a sort of a framework and a pathway to look at how SB 350, and equally important, how your SB and AB 32 goals could be achieved in looking at it from a cross-sectional greenhouse gas perspective, rather than a silo of energy efficiency-only perspective.

Man, I'll learn by the end of this.

So as a part of the changing environment, and Athena touched on this early, is this expansion and reliance on third parties. We're really looking for innovative solutions in our portfolio and looking at how we can increase the concept of pay-for-performance that was, actually, partially enabled by SB 350 to kind of help support the realization rates necessary to make sure that we're funding programs and not

finding out after the fact that the savings is or is not there.

Obviously, we've touched on this with all the other IOUs, as well, but increasing access to energy information. We're going to be moving also to, obviously, the statewide administration of programs to hopefully increase economies of scale and be able to leverage a sort of single point of contact and consistency statewide to support market adoption for customers.

I think it's important to note that we're looking across all the tools in our tool belts to help support customer adoption and market transformation more feasible, whether that's emerging technologies, introducing it into the mass market in through programs, or ultimately putting into a codes and standards.

And so the business plan is only 314 pages long, so it's a nice read if you're interested. But I took a little smattering of strategies and tactics to kind of give you a flavor of each sector's sort of high points, talking about what kind of things you could look forward into there, about what offerings we're looking for and what specific interventions are

addressing which barriers.

The residential sector, there's an increasing reliance on the behavioral performances that Halley pointed out earlier. But we are also looking at sort of targeted and pay-for-performance-type models for replacements of maybe whole-home offerings or other types of offerings. I don't want to make you confused. I'm not designing, delivering or implementing a program up here. I'm just giving you an example.

And so the other sectors that kind of all have some cross pollination is the commercial, industrial and agricultural sectors in terms of different types of customers have different technical expertise. And being able to deliver the right offering a the right time and making sure that we have a way to reach some of the smaller customers that may struggle with participating in our programs, I think strategic energy management, I put that in there, it's sort of something that was running in parallel to the business plan developing, of how we're going to introduce operational, behavioral, retrocommissioning savings alongside a widget-based performance it the industrial sector, and

figuring out how we can make pay-for-performance and meter energy -- metered energy consumption as usable as possible, as simple as possible for our customers to make sure we can capture stranded potential and use existing baselines and just expedite the process in general.

And for our public sector, I think Athena touched on this, as well, talking about how we can support them in leading by example, helping them with the different types of efforts that they're working through now, whether it be benchmarking to identify facilities that they need to target as part of their long capital investment time frame, and being able to work with them as they develop their Climate Action Plans, whether that's data access for them or data access for their communities. And also, we have a reliance on the cross-cutting portion of our portfolio codes and standards, emerging technology and, of course, workforce education and training.

As a part of the market transformational efforts, I like to kind of point out a lot of those strategies actual were leveraged and pulled from the AB 758 Existing Building Energy

Efficiency Action Plan to kind of cite and sort of consolidate best practices.

I think it's also important to note that we've had a lot of success actually in market transformation. Our programs themselves are performing market transformation. We have already seen a significant amount of success. I love to use lighting, because I actually read that EMNE (phonetic) report that LED prices were declining 16 percent year over year and kind of seeing those real effects on the market based on our programs and other market effects, as well.

So as I mentioned earlier, there are challenges with market transformation today as we look at how it fits in and how to right size it in the portfolio, given different resource constraints. And obviously tracking market transformation indicators or where we are in terms of progress is, obviously, a vital discussion about metrics. And how we kind of track our progress across the portfolio, I think that they all touched on this already, that these are sort of developing in real-time still, even though that they've largely been sort of defined, for the most part.

And, of course, leveraging best data where possible, where available, I think that there's some extremely challenging things that we do struggle with today that, hopefully, we can kind of figure out in the future. And one of the, of course, focal points is around disadvantaged communities, and we will be tracking metrics around that. And it's also important to note that disadvantaged communities, EE is only one small portion of it and it does span across multiple proceedings. And we've kind of put in here our electrification pilot project for the San Joaquin Valley, just as another example of that.

So with that, I think I finished under time. Here's my contact information. And I will sit down, waiting for questions.

MS. RAITT: Thank you. So next is Erin Brooks from Southern California Gas.

MS. BROOKS: Thanks. Good morning. I'm Erin Brooks, the Regulatory Policy and Reporting Manager for SoCal Gas in our Customer Programs and Assistance. I have the benefit of going after everyone on this panel, and so much of what I'm going to discuss today will likely be

repeated. But what I will try to focus on for the benefit of our time is what sets SoCal Gas apart and highlight what we have in common with others.

So you're all familiar with SoCal Gas. We are the largest natural gas company in the country. We deliver clean, reliable, safe energy to over 21 million customers. We are very excited that our business plans were approved on May 31st. And something that was, you know, a common theme across all of the PAs that have been presented today, program administrators, is that we're all looking to simplify our offerings to make energy efficiency a much -- more accessible to our customers in order to get the -- target these deeper savings and to jump twice as high, as it were.

One of the things that sets SoCal Gas apart is, as Alison mentioned earlier, we are increasing our budget over time and forecasting those efforts in recognition that energy efficiency savings will be more challenging to come by as we go forward as we have, you know, targeted a lot of that low-hanging fruit and we're looking for these innovative solutions from

the marketplace, but we think that that will require some additional investment on our part.

Here we go.

So our business plan is also 500 pages, some light reading in case you have some extra time on your hands, but we'll give you a very high-level overview today.

Some of our key goals that we discussed earlier is really targeting the long-term delivery of energy efficiency savings through products and services that customers would install, as well as energy efficient operations and practices, so looking more towards behavioral interventions and operational strategies. But we really want to, again, meet our customers' needs through simplified offerings.

We also want to recognize that as a gas-only utility, we can't do this alone. David Jacot mentioned earlier that SoCal Gas and LADWP partner. We also partner with the 17 electric utilities that are in our territory. We also partner with water utilities to deliver really comprehensive solutions to our customers to help target gas, electricity and water savings to really raise the value proposition to make these

investments on a comprehensive scale.

So I think this slide really sums up what we've been hearing today and how we really get to these SB 350 goals. We're going to need new program models to scale cost effective and streamline the experience. That includes our pay-for-performance approaches that we've been discussing, strategic energy management, normalizing energy consumption, as well as maybe some unique financing opportunities to reduce the reliance on our traditional incentive models.

We also will do increased collaboration with the energy efficiency industry. So as we transition our portfolios to more third-party designed, delivered and implemented, we're looking for that innovation from the market to help us target those deeper savings.

And then finally, targeting our customers using our interval data analytics. So we have our advanced meter networks that SoCal Gas finished at the end of 2017, so now all of the utilities have this ability to target our customers who have higher energy usage or specific energy needs, and also to the locational targeting so we can deliver specific energy

efficiency benefits in areas where there is grid constraint or pipeline constraint, as it were, so we can do some better targeting to get those deeper savings.

This slide is very overwhelming, but it really highlights that we have our five sectors that we've discussed, along with the cross-cutting efforts, like our codes and standards, workforce education and training, financing. And our goals in each sector are very well described in our business plan, but essentially we want to achieve our SB 350 goals, our goals that are set by the Public Utilities Commission, and really do the best for the customers under the plan.

So how do we get there?

The business plan has proposed a bunch of different strategies. And I look at this as sort of tools that are in this toolbox that we can all leverage in order to help target our customers and achieve these savings. So some of the strategies that we propose are things like partnering, and that's not only partnering with different fuel providers, electricity, water and gas, but also partnering with the customers themselves and their management teams. We have

intelligent outreach which is leveraging our advance mater network. We have technical assistance strategies, incentives, financing, direct install.

All of these things are tools that we can use and that our third parties can use to help us propose, design and deliver programs. These are not comprehensive by any means. But based on our experience and running our portfolio over the past 25 or more years, these are the things that we are looking toward in the future as some potential good strategies to give leverage.

Some of the trends that we're seeing are a lot of opportunities. We have a lot of new construction gaining momentum. If you have been to Downtown L.A. recently you cannot look out a window without seeing a bunch of cranes. And so LADWP and SoCal Gas are really focusing on new construction. We have a lot of legislative mandates that are helping drive progress in this area. SB 350, as we're here today to discuss, but also AB 802 which allows us to target below-code savings, and AB 793 which leverages energy management technologies.

We also have an increase in multifamily

new construction. You know that the trend in the housing sector is going in that direction, and so we need to develop specific solutions to target that customer base.

And we have some challenges in our rural areas. SoCal Gas does cover the San Joaquin Valley and other more rural parts of Southern California. Where we have recession, it still persists. And making sure that the energy efficiency investment is a great value to the customer is a challenge that we're still facing.

And then we have a lot of very unique segments. We have a really diverse service territory with a lot of different needs. And so we're looking to, again, try to streamline our offerings to make it simpler for the customers to participate, and we are looking for those ideas.

So another eye chart for you all. This really outlines, basically, those tools that I discuss in our toolbox and where they can be applied, from our perspective, in each of these sectors. And the takeaway from this slide is they can be applied everywhere. So maybe not technical assistance in the residential sector, but if you have those ideas, bring them forward.

And maybe not SEM, strategic energy management, in residential, but otherwise we think that there's a lot of opportunity to have creative proposals, leveraging all of these strategies in each of the sectors.

So some examples that I will just go through very quickly. In our residential sector, again, the IOUs are tasked with being the determiners of need of our portfolio and highlighting where we believe there are opportunities, and then looking to the marketplace to provide those solutions. We will also be providing some of these programs, as well, in the future, depending on how the market provides those opportunities to us. Our plan or our mandate is by the end of 2022 to have our portfolios be at least 60 percent delivered by third-party providers. But to the extent that that would be greater than that, then we are looking forward to those opportunities.

But in the residential sector, again, we're looking for whole-building solutions, and maybe some energy management technologies leveraging our 8793 offerings.

In industrial, we recognize that the

industrial sector is segmented based on the kinds of industry that there are. So like food processing may be different than refineries, which would be different from much smaller industrial facilities. And there might be different approaches warranted for each of those spaces.

In the commercial sector, we're looking for disadvantaged community outreach, and also some segment-specific solutions, like retail, food service, and mixed-use buildings.

In ag, we look very much at urban farming and greenhouses. I'll talk a lot more about that when think through industrial and ag.

And then lastly, this public sector which, as Athena mentioned, is separated from the commercial sector for really the first time starting this year, where were affording it a more special focus based on the needs of those customers. So often, public sector customers are on a different fiscal year. They have different approval requirements. And so acknowledging the needs of those customers will be helpful and really important as we encourage them to make these energy efficiency investments.

I'll quickly talk through market transformation and behavioral strategies.

SoCal Gas offers a few behavioral programs now. 2018 is the first year where we've been offering home energy report in the energy efficiency portfolio. When we did our AMI rollout, the advance meter rollout over the course of the last several years, our behavioral programs sort of lived in that area until the advanced meters were completely installed. And once the installation happened we took those programs over in our portfolio. So that's new to energy efficiency starting in 2018.

And we are delivering over -- or we're targeting delivering over a million home energy reports in 2018, which is around 20 percent of our residential customers. And we will be ramping that up going forward, consistent with the potential and goals study.

We are also offering a seasonal savings program in which we partner with Nest. I think Marin Clean Energy offers a similar program where Nest will adjust the thermostat for the customer very slightly to achieve these savings without bothering the customers comfort in the home, so

it's a really neat program.

And we have some Prop ZNE pilots that are taking place, which I will also describe here. There are four pilots right now at various schools in Southern California, looking at roof insulation, thermal retrofits, windows improvement. We have solar installations. Some of these are partnered with Southern California Edison, but they are in flight right now. And we are looking forward to how these school districts adopt the ZNE strategy and how we can support that going forward.

And then lastly, I'm going to talk about the disadvantaged communities and how we're going to report and track that. I think it was Halley that talked about this earlier, how we have lots of metrics in our business plans where we're going to evaluate the progress in our various sectors. And we want to be able to track specifically our interventions in disadvantaged communities in our territory. So we're going to look at things like our first year savings in these areas, the number of customers who are participating, and those who are kind of hard to reach, and hopefully tool some specific

interventions in order to achieve greater participation in those areas.

In SoCal Gas territory around a third of our customers are qualified for CARE programs and ESA. That does not mean that they are automatically considered disadvantaged communities. We know that there's the CalEnviroScreen tool that we use to identify those areas, but there is a significant overlap in Southern California for those customers. And we want to make sure that they have increased access to energy efficiency where it's really important.

And that is my presentation. Off to the panel. Thank you.

MS. RAITT: Go ahead.

MS. FISHER: Hi. This is Anne Fisher with the California Energy Commission again. I just want to say a thank you to all our presenters for coming out today and sharing with us. And now we're going to transition to the panel discussion.

Our first question for the panel discussion is: Which energy efficiency programs do you administer that have resulted in the

highest energy savings? Are there ways to transfer these successes into programs targeting sectors that have not achieved as much savings, such as the industrial and agricultural sectors?

And I'd like to have Erin Brooks from SoCal Gas start us off with this discussion.

MS. BROOKS: Sure. Hi. So for SoCal Gas, our industrial sector is really the largest contributor to savings in our portfolio, outside of codes and standards. And within that sector the food processing segment is really important, which I'll go into a lot of detail about that later this afternoon.

But I think what we're looking forward to when it comes to transitioning successful strategies into industrial and ag, as well as across our portfolio, kind of the three things that I hit on earlier. So pay-for-performance programs, that will really simplify the offering. Instead of making customers go through this process where we're verifying specific widgets are installed or going through the customer review, if we're looking at normalized metered energy consumption data and being able to see the savings that are realized at the meter, and then

pay the customers or pay the implementors based on those savings, we think that that's the simplest, a simple approach that can be really expanded, especially in industrial and ag.

We also think the Strategic Energy Management Program for the industrial sector is going to be really key, which we're launching now. And we'll take those learnings and expand that beyond industrial as is appropriate.

And then the last piece is the interval data, so leveraging our advance meter network, leveraging the networks of the other utilities, so that way we can target customers with the highest usage or in the specific locations where energy efficiency need is greatest. That ability is sort of unprecedented until now and we're really looking to tap into it.

MS. FISHER: Okay. Thank you.

COMMISSIONER MCALLISTER: Can I ask a quick question, just before we get to everybody else, just so you can keep this in mind?

And so industrial is brought up a lot, which is great because that's been a big gap, I think, for a number of years. And that's -- there's a lot of potential, and I think

particularly in gas, but all across the board, so that's great.

And then several of you brought up pay-for-performance and I want to ask kind of a nuts and bolts question about that. And maybe each of you when you're talking about that or other things, is there a methodology discussion happening about pay-for-performance? And, you know, there are a lot of details to that. And I think, you know, it's really the Energy Commission's job. I mean, obviously, you know, in the IOU, it's the POU -- it's the portfolio, but it's really a statewide issue, particularly wherever there's AMI, but really, it's a statewide issue, period, so -- and we have to have consistency. And it's also relevant for the forecast, and it's certainly relevant for the IRPs.

So I'm wondering if each you could sort of tell us where you are in terms of what it means to run a pay-for-performance program. The performance fees; how do you know and how do you plan to sort of put that in place and get some consensus about the methodology?

MS. BESA: Thank you for the -- thank you

for your question, Commissioner.

I think that, as you said, industrial has been the most challenging sector for a long time. And a lot of it has to do with the challenge of measurement and verification because of the issue of establishing baselines and trying to assess the impacts of these modifications through their changes in their production levels, which then has an impact ultimately on what their final energy usage is, which may or may not have to do at all with the energy efficiency aspect of the project. And so, and as probably most people know, industrial was exempted from the NMEC opportunity or the normalized meters analysis precisely because of these reasons.

And so in terms of doing pay-for-performance, I think that, first of all, we understand in a broad way that pay-for-performance is you say you're going to deliver savings of X, we do some type of measurement verification that we agree to, and we then drew up the payment based on that. And there's a lot of nuances between that.

So the most challenging thing is actually agreeing to a measurement and verification plan

in order to have an effective pay-for-performance program, one that is fair to both the ratepayer that we represent, and also the implementor, who in, you know, in good faith is actually implementing a project. And many things can happen to the customer in the process that has nothing to do at all with the project itself. And so trying to determine after the fact what you can tease out belongs to the project itself versus just operational changes is challenging.

So I think that the Commission, the Public Utilities Commission approving a strategic energy management plan approach, the study has actually developed a good measurement plan for the industrial sector that hopefully we can extend to the commercial sector. And they're a lot more predictable than --

COMMISSIONER MCALLISTER: Uh-huh.

MS. BESA: -- the industrial sector. It's a good start to do this from that perspective.

COMMISSIONER MCALLISTER: And then I probably wasn't clear. The pay-for-performance, I think, has potential across the board, not just with industrial, but -- so they're really two

separate issues.

But that's precisely why I asked the question, is that who's going to have that -- who's going to drive that conversation so that it's not piecemeal, so that it's not contextual, entirely contextual, so it's not, you know, customer-specific necessarily, but it operates under some actual guidelines that are consistent across the state? Because that -- you know, if we want rigor and if we want to really know, we've got to decide on the methodology.

So I want to, well, I want to move on to some others on this, but -- and let them answer, also, Anne's question.

MS. BROOKS: Well, Commissioner, if I can respond?

The CPUC is addressing pay-for-performance and normalized metered energy consumption. There was a ruling a month or so ago where parties all responded and provided input, so that regulatory process is happening. But we are very interested in standardizing the approach for a calculation, and based on the kinds of customers we're applying it to and the level of review that's necessary by the CPUC

versus the program administrators versus the evaluation after the fact. So it is that -- that work is underway.

MR. CALLAHAN: This is Mike Callahan with MCE.

I just wanted to add, I think that we're hoping the normalized metered energy consumption will help that across all sectors in terms standardizing the measurement. I think there's a separate conversation to be had that may not need to be standard but more about best practices in terms of how you structure those incentives. So we're hopeful for conversations in both of those areas.

MR. JACOT: David Jacot, LADWP.

We certainly have the AMI issue for the vast majority of our smaller customers, but our large commercial customers have been on TOU for a long time, so we have the capability there.

We have built into our customer performance program EONV (phonetic) protocols or monitoring verification, EM&V protocols, for projects -- and criteria for projects over a certain size or amount of complexity or an emerging measure that there's still a lot of

uncertainty around. And so we do, on those projects, six months of monitoring verification.

What we'll typically do is pay half the incentive up front and then -- because that gives us some cash flow on the projects in return. And then at the end of the period, we'll true up the numbers and if the savings are more than expected, we'll recalculate the incentive and pay out the balance. If they're less than expected, we'll recalculate the incentives and pay the lesser balance. So we do that. Now the next step -- so that's on a project-specific basis and for large, complex applications.

The next stop -- the next place to extend that to is when we have full AMI, all customers. Then we can start doing this, you know, and the NMEC approach can really take root over -- you know, you know, take hold of a lot more of our projects and our customers, but it's just a -- but it -- and it's another case of where we're late to the party, but by the time we get there all the up-front trial and error work, hopefully, will have been done and paid for by somebody else, and then we can just choose what works and run with it.

MS. FISHER: All right. Thank you.

MS. LABONTE: Yeah, I was just going to -- this is Alison, CPUC. And I just want to -- I hear that it's important to have measures or consistent guidance. However, I think for something as new as pay-for-performance and structuring and new incentive models, these earlier efforts in hearing from the community what pay-for-performance incentives may work and understanding that it may not be a one-size-fits-all is important. And especially with emerging, how we're going to have to evolve and bring new emerging technologies and strategies to bear over the course, through 2030, we'll need to allow for pay-for-performance incentive models to evolve, as well.

COMMISSIONER MCALLISTER: Yeah, for sure. For sure. And we've funded, you know, at the Commission, we've funded quite a bit of research on that. I think it formed the basis for some of the work that's going on at the utilities. And I want to give PG&E kudos, actually, for some of the smaller customer, you know, aggregated pay-for-performance work that you guys have been doing.

MR. FITZPATRICK: Thanks. This is Halley from PG&E. I'll take that as a queue to expand on that a little bit, a little bit maybe beyond -- I'd like to speak for a moment beyond pay-for-performance towards customers and think about, we're also looking at pay-for-performance on implementors. Because as was brought up earlier today, we're moving to 60 percent third-party design, proposed, implemented programs, and how do we remain cost effective under that model, also, and how do we make sure the risk is balanced?

One of the first things is defining what performance is. I think a lot of times we think about pay-for-performance in the context of pay-for-energy-savings performance. But our -- the energy savings make up, actually, a relatively small number of our total metrics that we need -- that we're tracking to in California, some of them, not the least of which are in disadvantaged communities. So I just -- this is a friendly reminder that there's a lot more to performance than just delivering energy savings.

And I think one of the things that we might even be exploring as we're really

challenged with cost effectiveness is do we pay for cost effectiveness? Is that a performance metric that we reward implementors on, for example?

But most importantly with -- if you're going to be paying for performance, it's important that that performance itself is measurable and it's understood by all parties involved before you enter a program, before you enter an intervention, to avoid contention and make sure that all success is defined for all parties.

COMMISSIONER MCALLISTER: Anne, why don't you go ahead and -- sorry.

MS. FISHER: Okay. Thank you.

COMMISSIONER MCALLISTER: Sorry to steal your time there. Go ahead.

MS. FISHER: Our second question is: What new strategies are you planning to achieve setting energy savings mandate under SB 350?

And I will move it over to Ryan.

MR. BULLARD: Thank you. I imagine you can guess which acronyms are going to come out of my mouth next, like pay-for-performance, PFP and NMEC and meter-based measurement. I think that's

really going to be the areas of growth.

I think the best example that I can probably point to is like in the 2018 Potential Goals Study, widget-based savings only goes up 20 percent through 2030, but behavioral goes up 300 percent; right? A lot of that is, obviously, the home energy reports, the particularly specific measure, but it goes into a whole bunch of other types of different activities. So I think that that's going to be something we have to keep our eye on and really look at it and define how cost effectiveness and incentives are really driving those sorts of payments. Because I really think that a lot of the devils are in the details, like how do you define e-wells (phonetic)? And, you know, can you do 100 percent pay-for-performance, or is it 75 percent time and materials?

So as we work through those types of nuances, I guess we'll get a better grasp on what type of market potential is real and achievable.

Another area to kind of point out is sort of the conversations around EE and DER (phonetic) integration happen, kind of seeing where we can see joint benefits across these resource types and leverage programs that can actually help

customers save energy, and also shift energy around for TOU purposes or be event response driven. So those can be a growing area of importance.

MS. LABONTE: To follow on that but paint a bigger, broader picture of opportunity from the CPUC lens, then new -- you know, a new strategy that I don't think I emphasized as much in my talk as I'd like to is the third-party solicitations. And I came from a background of running enterprises in the federal government and bringing new entrance. And allowing an innovation space creation from a completely new perspective can really be a big win. And there's a need here from the CPUC perspective, if we're going to -- it's high risk, that's what you take or have to accept along with that.

But we need to, therefore, put in place and be watching carefully that as the first round of solicitations go out, we're breaking down the barriers or making sure that we're learning from each next round that we are inviting those new actors with new innovative designs of energy efficiency programs to bring to the table for each of the program administrators those ideas to

reap the benefit from.

So that's going to be a big focus of the CPUC. And the new strategy is to ensure that we give it the fair chance that it deserves. And it could really pay off big, but we have to make sure that we are actually inviting and allowing for those new ideas to come to bear.

COMMISSIONER CHOPER: I'd just like to chime in this one a little bit. David Jacot, LADWP.

We see the electrification that I mentioned earlier in my presentation as opening up vast new energy efficiency opportunities, space heating and water heating. There's heat pump technology that's emerged (indiscernible) still costly (indiscernible) come down. But versus an electric resistance option baseline, energy savings are tremendous. That will be an EE measure, even if it is, to some extent, fuel switching, as well, because it's to the extent it sees market adoption.

The other salon (phonetic) even more interesting to me is on the transportation side. So with electrifying transportation, anything that gets people -- reduces EMT (phonetic), gets

people out of their cars, transit, bike share, carpooling, or gets them to drive better, better driving, you know, where they consistently exceed the performance specs of their car, those are now energy efficiency measures. Or if they buy the more efficiency electric car, the one that uses less fuel, that's something we can incentivize, as well.

So that's part and parcel of how we're going to get to these ever-growing targets, and certainly the aggressive ramp that SB 350 has put forward.

COMMISSIONER MCALLISTER: Well, I really hope that you're successful getting people to drive better in L.A.

MS. ROGERS: This is Cynthia Rogers with the Energy Commission. I have a question on the disadvantaged communities.

How are you targeting hard-to-reach populations in disadvantaged communities, for example, bilingual marketing, working with NGOs or other community groups?

MR. CALLAHAN: This is Mike Callahan with MCE. I can start to provide a response to that.

I think, you know, at a pretty high

level, policy is really important in that. The Commission's decision that approved the business plans also approved the changed definition of hard-to-reach customers and it allows disadvantaged communities to satisfy the geographic components of that definition, which makes a big impact, particularly in major metropolitan areas, those folks who were not able to meet the geographic component.

In terms of our specific work to target, we use multilingual marketing. We work through community-based organizations and NGOs for outreach. We think that's repairing the programs for the workforce development component that's geared toward disadvantaged communities. It can help sort of expand the footprint of the programs.

And as I mentioned before, trying to ensure that hard-to-reach populations outside of disadvantaged communities aren't left out. One of the things MCE is developing now is a heat map tool that layers in various data sources, census data, billing data, to try to identify which communities are most likely to find income-qualified renters to help us do more targeted

marketing to those folks.

MR. JACOT: David Jacot, LADWP.

You saw our equity metrics effort earlier, so we're quantifying need and tracking how we're performing in those areas.

To SDG&E's point earlier, we agree, you know, the EnviroScreen is not perfect, there's hole. So we make sure our efforts, while targeted in certain areas, are available across the city. We have disadvantaged folks, and certainly in non-disadvantaged communities, so we need to be able to serve them, as well.

Something really interesting that we do is a Community Partnership Grant Program. And we've been running this for about six years now. It's a one-year -- it's basically on an 18-month cycle, but it's a one-year grant to community-based organization in each of the 15 council districts, as well as five or six more that are citywide. And it's a very diverse base of community organizations. Liberty Hill has been one. Gang Alternatives Program, GAP, down in San Pedro has been one. Pacoima Beautiful. A bunch. It's, like I said, it's 15.

We do a solicitation every year. It's

for $45,000. We're looking to increase that. But then -- and then the citywide ones are $90,000. So that way we've really got this grassroots set of forces that all right promoting our programs. They're doing specifically what they signed up to do. In some cases, they're staffing neighborhood events, they're knocking on doors. They're creating media, public service announcements. We've got some really cool public service announcements out of the last round. So that's something that we work with.

Obviously, in language, we do -- you know, everything we do is in language for the targeted community.

And then finally, I would just mention that L.A. also has its own Sustainable City pLAn. The Mayor's Office of Sustainability oversees the pLAn, the p, capital -L, capital -A-n, so the L.A. pLAn. Anyway, you have to see it. It's hard to describe, but you have to see it printed. But anyway, it's a Sustainability pLAn, so it's loaded with equity stuff, as well. And so we work very closely with that, that that is not happening in a

DWP's contributions to the elements of

that plan have already been mapped. And so everything we track for our own efforts we can feed into that process, into that larger effort, and have it rolled up. So it's not a silo. It's not siloed in the slightest. It's directly related. The plan is just bigger than our efforts because it's the whole city and it's things outside of our Department of Water and Power can help with.

MS. ROGERS: Great, and thank you.

Did anyone else want to add anything? If not, thank you so much for participating.

COMMISSIONER MCALLISTER: Great. Thanks everybody. I guess, I mean, we have until 12:15. So, I mean, if you guys want to explore more, you know, we don't have to break right now. But if we want a little bit longer for lunch, we're going to come back at 1:15.

So does anybody have any points they wanted to make that they didn't get in?

All right, well, let's have a longer lunch.

MS. RAITT: Okay. And then --

COMMISSIONER MCALLISTER: Okay.

MS. RAITT: -- if I could just add that

if anybody wanted to make comments at the end of the day, if you can just fill out a blue card, that would be good, too. Thanks.

(Off the record at 12:09 p.m.)

(On the record at 1:15 p.m.)

MS. RAITT: Okay, folks, we'll go ahead and get started for our afternoon session.

And so our first speaker for the afternoon is Nicholas Janusch from the California Energy Commission.

(Colloquy)

MR. JANUSCH: Good afternoon, everyone. My name is Nick Janusch and we're going to kick off our after lunch workshop with our Behavior and Market Transformation. I'm going to provide a quick overview to put the -- to kick off the conversation.

And before I introduce our featured speaker, Dr. Sam Borgeson, but before I do that, I want to introduce myself. So my name is Nick Janusch. I received a PhD in Agricultural Environmental Economics with a focus in Environmental Economics. And I have a background in behavioral and experimental economics. And I was brought on board in February to help really

tackle this topic of behavioral and market transformation. And since I am somewhat new to this topic, I would really appreciate any stakeholder feedback to help further along this conversation.

So let's revisit what was done with the SB 350 Doubling Report. So here is the picture of the doubling target for electricity. And for market transformation, when we're looking at this issue, think of the best data and information available. We've calculated that or projected that behavioral market transformation comprises two percent of total savings. And not shown here, for natural gas, it's about seven percent. And within this category, behavioral and market transformation captures benchmarking, NG asset ratings, behavioral, retrofitting and operational savings, smart meters and controls, and fuel substitution.

So now we're revisiting this. We're, with this conversation and discussion, we want to have, and think of for future dates, have some big overarching questions.

The first is when we think of behavioral market transformation are what we are -- with our

current methods, what we currently have done, our analysis, are we capturing all opportunities? And that's considering everything that's been conducted within the social and behavioral sciences.

And then with that, with all these, perhaps, new behavioral strategies and insights, can we effectively capture, track and report these savings with confidence?

And third, we need to think about building this idea of thinking behavioral as a resource, can we, when we think about this behavioral wedge we were talking about, can we treat this wedge as a resource when it comes to forecasting and our supply-side planning?

When it comes to this topic are we adequately capturing the potential of using behavior as a resource? And I'm not going to go into details. Here you can see in the supplemental slides that there's a list of literature that has addressed this issue. And when we -- from what I've seen, what I looked at, there is a large disagreement about the definitions and interpretation of behavior and market transformation.

And a recent report by the Energy Commission, authored by Les Heiser (phonetic) and all, it's titled Advanced REsiden6tial Energy Analysis Project, he has a more -- they have a more broader perspective of behavioral and market transformation. A lot of the focus is on behavioral change, while they have looking at things beyond consumer, and that includes all market participants. It could be vendors, manufacturers, buildings, builders, regulators, and everyone.

And thinking of all of these things, how these people's behavior are, are there institutional barriers that exist that hamper innovation and hamper our motivation to getting to our goals? And even with that, there's still an overarching existing uncertainty and challenge in valuing behavioral impacts.

So I'm excited to have Sam Borgeson to talk about this. But we also seek further stakeholder engagement and comments on this issue.

So transition here, so to introduce today's speaker, Dr. Sam Borgeson is a partner at Convergence Data Analytics. He received his

Doctorate in Energy and Resources at UC Berkeley. And he has extensive experience within the energy efficiency sector, worked at Lawrence Berkeley National Lab for over seven years, and has consulted for organizations such as PG&E, Lawrence Berkeley National Lab, and Stanford's Sustainable Systems Labs.

So with that, I'd like to introduce the speaker.

DR. BORGESON: Hello everyone. Am I coming through?

COMMISSIONER MCALLISTER: Yes, we can hear you.

DR. BORGESON: Okay. Great. I need to apologize because I am out of my house. And my audio environment of my house, a faulty internet connection today, but I'm very pleased to be speaking with you.

I did a master's degree in Building Science before my PhD in Energy Resources. Both were focused on this question of characterizing efficiency resource in buildings and trying to understand the role that buildings have to play and efficiency has to play in climate policy. So that's sort of the experience I'm drawing on for

this talk.

Can someone advance the slide? I guess I'll say next when I need the slide advanced. Okay. Great.

Yeah, so when we think about how to save energy, I think it's important to recognize that there's several strategies. And the one that we talk a lot about in the efficiency community is the more narrow definition of efficiency, where you get the same service using less energy, more efficient equipment, for example. But that's part of a -- not where all the potential lies, because there's are substitutions that people make on desirable that are lower energy. There's also substitutions that people will accept. I mean, so that's where you get a slightly different kind of service, but nevertheless one that works out.

And, actually, a lot of things that are considered pure efficiency often are some form of substitution, where there is, in fact, a trade off. And to the extent that they're desirable, that people want them, we're in a much better position than saying, hey, you're going to get exactly what you used to have.

There's also conservation, which a lot of people in the public conflate with these other forms of energy savings. And for most people, it means doing without something that they'd rather have. But to the extent you're willing to do it, you tolerate it with some discomfort.

But there is another category, which is waste elimination. And that's just getting rid of services that aren't being used, that aren't valued, you know, lights that are on when no one's in the room, or more importantly, you know, on all night, you know, in environments like offices, so there's a lot of examples of waste. What counts as waste is subjective, however, and so there's a nice overlap with these questions of behavior.

Next slide please.

So this is a summary slide from a broader body of work on the role buildings have to play in decarbonization and the climate fight, but I think it's probably fair to say the specific motivation behind doubling efficiency. And I think two of the most important are the top two here, that if we want to make timely changes, a lot of those changes have to take place in

existing buildings. We all know there's challenges retrofitting existing buildings. But, you know, they're also -- they live in the real world. You know, they're imperfect. There's all kinds of potential out there when we have information needed to diagnose them.

But the other thing that's very important in this context is that consumption characteristics vary extremely widely across buildings. You can actually exchange buildings to people there. Consumption is personal. And even superficially similar customers of utilities with similar, you know, building characteristics can use dramatically different amounts of energy and in very different patterns. And there's actually a lot of potential for improving program outcomes in embracing all that diversity.

These other issues that I've listed on this slide are not maybe headline issues for this particular talk, but I think the bottom one is worth dwelling on just a bit. I think we don't know how to achieve all of our goals. And that means that we have to be prepared to make mistakes to learn, to do some work that's interested in a long view, rather than an

immediate payback, if you will. And in many cases, efficiency programs aren't very well tuned for embracing those types of goals.

Next slide please.

Okay, so this is about all the many different ways that we might define behavior. And I'd just encourage everyone in the room to think about how different categories of behavior impact energy use and how they interact with programs in our larger goals.

So there's obviously things like technology adoption, people's decision making about what to buy, when to buy it, but also operations, so how to use it. There's broader decision making. We're, of course, very interested in the decision process of enrolling in programs or succeeding as a participant in programs. You know, we're also interested in how people would be behaving absent our programs. But there's also more complex domains of behavioral interactions with the energy system.

And probably one of the most important is how, rather than individuals, how organizations make decisions of energy and about utilities and the programs that we're offering. Almost every

decision about energy is made by more than one person; right? Like I don't decide anything in my household on my own; right? I have a family that is involved in that decision. So even things that appear personal are mediated by a form of consensus building. Of course, in big organizations, big companies, this can be a very complicated process with, in some cases, sort of head-scratching results until you start to understand it from an operational lens.

Next slide please.

So I think that the -- one of the most important conceptual shifts that I experienced in my time doing research on these issues (indiscernible) the disconnect between the original motivation, the shape, the design of efficiency programs. You know, the original argument for cross containment. This is the cheapest resource. This is the way to control costs on the grid, so it's inflected throughout with all sorts of cross-containment metrics and language and assumptions. But climate change mitigation buildings really isn't, narrowly speaking, best described as a cost-containment effort.

And so one thing I think about our current efficiency programs and their future in a much broader context of climate mitigation is figuring out how to reorient the incentives of programs, the language of programs, the metrics of programs, the evaluation of programs to focus on the types of long-term changes that we're pursuing in the sort of grid transformation and climate mitigation push. And that means in many cases, as I mentioned already, room to fail and learn, take long shots working towards innovations.

But probably like the nutshell definition of what we're talking about here is developing, commercializing and scaling low-carbon and efficiency technologies. And that's something that we have a practice of in California, but it's not where, you know, let's say all of our time and attention go. But if we're pursuing a more aggressive efficiency -- set of efficiency goals, especially with a longer time horizon, I think we have to have the conversation about our attitude towards the market transformation goals, as well.

Next slide please.

So an important reminder here. We are ultimately talking about human beings. We all navigate the world every day trying to understand what other people want, what they're doing, how they're doing it. There isn't a clean, simple model that predicts human behavior. And there are so many disciplines that have things to teach us.

And when we talk about behavioral programs, when we talk about behavioral potential, I just want to caution that it is so handicapping to rely too heavily on any one view, any one sort of cartoon explanation of how people behave. You know, when we want to, you know, really improve the contribution of behavioral insights to (indiscernible) of how we achieve our efficiency goals, we need to draw on lots of disciplines.

And not to make too fine a point of it but, you know, if we're in a cost-containment model, of course we're leaning very heavily on economics to understand our goals and our outcomes and our views to the extent that people aren't purely rational actors. Or to the extent that there's insights in things that are

motivating to people outside of the economic realm, I think we have a ways to go in terms of fully incorporating those insights into how our programs are designed and executed. Plus, fortunately, there's lots of other fields that give us good examples that we can draw on. So, you know, were not lost in the woods here. We can seek inspiration from other practioners.

Next slide please.

I actually feel a little sheepish presenting on behavior in the context of efficiency to the CEC or in the context of the CEC because so much of what I know about it comes from reports that the CEC has produced. This is just the set from the 2006 to 2008 program cycle. This was the program cycle that produced a lot of the literature I was interested in grad school, so I know it quite well. And I just, I wanted to thank you for having a long-term outlook and a willingness to support this type of analysis, and also public, you know, publication of these types of insights. I think that's been crucial to this conversation and moving behavioral programs of all stripes forward.

But it also gives me a little pause

because I feel like, well, what else do we need to do? What don't we know? You know, here's stuff from 2006. We could go back to the '80s and the '90s and find extremely confident researchers providing us guidance, as well.

So one of the things that I want to be mindful of is it's very important that we get the right information, that we do research and that we understand it's meaning and apply context. But I think it's also important that we look at reasons why that may not be sufficient to make significant changes, especially when they're, you know, deep and structural and such, in politics and power dynamics, and so on and so forth.

And so I would just suggest, we actually know a lot already. And there may be a deeper set of questions for me to ask if we really want to reach the potential that some of these studies are pointing to.

Next slide please.

So with all of this introduction, I wanted to propose for you my simply, my simplified anyway, model of energy behavior, of how people behave with respect to energy. And this is my proposal for, you know, the sort of

cartoon version of behavior that we should run our ideas through when we're trying to figure out, is this something that could work, or what's missing.

So first and foremost, energy is designed for people. Obviously, the location of energy conversion is often a piece of equipment, you know, and it's located within a specific facility or premise. But let's not lose sight of the fact that all consumption ultimately, if it doesn't have a purpose for some person or group of people, is a waste that is unnecessary. And even the ones that are automated or even the ones that, you know, fuel very much for the building, we need to ask, are the occupants of this building getting what they need from this? Is there another way to provide it? And to a lot of things that -- I see a lot of potential in that type of interrogation.

The other thing, everybody knows this in their own lives, energy, compared to people's incomes, most people's incomes, and compared to the past, energy is quite inexpensive. I know there's certainly very significant social problems with the set of customers for whom

energy is a very big part of their budget and people who are struggling to pay their bills. But across the entire population, energy is a very small part of people's budgets. Efficiency savings are there for a small part of their budgets. And at any rate, people's utility, right, economic utility is ultimately subjective.

And so this is sort of -- this is a bit of my pitch just to say let's not overemphasize the assumption that people will make the rational choice, especially with respect to something like energy. It's not a big part of their budgeting lives. And for those entities for whom it is a big part, like, you know, large-scale manufacturers or something, you can bet that it's a big part of their decision making. You know, so I think that actually -- it actually makes a lot of sense when you see people not paying much attention to it.

Which is this third point here, people don't really have a lot of attention for this type of issue. And they don't really want their attention to be drawn towards it, at least not for any extended period of time. If we point something out that's not going well, if we make

them an offer that they appreciate, certainly that will be time well spent. But in general, if we spend all our time trying to get people's attention and hold people's attention trying to convince them that they should be energy nerds like us, we're going to be undermining a lot of people's interest in what we have to say. They'd rather be doing something else.

And coupled with that is energy, you know, especially in the form of like electricity and natural gas delivered on site, you know, it is such, typically, such a reliable system that's so tightly integrated into our lives that it's almost become invisible; right? So people don't have a great intuitive understanding of how much different appliances -- how much energy different appliances use, which things that are in their lives that use or less energy, how to diagnose things like waste in their homes, how to make decisions about replacements when the time comes.

And so, you know, unfortunately this low, what I call, NG literacy, what it means is even if you get someone's attention and you achieve some degree of motivation in them to do something, you can't really expect people to find

exactly the right thing to work on. There's missing information that could be used to help guide them.

And then finally, I will make the case that in the resource of meter data and , in particular, things like smart meter data, we see such dramatic diversity of how people are using energy. It doesn't matter how, you know, how you define similarity, just there's huge diversity within groups of similar people. And that means that we aren't really achieving our full potential if most of our efforts are prescriptive or one size fits all. But if we want to go after that diversity, if we want to mine that diversity for efficiency gains, we have to focus on getting individualized information. And that's a tough challenge, but there are actually a lot of organizations in other disciplines that do this very effectively. And I think we, basically, can be inspired by those other institutions.

Okay, next slide please.

Yeah, so this is -- Stewart Brand is, you know, the founder of the Whole Earth Catalog. He's kind of a deep thinker, you know, a bit of a visionary of social comment. He has very

incisive social commentary. And Stewart Brand is actually a very good building scientist. He wrote a book in the '90s called How Buildings Learn. And when he studied buildings, he realized for most of their lives they're in use -- or most of the lifecycle of a building is in use. And for that entire time, people are trying to adapt those buildings to their current needs and interests. And he has this really fascinating documentation of decades of change in different kinds of buildings, buildings that start out identical and ultimately diverge, and all sorts of other things.

But the important thing here is whether we do anything to accommodate it or not, buildings are always going to be adapting to these changing needs of people. And we will either be fighting against those changes or we will be lining up and taking advantage of and shaping those changes.

And I think this idea that during their lives, that there's always pressure and there's always change taking place within buildings is a really useful framing for thinking about how do we wind up with waste? How do we wind up with

misconfigured system? How do we wind up with opportunities for savings for areas where there's consumption that no one benefits from? It's inevitable if you think about buildings in this way.

So next slide please.

I won't dwell on this slide but, you know, these are citations, if you will, from my life as a building scientist, the reading that I did as a researcher of building science. And study after study after study, dating all the way back to the late '70s, you know, sort of, I think, what was by consensus the origin of our real quantitative interest in efficiency, there have been people pointing out these operational concerns of buildings as one of the major areas of needed improvement.

And so I would say, you know, as a building scientist, as someone who knows lots of building scientists, I would say the building science community is often puzzled by how indirectly efficiency programs pursue the kinds of problems that building scientists are interested in. And I'll just point out, there's lots and lots and lots of literature on how

buildings are used in operation and what's wrong with them and how to fix it, so on and so forth.

Next slide please.

So this is a figure, back to Stewart Brand's, How Buildings Learn. I think this is a really useful figure. It's very applicable in the context of the CEC, as well. So if you think about a building and all the determinants of energy use in the building, there's just so many of them. But if we want to shape that building's trajectory over time, we have things like the site, the orientation, you know, the core structure of the building that you're only going to do once, they're effectively permanent, or at least they will extend for the entire life of the building. And anything we do to impact those decisions will have far-reaching ramifications.

I think orientation is a very interesting one. You know, we have net-zero goals. We have passive heating and cooling opportunities. We have passive daylighting opportunities. And all of those things relate to the geometry of the building with respect to the sun and their site-local conditions. And if we make those decisions properly we'll reap benefits for decades from

them.

Whereas other aspects of the building, certainly, you know, the fit and finish, which we might say it might, you know, get renovated in some sense every 10 or 20 years, the equipment within which might have, you know, up to a 10-year lifetime, and then, of course, all the operational stuff, increasingly controlled systems, computerized systems, you know, some of those things, you know, are configured in a certain way for days. But certainly I think, you know, single-digit years is kind of there on the horizon.

And the point that I want to make here is, number one, not all decisions we make when buildings are being built are as permanent as we hopefully get to make when buildings are being built or being retrofit. And second, our policy tools don't always reach all the points when intervention could be productive. And so, you know, when you think about things like zoning and building codes, you know, we know that those are very important parts of our efficiency portfolio, but there are areas where codes have struggled to get purchase or where no one considers the domain

of, you know, sort of codes as originally framed. I really applaud the work that's been happening at the CEC to develop stretch codes to try to challenge our understanding of what can be put into a code, you know, putting (indiscernible), et cetera.

Next slide please.

So the only thing that I -- the one thing that I want to point out here is if you think about how do I achieve efficiency, we can upgrade equipment, we can repair equipment, but we can also do controlled planning changes. We can change step points. We can produce service intensity, things like de-lamping and lighting. We can substitute services. We can eliminate services that are wasteful. We can also think about, you know, demand flexibility in the category of demand response. And lo and behold, a lot of those same things, certainly all the control ones, overlap very heavily with these strategies for efficiency.

I think this idea that we need to get better control over buildings and we need to use that control to study buildings and, you know, individually, so that we can make the decisions

over time is really important towards the potential for savings. And it's very squarely situated in behavioral context because you can't make any decisions about the control of the building until you know what it's for, what people expect, what they need, you know, and what they're after.

But I would say these are the categories where the future role of buildings on the grid lies. So we've gotten very good at deploying equipment, you know, to upgrade or to replace or repair, but I think we need to get as good or better at some of these control challenges.

Next slide please.

There's a very well-known study in research circles. It was done in 2009. The lead author was a guy named Petes (phonetic). It was published in the Proceedings of the National Academy of Sciences. And everybody calls it the Behavioral Wedge Paper. This was a paper that asked a question very similar to the topic: How much savings can we get out of behavioral changes? Actually, sorry, it wasn't savings, it was mitigation: How much carbon mitigation can we get out of behavioral changes? And it was a

broader question than just buildings. It was about households, and so things like transportation were in there.

But the thing that I think is so interesting about the results of this study, I think most people on the street, if you stop them and you say, you know, what do you think is an efficient behavior or, you know, what do you need to do if somebody tells you to become more efficient, a lot of people will talk about things that require a really high mindshare; right? Turn out the lights every time you leave the room; right? You know, make sure that you're mindful of your consumption on an ongoing basis.

But what these all shows was that actually the decision making process that leads to purchasing, that basically cements the characteristics of the equipment that you own and operate, and infrequent actions, things like weatherization, you know, you commit to it and you get it done and then you don't have to think about it again for a long time, things like maintenance, you know, just like a regularly schedule of, keeping things in good repair, good working order, they have way higher potential for

impact than the daily actions that everybody -- I think that non-advocates anyway see as just such a burden in terms of the mindshare.

I think this is very encouraging, but we have to take very seriously the fact that when people are in the market for a new furnace, they have almost no time, right, because their house is cooling down; right? It's like broken. People have almost no time to do a deep dive. We have to prepare people for those moments. They have to know where to go to get the information about what's a viable replacement. It has to be in stock. The installers have to be prepared to do it. And probably the installers have to motivated to improve, you know, the efficiency profile in that moment. And if it's just a panic reaction, buy the first thing off the shelf, you know, we need heat by tomorrow, that's an opportunity that's not going to come back up for another 10 or 15 or 20 years.

And, you know, so this environment approach, let's say I just bought a new refrigerator, you can look up ENERGY STAR refrigerators and you can try to figure out where they are or what they are. But it is so hard,

even if you're super motivated and very well informed, in many cases, to find good information that's actionable in the context of purchasing. So just a little editorial there about some real-world lessons we might draw from Petes, et al.

Next slide please.

So I think many of you probably know Carl Blumstein (phonetic). He's one of the cofounders of the C Triple E (phonetic). He's run CIEE for many years. And Carl has done some work and published some work pointing out there's an inherent tension in efficiency programs. You have to have countable savings in order to administer programs, but evaluation can't precisely and accurately determine something that never happened, the counterfactual.

And I think in many cases we've spent a lot of time wrapped around the axle of trying to figure out what we've quantified something properly, whether two different groups who may be actually somewhat reasonably -- you know, have disagreements that are both reasonable, trying to adjudicate who's right, this framework that requires us to always be counting savings, even when they're very difficult and even when no one

will ever objectively agree on the answer, is a big problem. And it definitely shapes -- the need for quantifiability really shapes what interventions are viable.

Next slide please. We're nearly done.

Something that I was interested in, I looked up the most recent potentials study, Efficiency Potentials Study. This is Navigant's 2018 study. And I was interested, of course, in the BROs, right, this behavior, retrofit and operational opportunities. And this is sort of the -- this is the less stringent version that I plotted up here. But the main thing you need to know, probably the only thing anybody would ask you if you just pulled them over on the street, they'd say what is that light green one? That's what this is all about. That's home energy reports.

If our definitely of behavior in the context of efficiency is nothing but or is dominated by these peer comparisons that motivate people but don't really challenge them into constructive actions that leave them kind of their own to make up their own mind about how to resolve these issues, I would argue, we're not

doing a good job mining the behavioral resource.

And so to me, this forecast where the behavioral savings are dominated by HERS out as far as the eye can see, all the way through 2030, I think this is not an accurate reflection of our potential. Because what we call HERS, they saved about one, one-and-a-half percent of energy. And, you know, I think there's clearly greater potential than that. You know, we can talk about how hard or, you know, what it takes to deliver on that potential, but I don't think this is an accurate outlook for what the actual potential is.

Next slide.

Yeah, this, we're headed to the conclusion now.

So my work, you know, I'm very interested in this topic. And so what I've chosen to do with my time and my professional life is to work with really large sample meter data to understand how we can make programs and analysis more personalized and how we can map spatial and temporal patterns of consumption into better program design, better program execution, better program evaluation. So, you know, in that data,

we see time and time and time again that there are categories of consumption that aren't as well represented in the efficiency programs as they appear to be represented in the breakdown of how much energy are using in those categories.

Oh, yes? Is someone asking me a question?

MS. RAITT: No. Go ahead.

COMMISSIONER MCALLISTER: No. Go ahead.

MS. RAITT: So we are --

DR. BORGESON: Okay.

MS. RAITT: -- getting low on time.

COMMISSIONER MCALLISTER: We're a little bit over time, so --

DR. BORGESON: Okay. Yeah. Understood.

So I think metered data, you know, it's a new tool, and we haven't really scratched the surface of what can be done with it.

So next slide.

Oh, yeah, we can skip this. This is a visual intuition for what you might see in metered data. This is the last slide.

So I would just like to propose -- this is a hell of a last slide, I understand that -- what I was (indiscernible) about in building this

slide was in a typical program there's a lifecycle of design, deployment and evaluation. And we really need to think about that whole lifecycle in the context of where can we inject new data, better analysis, new information? And, in fact, I had very little trouble thinking of areas where we can improve state of the art with this framing of, you know, adding more information and making it more quantitative in terms of design, in terms of being more disciplined about what we do in the field and how we measure it.

So my sort of parting thought is there's actually a lot we can do to improve our programs and kind of, sort of drag them into the 21st century as far as best practice from other industries.

I thank you very much for you attention. I'm happy to field follow-ups.

COMMISSIONER MCALLISTER: Thanks a lot, Sam. We really, really appreciate it. We don't have time for questions, unfortunately. But I think when we did the first draft of the AB 758 Action Plan, you were in the middle of a lot of this work. And glad to see it sort of bearing

fruit and providing some directions. And certainly going forward in this year and next year, as we update the Action Plan for Energy Efficiency, we'd love to have your sort of updated input on the, in particular, the data sections of that report. And that's one of the organizing principles of it and I think your input will be really valuable there.

DR. BORGESON: Oh, yeah. This one, I'd be very happy to contribute.

MS. RAITT: Okay. Thank you.

So our next panel is on Agricultural and Industrial Energy Efficiency. And the Moderator is Manjit Ahuja. Excuse me.

Go ahead.

MR. AHUJA: All right. Thank you. Good afternoon. My name is Manjit Ahuja and I work in Efficiency Division. I'm going to provide a quick, a very quick overview of potential energy savings, energy efficiency savings from the industrial and agricultural sectors.

This figure comes from SB 350 report. And I want to highlight two items in this figure.

The first is I want to highlight the gap, the gap on top which shows the energy efficiency

we need to achieve to meet the objectives of SB 350.

The second item I want to highlight is the top wedge, which is hard to see, it's the orange wedge. And that the wedge, energy efficiency savings, that we are expected to achieve, our best guess at this point from the industrial and agricultural sector. So it's the minimal energy efficiency saving shown there.

So to reemphasize, the SB 350 figure shows very small energy savings from the industrial and agricultural sector. However, the industrial and agricultural sector accounts for a quarter of the energy consumption in the state. So what we need to figure out, we're working with consultants, and to figure out what do they determined what is the potential of energy efficiency from these two sectors, energy savings in these two sectors?

This morning when IOU reps were presenting their business plans, a couple of them talked about the length of the document, and they are lengthy. I have read the business plan sections from -- all of them, actually, and what I can tell, a relevant section, and when I say

relevant section, I'm talking about ag and industrial, and I can tell you, those are impressive, and not even just impressive, very impressive. It shows the effort that thinking has better gone by -- behind -- by the planners, the writers in developing those plans, and those are very impressive. So -- but at the same time, a plan is one thing, but achieving a plan, that's when you get challenges and that when you get, you know, successes and challenges.

So we want to hear from the -- our reps from the IOUs this afternoon, what are the challenges and what are the successes they faced while their implementing? And what are the goals going forward?

This morning, Erin mentioned that the industrial sector is the second largest, I think you mentioned, potential savings. And I'm gratified to hear that because that's where the potential is.

Last is we -- in the May Business meeting the Commission adopted Food Production Investment Program. And Mr. Kazama from CEC is going to provide more details on that.

So we have four presenters, three from

IOUs, and the fourth is Mr. Kazama. And I'm looking -- we are looking forward to hearing from them.

I want to wrap up here, but before I wrap up I just want to thank the presenters for coming here and sharing their successes and challenges.

And that completes my presentation. Thank you.

MS. RAITT: Thanks. So first is Colleen Breitenstein from Pacific Gas and Electric.

MS. BREITENSTEIN: Hi. My name is Collen Breitenstein. I'm with PG&E. I have a background in implementing energy efficiency programs and projects for over 11 years in California. And I have, at my time at PG&E, been really focused in the industrial and agricultural sectors.

So if we're going to go ahead and jump right in, as you can see, here are the electric usage and corresponding electric savings we see out of the various segments. As you can see, industrial is a little bit off, where the other segments do closely, more closely align with the usage and savings.

So next slide.

So the industrial savings overview, as you can see, we definitely have some room for improvement there, especially on the gas side when it comes to manufacturing. And we have a few strategies that I'll talk about later about how we're trying to achieve that, both in the short and long term.

Next slide.

So looking back, this is the barriers that we've traditionally faced with these customers. It is very challenging to establish the baselines, especially in highly customized environments. When there are only a few customers doing things of that nature, it can be very difficult to establish the research that would support a proper baseline. We also have to address the company-specific standards that can impact their decision making process, which is also very complicated.

We do encounter customers who are highly motivated. And in those types of environments, we can run into free ridership concerns because they have a motivation, frequently to reduce their energy usage, also reducing their bottom line costs. And that can present challenges as

we try to get them into our program.

And just again reiterating that a standard approach can be very challenging because there are typically custom-built environments, so they do use similar pieces of equipment, but they don't always use them in similar ways. And so each customer has to be approached and treated, sometimes in a variety of facilities under one customer in a very different and customized way.

And then traditionally, this is looking back, is the stranded savings in the operations and maintenance.

So those are some of the main barriers we've encountered with our industrial customers.

Next slide.

But there are opportunities, especially in the operations and maintenance, through these strategic energy management. And this is going to be a big change for how we've engaged with these customers, moving away from transactional-type relationships to long-term engagement and actually working with them over a long period of time, educating them, referencing the previous presentation, increasing their energy literacy and getting them the tools they need to enable

better and more steep energy savings, and also be able to do additional benchmarking as we move them through that process.

We've also expanded our financing offerings. One of the challenges we've had with financing is the typical industrial customer size. A project doesn't lend itself to what our financing offerings were. So we've now taken steps to address that to open that up to customers and enable them to access that financing that previously they weren't able to, unless it was on a very small project.

And then also, we are looking at expanding, and this is more of a short term, expanding and improving the existing measures. For the gas savings, which we saw the big disparity a few slides ago, we are increasing the access to our pipe installation measures. Again, this is a measure that, while it's used differently by different customers, it is a common measure. And so we have increased the access to that. So we are looking to -- we've actually launched that in the past 60 days. So we are looking to see some gains in that in 2018 and going into 2019.

And also, the process fan VFD's, this is another common piece of equipment that's used differently by different customers. There was previously a prescriptive themed measure. That measure had some issues. We are now moving to a customized calculation which will still allow us to address the needs of those customers, but in a more specific way that will access the true energy at their site.

So moving on, agricultural sector, it's pretty obvious for the electric usage and savings that it is dominated by crop production. That is typically pump and irrigation systems. We have an estimate of over 80,000 pumps in PG&E's territory, and those pumps are used for a variety of different crops. For the gas usage, that is still dominated by the greenhouse industry, but we do have usage in the wineries. Dairies don't make much of an impact there because they actually do their own methane capture.

So next slide.

So, as we saw with the domination by the crop production, we really are limited to pumps. And what can do with those pumps? Traditionally, we've offered the Pump Overhaul Measure, pump

testing. We launched a VFD measure a few year ago. But really trying to get beyond touching a pump, into the irrigation system, California, especially during the drought, moved away from some of these various types of irrigation systems and has really moved toward micro drip, micro sprinklers. So that has reached a tipping point where we really can't consider those to be non-industry standards. There are still some customers, the smaller customers, who might need some help getting at those, but they are not our large users. We also --

COMMISSIONER MCALLISTER: Quick question. Are you including the agricultural processing facilities in industrial or in agricultural?

MS. BREITENSTEIN: So they are included in industrial, but I will touch on them --

COMMISSIONER MCALLISTER: Oh.

MS. BREITENSTEIN: -- with the SEM because they typically -- while some of them are standalone processing facilities, there are many who are vertically integrated.

COMMISSIONER MCALLISTER: Okay.

MS. BREITENSTEIN: And so we will have crossover there.

So -- and then in the industry standard practice, that also can be challenging to establish. There's over 400 commercially-grown crops in California. That is a large number to study individually. Each crop has its own needs. We do try to focus on some of the larger users, especially the larger water users because that's where we're going to see a lot more pumping.

And then also, adoption varies by the sophistication and resources of a particular grower or entity. The larger growers will typically have an agronomist or someone who really does focus on the economy of growing, where some of the smaller growers are in a situation where they really just need to keep the water flowing in order to make sure their crops don't die.

We also see that disparity in our dairy industry, as well, and in the wineries to some extent. But wineries have done a lot to become more sustainable.

And then the current market characterization is not current, so we do have stale information that we're operating with. We have engaged with a lot of the agricultural

universities in California. We have ongoing engagement with CSU Fresno. We really ramped up our engagement with Cal Poly. We've had some additional work with UC Davis. We're trying to get some outreach done in Chico, and also within the community colleges because those are typically vocational schools where the training for a lot of the folks who actually do the work occurs. That is one of our strategies to try to get better information, is to work with these entities who work with our customers.

And project level influence can be challenging due to a lot of the variable environmental factors that can impact the energy usage at a site. And then the customer decision making, again, with energy not being their top costs, they frequently are looking at their production and just making sure they are able to get something from field to market.

Next slide.

So briefly touch on the strategic energy management for food processing. Within the past few months, we've launched two food -- or two strategic energy management programs, one targeting industrial manufacturing, the other is

actually targeting food processing, which will cover some manufacturing of food, but also because those entities frequently are integrated, we will have some cross-over into our field production and supply chain.

Financing, again, we are looking at how we can increase the access to financing because they do have challenges, especially with meeting first-time costs, so we are looking at ways we can address that. Partnering with the Food Production Investment Program, we've got active engagement in that. And expanding and improving our existing measures. The Viastine (phonetic) Measure is one that we've had success with. We've actually launched an enhancement to try to get a better quality installation out in the field and push the market to doing more, doing it better. And changing requirements for the pump overhauls to make sure that we are capturing accurate energy savings.

Thank you.

MS. RAITT: Thanks. So next is Athena Besa from San Diego Gas and Electric.

(Colloquy)

MS. RAITT: Sorry. It will just be a

minute here.

(Colloquy)

MS. RAITT: Sorry about that.

MS. BESA: Good afternoon again. I'm Athena Besa with San Diego Gas and Electric and I'm the Senior Energy Efficiency Project Manager.

So I'm building up what I had talked about this morning about SDG&E's portfolio. And I'm going to focus on the industrial sector at this time, and the agricultural. So I'm going to skip part of this discussion.

So the interesting thing about SDG&E is we have both a small industrial and an agricultural community in customers. So if you look at the statistics that we have posted here, they only account for eight percent of our electric consumption and five for gas. And because of that, we don't spend a lot of money on our customers in terms of energy efficiency projects, but not for -- it's mostly because we try to find something to do with them.

So as we all talked about earlier, industrial customers tend to be very specialized, in a sense. And to the extent that SDG&E has a lot more smaller customers, it makes it even more

challenging to go beyond some of the traditional measures that we offer in the general portfolio.

So to give you an idea of what kind of customers we have, we can go from having a ship building operation in our port, all the way to -- we have a lot of microbreweries, which are considered industrial. So if you look at the scope of the things that they do and what they need, there's -- although they're process oriented, they're still not the same process. And they have to offer -- you have to offer them a lot of customized approaches.

So when you consider, also, what these customers are more concerned with, there's a lot of environmental regulations that they are concerned with that are not necessarily related to energy efficiency. So we have to work with that competitive idea that they're trying to address versus their energy needs. And then, of course, they need productivity and their ability to provide profit. So these are the things that drive them in particular.

So one of the primary measures that we tend to see for industrial customers on the electric side, they tend to be motors and drives.

And to the extent that we've identified other opportunities, which we talked about a little bit earlier, is O&M, which tends to be the behavioral types of measures and retrocommissioning, as opposed to bringing on new equipment.

The other thing that's also increasingly getting attention is wastewater treatment. With the water crisis, a lot of people are into recycling water. And so there's a lot of potential opportunities to try to figure out how to get the most out of their water -- wastewater treatment.

Okay, so because we don't have a large population, we haven't really focused as much in customization. The best of customization that we offer would have been like through our calculated programs. We have specific audits done on the customers, and then we develop a plan for them.

We talked about, earlier, some of the challenges for if you have a calculated project and you're using a pay-for-performance type of approach, and by that I mean, you know, you make adjustments to the payment base on the actual verified savings that you see, it makes it a lot complicated in terms of establishing the

appropriate baselines and normalizing the post-consumption to make sure that you're just accounting for energy efficiency.

The other -- so the interesting thing about what we've done in the last year or so is really the development of the Strategic Energy Management Program. So Commissioner McAllister was asking earlier, it was like do you have a standardized way of trying to approach this measurement issues? And I think the answer to that is the strategic energy management approach. So we may not all agree with this. We had a lot of discussion in order to get to where we need to be.

But there is a standard manual for the program and a standard M&D guide. These manuals were developed in concert with the Northwest Program, so there's some lessons learned already that we are picking up. And then DOE is also adopting SEM, and we're all using the same basic manual. So I think that because we're doing this in a coordinated effort, and there's a lot of lessons learned moving forward, that potentially strategic energy management has good potential to help address the measurement issues for

industrial customers.

For SDG&E, we are, because of the way -- because it needs to be very specialized, we are going to look forward to third parties offering their services in how to address our customers' needs.

Our agricultural sector, so I'd like to point to some interesting statistics. So when you think about San Diego, you don't really think about we are a farm area. We're definitely a destination vacation place. We're coastal desert. But we have many more farms than any other county in the United States. And the reason for that is because we have a lot of small farms, so small acreage, small farms or small agricultural, and therefore we have a lot more from that perspective. But again, they don't use a lot of energy from our perspective. And they have a lot of other concerns that drive them.

And in the last decade it really has been about water. So the agricultural customers will make or break based on their water need, and so we've seen a lot of customers who have converted, who have retired from their farming businesses. And so we don't have a lot of the traditional

agriculture.

One of the interesting things in San Diego is that with the legalization of cannabis, there's a potential for an increase in indoor agriculture for this type of product. And they are water intensive. They're energy intensive. And so they are a potential end use that we would have to address moving forward from that perspective. So again, water is one of the biggest issues in this particular sector. And so we're going to have to work with them in order to figure out how best to serve their needs.

We also assume that the strategic energy management approach can also be extended to the agricultural program. But we are focused on making it work in the industrial sector before we try to extend it over to the agricultural sector.

I have one more slide in here that I could have covered earlier, and it has to do with workforce education and training. I think some of my colleagues talked about this, but this is one of the areas. And it's not particular, necessarily, to industrial or agriculture, but definitely, there needs to be a focus on making sure that we have trained workers, employees who

are focused on the energy sector. So we are offering programs to do that. We're working with other agencies to make sure that we can actually create a workforce that can deliver energy savings. And in particular, it is challenging to find the right type of workforce to work in industrial and agriculture.

With that, I conclude my presentation. Thank you.

MS. RAITT: Thank you. Next is Erin Brooks from Southern California Gas.

MS. BROOKS: Good afternoon. Hi, I'm Erin Brooks from SoCal Gas. And today we're going to talk a little bit more about a deeper dive into the ag and industrial sectors for our SoCal Gas customers in our territory.

This is a repeat from before, but just to remind everybody, we're really looking towards creating long-term solutions for customers in these sectors to sustain lasting operations, as well as changing out their equipment and focusing on both behavioral and the actual products and services, and addressing their needs in a simplified way.

I will pass over our SB 350 goals.

So starting with the ag sector, ag sector is still a little bit small for SoCal Gas. The ag sector represents about two percent of overall consumption, but we do think it's a very important sector. It is comprised mostly of a few larger customers within that segment. So, you know, two percent of these customers are very large, but they represent about 44 percent of the consumption. So we have historically targeted our larger users with their energy efficiency. So we have a lot of really small customers who also have various energy efficiency needs that we are looking to address going forward. And also, the kinds of customers we're looking at are those with greenhouses, farming, and then post-harvest are the primary segments.

So some of the challenges in the ag sector is that, because they're very small, they often lack access to technical resources to do these assessments at their facilities, as well as financial resources. And they also have competing priorities. There's production windows where they can -- they have an opportunity to make changes during a very specific time of the year. Other times, they're in harvesting or in

the growing season and they can't really change their operations. So it's a much more narrow focus. And it's also difficult to offer standard programs to these customers because their needs vary so greatly depending on the kinds of crops or the operations that they have.

Some of the trends we see is that, of course, we have limited water. I know we are technically out of the drought now, but water is also a concern in the ag industry. There's also a decreasing in labor availability, which allows -- which also provides for increased mechanization in this industry. There's also this opportunity with the cannabis legalization, and indoor agriculture, so we are looking at efficiency opportunities for those customers. And as well as increased labor costs limit the capital that these customers have to do these energy efficiency projects.

So in SoCal Gas area we have a lot of urban farms and nurseries. You can see from this picture sort of the distribution of nurseries versus urban farms, and they're really a heavily concentrated area, even in the L.A. Basin itself.

And so in the ag sector, we have a few

customer segments, like I mentioned before. Greenhouses is one of the primary energy users in this segment. There's a lot of opportunity here, although we tend to focus on smaller greenhouses because there are some questions on industrial -- or industry standard practice, that was mentioned earlier, with these larger greenhouses, over a million square feet, and whether we are able to provide energy efficiency incentives to those customers. So we focus on the smaller ones and look at all kinds of savings opportunities for them, like the variable frequency drives, building shell, all of the -- lots of lighting opportunities, thermal curtains and so forth.

We have this urban ag which can be indoor ag, but can also just be small farms. As you all know, there's a big push in the past few years towards more farm to table living. So lots of agriculture is happening closer to the population densities so that it doesn't have to be transported a really long way, and thus contribute to our greenhouse gas emissions. So we have lots of little farms that have popped up all over and we're looking at ways to address the needs of those customers.

Again, there's lots of conservation potential here. We look at herb gardens, tomatoes, carrots, peppers, lots of these kinds of small, small farms that are usually single-crop focused all around the Los Angeles area, and we're working with those customers.

Another segment that is special is mushroom farming. This is really variable in size, but it's usually quite small. It sort of resembles a commercial customer, just on the facility that they operate in. But there's lots of opportunity for HVAC, for lighting, for insulation, and especially water conservation.

Moving to our industrial sector, I mentioned this earlier but this is about 25 percent of the natural gas consumed by SoCal Gas customers, so it's by far our largest single sector. And there is a lot of opportunity here. We have refineries in our territory. We have food and beverage, textiles, minerals and plastics. They do a lot of process heating, water heating, space heating. And then they are -- again, this is really dominated by a few very large customers. And so we want to really focus on strategic energy management specifically

for these really large customers, and also offer comprehensive approaches to simplify that engagement.

Some of the challenges that we've see in the industrial sector so far are that there is low adoption of energy efficiency solutions by really small customers. Again, that's depending on the kinds of operations they have and the access to capital, and ability to adjust their operations to do these projects. Some customers, we find, have turnaround of their facility. They're operating constantly and they only shut down maybe once every two or three years. And so being able to time the project to that specific window is a challenge. And if you miss it, then you have to wait another several years in order to do the work.

Lots of the projects are complex and time consuming. We have a review process that we go through to make sure the savings are verified and accurate, and that takes some time to go through that process. And then we have -- it's sometimes difficult to convince customers to pursue energy efficiency because they're focused on just their operations. And whether they're willing to take

the time out and make these upgrades during those turnarounds or during some other kinds of down time does take some convincing on their part.

But we have seen a lot of opportunity in the industrial sector. The vacancy rates for a lot of these facilities has declined, so operations are ramping up again, which was positive. We see a lot of new construction in the Southern California region, especially in the Inland Empire. There's lots of growth there in the industrial sector.

For in 2016 historical information, you'll see the segments that I mentioned, refineries, food and beverage, minerals and plastics. So refineries are by far the largest portion of our industrial sector, but food processing is the second highest, and that's what I would like to talk about now.

So you'll see that within our industrial sector, food processing customers are about 15 percent, but they represent 27 percent of the usage. So there is some significant opportunity in this segment. And these are mostly comprised of cheese manufacturing, fruit and vegetable canning, dry, condensed, evaporated dairy product

manufacturing, milk manufacturing, and frozen fruit juice and goods, so there is substantial savings potential here.

We have to work with them on their return on investment to make sure that their management buys off on the value of these projects in time for them to make the capital decision in their capital planning. And then we have to recognize that they are very niche customers. Each of these, in food processing, they have very specific needs and very specific kinds of operations. And so getting that technical expertise in to evaluate their opportunities is pretty important and essential that they understand, really, the very specific kinds of customers that we have and the operations that those customers have. It's not easy to evaluate a refinery versus a cheese plant versus something else and you -- the same approach is not able to be applied. So having that expertise in specific food processing segments is really important.

Another growing areas, in addition to San Diego that's maybe like the brewery capital, the breweries are also growing in Southern California in our territory, as well. We have about -- in

2014 there was 24 percent growth, and it's been even higher since then. This industry is really exploding, and so there's lots of energy efficiency opportunities here. We see that there are, not only, of course, in the gas usage but electrical savings, as well. So again, we do partner with all of the electric utilities in our territory in order to offer these comprehensive programs to them in order to achieve savings, not only on the gas side, but electricity and water.

And then finally, all of our energy efficiency offerings, whether it's for the nonresidential sector, whether it's the custom program where you have, basically, a dollar per therm depending on the kinds of retrofit that you're doing, or our standard deemed rebates apply for industrial and agricultural customers. So we have deemed incentives for boilers, for heat curtains, for specific measures that apply to those kinds of customers. Or if the deemed doesn't work, then we have a customer approach that we can apply.

And thank you very much.

MS. RAITT: Thanks. Next is Don Kazama from the Energy Commission.

(Colloquy)

MR. KAZAMA: Good afternoon, members of the audience, Commissioners Hochschild and McAllister. My name is Don Kazama from the Energy Efficiency Research Office, representing the Industrial, Agricultural and Water Program. And today I'm going to discuss and just give a high-level overview of the general -- generally of the Industrial, Agricultural and Water Program, and a little bit more specific discussion about a certain program element that's brand new. It's the Food Producers Investment Program which you heard a little bit about from previous speakers.

You heard this morning from Commissioner McAllister that we are going to be moving pretty soon from an energy-based metric for energy efficiency programs to more of an emissions-based metric. And we do have a statutory goal that we have to meet of 40 percent greenhouse gas emissions reductions by the year 2030, and that's sooner than you think timewise, so it would behoove us to get moving quickly. And to get there, we're going to be relying on increased energy efficiency and on renewables to reduce our

carbon footprints. And the CEC programs which I will be discussing are designed to drive the technology and the innovation which is going to help us to reach or goals.

These are our current funding sources for the Industrial, Agricultural and Water Programs. They're public goods charged based. And the first one is EPIC, the Electric Program Investment Charge. And $125 million a year has been authorized for expenditure for energy efficiency projects. And the other is natural gas, of which $24 million a year has been authorized for expenditure. And the new one is sourced from the Greenhouse Gas Reduction Fund. The is a fund that's paid in by facilities that are subject to Cap and Trade by the California Air Resources Board. And this expenditure was authorized by AB 109. And this begat the food production -- I'm sorry, Food Producers Investment Program.

And as the Commissioner mentioned this morning, we need to have projects on the ground to get actual greenhouse gas emissions reductions, so these programs are designed to do just that. And we want to make a bigger impact on the curve that Manjit showed you a little

while ago and to tap into the really large potential for industrial energy efficiency savings that have been discussed by all the utility reps here today.

I'm going to show a few examples of the types of projects that we have currently funded. And the first one on the left there is -- the awardee was GTI and it was $2.6 million out of the Natural Gas Fund. And what this project did was replaced conventional drying tunnels with a rotary process instead. And the test site here was the Inland Empire Foods Company in Riverside. And this project resulted in a 81 percent natural gas use reduction, which is pretty significant.

The project in the middle was awarded to the U.S. Department of Agriculture, $885,000, again, funded by Natural Gas. And this is infrared dry blanching and catalytic drying of what they call snack foods. If you guys have ever eaten kale chips, beet chips, things like that, this is exactly what this is. The prior process used a conventional drying oven to dry these products out for consumer use. This one went to dry blanching with an infrared process and saved 40 percent on natural gas use.

And the other project on the right is at Jackson Family Winery in Sonoma. And this project uses a combination of reverse osmosis and forward osmosis for treatment wastewater for reuse. And this water is good enough and clean enough that it could be used for facility cleanup, including barrel washing. And the impressive thing about this, in addition to the 250 metric tons per year of CO2-equivalent emission reduction, it reduces groundwater use by 90 percent. And this is a pretty large factor as the California industry is located in some areas like San Diego which are kind of water deficient. So it's very, very important in that regard, as well.

There are a bunch of numbers up here. I'm not going to necessarily read them, but the food processing industry in California is vitally important. I mean, it contributes a lot to the California economy, $82 million. It produces almost 200,000 jobs, direct jobs, plus subcontractors and others who provide services and goods to the facilities. And they use a heck of a lot of energy. And their emissions reflects that, it's 3.3 million metric tons of CO2 each

year emitted.

And a side goal of our work here is to help these industries remain competitive so they'll stay in the state and not migrate out.

And real quickly, through the Food Production Investment Program, I'm going to refer you to the published guidelines, which I'll talk about in a second, to get some specifics. But basically, this program was established by AB 109 and it allocates $60 million from the Greenhouse Gas Reduction Fund to fund energy efficiency projects that specifically reduce greenhouse gas emissions. And the program was developed with pretty significant input from the food processing and from trade organizations and government agencies, as well, such as the California Department of Food and Agriculture, and just general public comment from stakeholders.

The name of the game for the FPIP is to reduce greenhouse gas emissions. And our goal is to get more projects installed. Again, this goes back to Commissioner McAllister's statement this morning. These projects should not only exceed best practice, but they should go out of the advanced areas, cutting edge areas where this

technology is not necessarily used here in California but might be proven to reduce greenhouse gas emission reductions in places like Europe.

Another goal of this program is to get other food processors, other industries to actually adopt -- to look at what we're doing here and then adopt the technologies for their own use.

And lastly, as required by SB 535 and AB 1550, this program is designed to have a positive impact and benefit disadvantaged communities and low-income communities.

Okay, we implemented this program in two phases. And we are -- just have completed the first phase and we produced and published a set of guidelines which inform food processors on how to access the $60 million in funds.

The program is set up so that there are two tiers in which food processors will apply for funding, Tier 1 which are basically prescriptive measures, and Tier 2 which are the advanced technology, they're more or less custom measures. And I'm going to refer you to the link on the guidelines to get the detail on it, but in both

cases, EM&V will be conducted so that we can get, as what a previous speaker said, countable energy savings. And countable energy savings equals countable GHG emissions reductions.

The grant funding opportunity or solicitation is currently in the works. And we expect to release that by later this month, with some pre-bid workshops coming up in July. And the proposals themselves will be due in September.

And here are the various links where you can go to, to view the guidelines and eventually get a copy of the GFO. And also, there's a key staff contact, Cyrus Ghandi. He's the main program contact on a day-to-day basis. And there's also a docket that has been activated for the public to provide input during this entire process.

Thank you very much.

COMMISSIONER MCALLISTER: Was there any follow-up with questions or anything like that? Did you have any prepared questions for the panelists? No? Just wondering sort of --

MR. AHUJA: (Off mike.) Yes, I do have questions.

COMMISSIONER MCALLISTER: Okay. Great. I've got a couple questions, too. We've only got about seven minutes, though.

MR. AHUJA: So when I was doing research, I found out that a couple universities, one in Southern California and one in Northern California --

COMMISSIONER MCALLISTER: Could you put the mike -- there you go.

MR. AHUJA: When I was doing research, I found that a couple of universities, state universities, one in Southern California, one in Northern California, Southern California is Northridge, and I think Northern California is San Francisco, they're funded by DOE to do audits, energy audits. And so -- and when I talked to the program managers, I didn't get a sense that there was leveraging going on between the utilities and the universities. And what I found out was that these universities, as I said, they were funded by DOE, and they were reaching out to a smaller customer, bakeries, et cetera, and saying, hey, come on, you know, we'll do a free audit. And I thought they would be -- they could be, potentially, part of the marketing by

the utilities.

So I just want to know your thoughts. How are you leveraging any potential for leveraging for this newly-funded program?

MS. BROOKS: Okay, this is Erin Brooks from SoCal Gas.

So I am not aware of the actual leveraging that we do, but I agree that that is a great opportunity. But I'll take that back and find out what we do in that area now.

COMMISSIONER MCALLISTER: Because there have been several of these over the years. They've been in place for like 20 years. I mean, SDSU down in San Diego has had the Industrial Assessment Center for, I don't know, 15 years, and they've done some really good work. And, you know, hopefully, there's some collaboration that can happen there. I don't know about their funding situation today.

MR. KAZAMA: This is Don Kazama and I'm the former Program Manager of the California Energy Commission's DOE-funded Industrial Energy Efficiency Program. And as such, we work closely with the centers are San Francisco State University, San Diego State University, and the

now defunct, I hate to say, Loyola Marymount University in Los Angeles with their Industrial Energy Assessment Center. And I'm most familiar with the work done by San Francisco State. And they have to date conducted over 500 industrial energy assessments, which include many, many food processing plants, as well as standard manufacturing plants. So they have quite a bit of a track record.

And I might want to add here, too, that San Francisco State, the IAW (phonetic) Program has an interagency agreement with them to conduct EM&V for some of the projects that may come out of the FPIP Program.

COMMISSIONER MCALLISTER: Oh, interesting. Great. Thanks. I did not know that you managed that program. That's great.

So I have a couple of questions. You know, we heard, well, maybe a year or so ago there was an En Banc between the PUC and the Energy Commission, and it was sort of about retail choice, I guess, is really the way it was billed. But it was a fairly wide-ranging discussion. And the large energy consumers were there, CLICA (phonetic). I don't think CMTA was

there, but the manufacturers are in this discussion, as well, obviously. And they -- you know, energy is a big cost for them and they want to keep it down. And I guess the -- and they sort of have, you know, over the years asserted that they don't -- they can't really participate in the programs at the utilities. And I gather that's changing somewhat.

But I guess what's the status of just sort of your outreach to the industry groups and sort of your ability to provide really solid contextual, you know, I won't say custom, but just solid assistance to them to not just get their energy bills down, but also, you know, provide incentives of some sort to them?

MS. BREITENSTEIN: This is Colleen from PG&E.

We actively engage with CLICA, and also the food processors.

COMMISSIONER MCALLISTER: Uh-huh.

MS. BREITENSTEIN: So we -- I referenced some of the challenges we faced --

COMMISSIONER MCALLISTER: Yeah.

MS. BREITENSTEIN: -- with them participating in our traditional programs. We're

hoping that by the launch of SCM (phonetic) and being able to roll that out, that we'll be able to address some of those challenges that have created, probably, some of the feedback you've heard.

COMMISSIONER MCALLISTER: Yeah. Yeah. Well, I'm sure you've heard it, so --

MS. BREITENSTEIN: Oh, I have.

COMMISSIONER MCALLISTER: I appreciate you expanding the financing platform to be -- to do bigger projects, for sure.

MS. BREITENSTEIN: Yeah. That's another aspect that we're hoping to help them, because there are some different requirements for that which may allow them to access the energy efficiency through the financing platforms, versus our traditional dollar per kWh therm.

COMMISSIONER MCALLISTER: Yeah. That sort of leads to my second question.

You know, there's a lot of incremental things that people can do to save energy. And, you know, kind of at the margins, a few percentage here and there. But I guess, you know, really the bold stuff is, to get deep savings, is pretty -- tends to be pretty capital

intensive. And particularly where you've got a facility, for example, it's got, you know, a heat process and a refrigeration process, you know, like linking those two up and, you know, putting in place, you know, heat pumps in between, like balancing the two and helping them really innovate with capital intensive, relatively large capital, but it's still cost effective. It's just, you know, it's a bigger hurdle to get over to do the project.

I guess, how do you see those sorts of, you know, big capital kind of innovations happening?

And I was just over in Europe at the Clean Energy Ministerial in Denmark. You know, I did a couple of sort of studies of -- or not studies, site visits of these big facilities. And they are really taking an integrated approach, like and saving massive amounts of energy in pretty innovative ways.

And so I think I'd like to see something, you know, more of that here. And I'm wondering sort of what role those sorts of bold projects could play within the portfolio, you know, really just at all, not necessarily within the portfolio

but just to make them happen?

MS. BROOKS: So this is Erin from SoCal Gas.

We agree, there's a lot of opportunity for these big, comprehensive, intensive projects. The challenge we've had it the past, or most recently, is isolating, potentially, the energy savings parts of those projects versus the other benefits that the customer receives. And we've gotten lots of questions about that through our traditional programs and whether -- questions about spending ratepayer dollars on other benefits that the customer would receive in addition to energy savings.

And then looking at -- we have historical program rules that we're looking at adjusting where we have caps on some of these projects. So if it is a really, really large project and it's like a $20 million investment that the customer is making, we can't pay them a dollar per therm for that because that completely bankrupts the program budget and doesn't allow for equitable access to all customers.

And so measuring the effectiveness of the incentives, whatever the cap is, if it's $1

million per customer, or depending on the program, and that motivation for them to make that decision at that point and judge -- and showing that our -- you know, the ratepayer dollars does result in that investment that's being made, even though it's a really large capital investment, is something we're still working through also.

COMMISSIONER MCALLISTER: Okay. That's interesting.

So I guess in the context of SB 350 where we're going to be, you know, putting together the plan for doubling and we're going to be including the industrial sector, I mean, I guess the portfolio is a piece of that; right? But I think -- so we're going to be convening industry groups. And again, we want everybody's feedback on like, okay, where should we convene and who and when and sort of, you know, helping us get the most out of that effort, so -- but we'll make sure to include, you know, the utilities, certainly the local ones. But I think it's important to have you guys -- have the portfolio, at least, there as a resource, so I'll make sure I do that.

Anybody else want to make any comments? I think we just have time here. Great. All right. No, go ahead.

MS. BREITENSTEIN: Oh. Colleen from PG&E.

Really just kind of reiterating what Erin was saying, and then reinforcing what you're going after, we have, at PG&E, encountered with one of our refineries a very large, complicated project which started many years ago, encountered a lawsuit which sent it off the rails for several years --

COMMISSIONER MCALLISTER: Uh-huh.

MS. BREITENSTEIN: -- but it's now come back. And so we've taken a very different approach to that one because it is so large and we are looking at millions of dollars in incentives. And we are taking a very thoughtful approach to how we would, one, mitigate the impact to the portfolio to make sure that we don't shut others out because we've exhausted the funds, but also to ensure that we are being fair to other ratepayers by making sure the investments are cost effective and looking at various ways to get this one through. Now

granted, we can't take that approach with every project or every customer because they wouldn't necessarily warrant that level of intensity. But this is something that is completely outside of anything we've ever done before. So we are trying to be creative within the bounds of our program rule.

COMMISSIONER MCALLISTER: Yeah, great. I very much appreciate that, so thanks. All right. All right, I think we're good. Thanks very much.

MS. RAITT: Thanks. So we'll go ahead and set up for our next panel on Conservation Voltage Reduction Technology.

All right, so our first speaker is Laith Younis from the Energy Commission.

(Colloquy)

MR. YOUNIS: Okay, good afternoon everyone. My name is Laith Younis and I'm with the Demand Analysis Office.

Conservation Voltage Reduction, or CVR, is a proven technology to reduce energy use and peak demand. It is a technique for improving the efficiency of the distribution system by optimizing the voltage. CVR is included within the programmatic activities to satisfy the SB 350

doubling goal. These efforts are achieved by installing various forms of equipment sensors. And some utilities have been able to find similar savings using software-based programs and products, reducing the capital costs even further.

The Energy Commission is excited to welcome Michelle Nall with Glendale Water and Power, Bryan Pham from Southern California Edison, and Russ Griffith with PG&E, who will be discussing the potential of CVR technology and their CVR programs.

MS. RAITT: Michelle Nall from Glendale Water and Power, please.

MS. NALL: Good afternoon, Commissioner and Advisors. My name is Michelle Nall. I'm with Glendale Water and Power. I'm the Utility Business Systems Support Manager. And we manage all of the Smart Grid systems that were implemented.

So Glendale, if you don't know, is outside of Los Angeles. It's northeast of Los Angeles. We have about 125,000 customers. We deployed Smart Grid in 2011 and part of the Smart Grid initiatives was implementing a CVR solution.

We implemented all our, you know, electric and water meters, our AMI.

And in 2014 we selected Dominion Voltage, Inc., DBI, their EDGE Solution. So their EDGE Solution uses the AMI voltage data, along with the existing SCATA controls to optimize voltage levels on the network. The EDGE Solution has three different modules. They have a planner, a manager, and a validator.

So the planner determines the Bell Weather meters and outliers for the minimum and maximum voltage. It utilizes data from our meters and the voltage data is imported into the planner and that's when it determines the outliers for the minimum and maximum voltage.

The manager is more like a dashboard for each transformer's voltage performance so we can monitor that, and we can turn it off and on based on the needs of our dispatch.

The validator actually calculates the energy savings for each of the transformers and feeders for us. So it uses the real-- like I said, it used the real-time AMI data to make control decisions so it responds dynamically to changes on the grid.

So our pilot program we started in September of 2014. It uses -- we basically just use one transformer and one feeder and it's about 3,800 meters. It uses 15-minute voltage data. We have an AMI -- we have an adapter on our open way collection engine and that's where it pulls all the voltage data for the meters that imports it into the planner.

When the data's imported into the planner, it basically selects 20 Bell Weather meters on the high side and the low side. And we want to try to get the range between 114 and 126 volts.

So for the program rollout, when we first started we wanted to identify all the outliers. We wanted to identify anything that had the voltage that was under 114. We actually found a lot of issues. So there's a lot of panel issues. We actually found transformers that were out just doing that analysis prior to it. Because you don't want anything that's significantly low.

So we would send out field investigations for that to determine what were the causes of the low voltage because otherwise it's a barrier for the EDGE to work correctly.

So our pilot program we rolled -- like I said, we rolled out one feeder. It was a slow rollout. We had a lot of pushback from our engineering department for whatever reason and I'll get into that with our barriers.

So we rolled out one feeder, then two feeders the next year. This year we actually implemented 19 transformers and 33 feeders. Our goal is to have 38 transformers and 54 feeders. Right now we're only focusing on residential and small business. We're not rolling it out to our large commercial customers. That was a joint decision at this time because they want to be able to monitor it for a while before we do that.

COMMISSIONER MCALLISTER: These are transformers, these are substation transformers or these are distribution --

MS. NALL: Yes, substation transformers, yeah.

So over the last three years that we've implemented the program we've seen a savings on an average of 2.2 percent per feeder. Some are higher, some are lower.

And this is just the chart that you can see where the energy savings have occurred for us

in the last couple of years.

So this is the methodology that DVI uses. I'm not going to go into detail on that because I'm not an engineer. This is basically an engineering calculation. But the validator uses a statistically pairing process to determine the CVR factor, which is then combined with the voltage reduction data to calculate the energy savings.

So the data in here is in the slides. I know Bryan and Russ can probably go into more details on the calculations, since they're engineers. So this is just the methodology that DVI uses.

So some of the implementation barriers we had, we didn't have too many. There were no regulatory barriers. Our city council was fully supportive of the program and the project. There's no technical barriers because the technology worked as promised and we're very happy with the product.

The only major barrier was the human factor. Our electric service staff were convinced that the system would harm the load tap changers and increase operations, maintenance,

and costs. They weren't convinced that we would have any energy savings at all. And they were concerned about the safety factor, as well.

So with that, I am done with my presentation.

MS. RAITT: Thanks. Next is Bryan Pham from Southern California Edison.

MR. PHAM: Hello, my name is Bryan Pham. I'm the Senior Manager with Southern California Edison. So thank you for the opportunity to be here to present what we're doing at Edison with the Distribution Volt/VAR Control project and in relation to CVR, conservation voltage reduction.

Now, throughout this presentation I will refer to Distribution Volt/VAR Control as DVVC to keep it short.

Just real quick here, one thing to note now is that we have 15 million customers, approximately, probably a little bit more. And the main thing on this one is Edison is really supporting the green gas reduction, basically effort that the State is doing.

So before we talk, and talk about Distribution Volt/VAR Control, you can't talk about how the solution is without really

understand what does Distribution Volt/VAR Control mean. So let's talk about why the utility needs to control voltage and VAR.

Voltage is an easy one. Everybody probably works with that. A utility, like Edison, required to maintain the voltage within a range. If the voltage gets too high or too low outside the operating range, basically it won't work. You can't turn on your TV or things just doesn't work well.

Well, VAR, I'm going to try to simplify VAR a little bit. It's one of the things that's a little harder to explain, but I'm going to try my best. So VAR really stands for volt and reactor, and without really get to what that is, and I'm explaining why is it important.

So VAR consists of both inductive and capacity load. So inductive load basically comes from customer appliance or customer equipment, things that usually have a motor. You know, in the house that will be appliance, like a washer and dryer has a motor in it, so it creates inductive load.

Okay, so now what happened is when the VAR exists on the system it creates some

inefficiency. Because what happens is and, you know, without going to the math is, as you know it's we use AC outlet current. When the current way form and the voltage way form are not in the sync, they start getting out of sync, meaning they don't peak together you can have some inconsistency on the system.

So by adding capacitors to the system it can fill out the inductive load that's created from the appliance. And when that happens it could bring it back closer to zero VAR flow and that creates a condition we call in phase, the current goes in phase and that increase the system efficiency. So that's why we control VAR.

The other thing we control in VAR, without VAR we have about 14,000 capacitor bank on our system and over 1,000 substation capacitor banks. To see how important that is, because you have to supply VAR somewhere, and if you're going to turn off the -- right now we're going to turn off all the 14,000 cap bank and the 1,000 substation cap bank, the entire area in Southern California would go black. That's how important that is. So it maintains system stability.

Now, so Edison, for the last 50 years

have basically have chosen to control voltage and VAR by using capacitors. And on distribution capacitor, meaning they have to install on the distribution circuit and the substation. So now, the capacitor, they can be turned on and off and when that happens they can either raise or lower the voltage on the circuit, out in the field. And that in effect raises or lower customer voltage.

The problem is though the efficiency here is the capacitor are not optimized. By that what I mean is they basically function on a stand-alone basis. They sense the local voltage and they turn on and off, but it's based on what they see at that location. They do not communicate to each other and coordinate together.

So because of that there's most of the time we have higher than necessary voltage and higher than necessary energy consumption as the result.

Now, this real quick is the CVR concept. Actually, Edison have 25 years' experience with it. Back in '92 we did it. We actually did it on two entire substations, with 18 distribution circuits. It's up about 80 NVA load or so. And

we actually demonstrate a 2 percent energy savings. We published a paper and you can actually go look for it. Now, and then so that was then.

But recently, what we did again in 2015, and we demonstrate DVVC save more than 2 percent energy savings as part of the Irvine Smart Grid Demonstration project. This is a project that the Department of Energy funded, a project we did in 2015.

So, and then another one and I believe CEC gave some reference to, or some links to these two documents here, also is the DOE, in 2010, they published a report to show. Basically, what they did was a bottom-up approach. Meaning instead of us, we actually check and test out in the field, involved thousands, or tens of thousands of customers during our demo. They just take their appliance, you know, washer or dryer, the latest one they had at the time, the TV, hundreds of different things and they test it on the appliance basis.

So it's an interesting read. It's the CVR is for real.

Okay, so how do we solve the problem of

enough optimized capacitor problem? We did it by leveraging technology and also the modern equipment that we have now to perform a capacitor optimization algorithm.

And as a result, what happened is they called in the old capacitor and we lowered customer voltage without violating the operating range. And as a result we always verify and, again, we save the customer energy because of that.

So you may ask what's really the cause of the energy savings? What you find out, just like DOE reports show, most of the appliance, equipment, basically appliance operate within an operating range. It will work fine within a range. But exactly increase efficiency when you actually lower -- a little bit lower on the operating range. So that's where it comes from.

So, basically, real quickly, the illustration just shows the lower the voltage by 1 percent and you see the NC savings by 1 percent.

So what are really the benefit of DVVC can provide? And this is one of the things, we did an economic study a couple years back, before

we deploying. We are deploying, by the way. Right now, as of now we have 200, close to 300 distribution substation is being deployed already over two years, and that's over like 2,000 distribution circuits. And we actually measure the savings and it's pretty significant.

And what you see is the affordability is the payback ratio, it takes about one month to pay back the entire effort. I've never seen any, you know, cost-to-benefit ratio that high, one month payback.

The customers see the savings. We verify that, again. Environmental, again green gas reduction. Right, energy that you don't have to produce. I mean, you're reducing green gas emission. Operations are excellent.

We actually, because of DVVC, we monitor them remotely and it's all scaled at two-way control. We have found control of the cap bank that failed. Before, instead of having to wait for a while to go out, we send people to go out whether they fail or not to inspect, we ask people to go out when they fail. And that's really increased the efficiency on O&M.

And DI integration, the last point,

because we lower the voltage and we can control that totally on the utility side, to benefit the customer at the same time, as we get more and more PV penetration sometimes it causes high voltage. Now, because of DVVC we lower voltage and that would basically help with the integration.

And when we have the Smart Inverters, which is still under development for the market right now, and when we control that, we already have a method to integrate into the control algorithm, also. Thank you.

MS. RAITT: Thanks. Next is Russ Griffith from PG&E.

MR. GRIFFITH: Hi, good afternoon. My name's Russ Griffith. I'm with PG&E. In terms of background, I'm a Navy NUC, termed Smart Grid Guy. At PG&E I led our Volt Optimization Pilot over three years. Let our Smart Inverter Field Pilots as well as our DER Management System Pilot, DERMS. That got a bit of buzz in the DER space.

I'm going to talk about PG&E's VVO pilot, as well as some of the studies we've done looking at what are the potential savings of a wide

scale, VVO-driven, CVR deployment across our service territory. And where Southern Cal Edison will talk about dynamic Volt/VAR control, and Glendale will talk about use of DVI's EDGE, PG&E. we're all about Volt/VAR optimization. That's our internal branding. So if I go to that too much, that's my way of saying conservation voltage reduction.

In terms of what we've done, there's a couple of slides of bullets. I'm sorry for those. We have some pictures towards the end which are meant to be a bit of a credibility statement around some of our Smart Meter-driven voltage analysis that helps us come up with what I think is a fairly sophisticated analysis of what the real potential savings are of driving CVR savings across our service territory.

So this first slide says we had a CPUC-approved pilot and it lasted just over three years. We ran this pilot in Fresno, on 14 distribution circuits. And we have verifiable savings from the pilot. Our two vendors were Dominion Voltage, Incorporated and Utilidata.

Some people say, hey, you piloted VVO, go out and scale it, you've already found solutions

that work. The answer is, yes, we have. However, our vendor selection for the pilot in 2014 versus our present planning around how do we deploy at scale, we're looking at potentially different sort of what we'll call a solution architecture. It's all about the systems integration that drive system performance and really good system up time.

We chose DVI and Utilidata in 2014 because we thought given our constraints of the pilot they would show the true potential of what CVR savings exist in our system.

What we're looking at now is an advanced distribution management system, ADMS. It's integrating our distribution SCADA with our as switched model of the distribution system, where the topology changes minute-by-minute of the day. When there's outages, a car hits a pole, the squirrel jumps between wires, or we do maintenance on the distribution system. The topology of the system matters in determining what control set points have to go out to the capacitors and voltage regulators, and load tap changes in the substation.

And that's why we think the integrated

system is what will work best for our customers for the future. So if we build VVO or conservation voltage reduction on top of the DMS that gets us a good solution, while also having optionality for what can Smart Inverters do to help when they're in the right location, when we have the right way of engaging with them, or other solutions to help improve the voltage on the distribution system.

This slide shows a little bit about the measurement and verification approach that we took in the pilot. If you're close to the screen, you can see a neat picture looking at time series box and whisker plots. Our measurement and verification approach for the pilot was have it on for a day, have it off for a day. When it's off, your opportunity cost is the lost conservation, but you build a really good sample size that helps you figure out what's the baseline. And then, if you can measure baseline compared to the energy consumption when it's on, I think that's a very defensible quantification of savings.

I'm going to go on to the next bit. But our key takeaway was when we piloted it on our

system we found CVR factor that was very much in line with what other California utilities have seen and with other national studies. And we saw voltage reduction and energy savings that were absolutely in line with other California utilities and other national studies. So overall, really good.

So what's next? Before VVO, PG&E recorded Smart Meter voltages once a day. We call it the Midnight Anchor Voltage Read. Read voltage at midnight and it was really to find problems on our system. When we started this pilot, we decided to turn on voltage collection either every 15 minutes or 60 minutes, based on what sort of Smart Meter you had. And we scaled this voltage collection across a million years.

And now, we have years' worth of Smart Meter voltage data. So what does that do? There's a little equation on the bottom right-hand side of the slide. The CVR is really simple. You have a voltage reduction element and a CVR factor, how the load responds to voltage element.

You can assume the CVR factor based on industry studies or load forecasts, such as

what's happening with LED lighting. But how do you come up with a great quantification of the voltage potential reduction circuit-by-circuit, or substation bank-by substation bank? We think it's measuring the Smart Meter voltage data.

So there's a few pictures here. These pictures are great if you like picturing in your mind how you might analyze hundreds of millions of Smart Meter voltage reads on a time series basis and turning that into a total resource cost forecast for VVO deployment.

And I'll try to go through that just to help build some credibility and help us think about what does it make sense for PG&E or maybe other IOUs to think about why I'm seeing how VVO or CVR can help with SB 350 targets.

Overall, you want to look at what are your most limiting voltages on the system. So you're constantly recording voltages throughout the day. This plot up here says if you look at time, and then loading, you can find that little box and whisker sort of distribution of what's my distribution of voltages at different points of load.

That bottom, those little bottom dots

right there, those are your lower voltages, the most limiting voltages. If we change the way that we represent that data to be a distribution of, what's the lowest voltage at a given bank loading of 20 megawatts, 21 megawatts, 22 megawatts, we can say, okay, let's find that first percentile voltage. That's our limiting factor.

We have a distribution for various discrete loading measurements, 20 megawatts, 21, 22, et cetera. And we can plot that of what's our limiting voltage correlated with what's our bank loading for that particular bank, and do an 876ER (phonetic) analysis of saying how many hours are we at 20 megawatts, how many hours are we at 21 megawatts.

And this voltage delta between a lower limit, 114 volts, 115 volts -- 115 volts and the top point of the curve. The area between those two curves that's your voltage potential. You turn that into a percent change in voltage that you can assume and -- and I'm going to skip slide 5 and come back to it, eventually.

You have a percent delta V that's quantifiable. Multiply that by the assumed CVR

factor, throw that into an avoided cost analysis. And at the end of 2016, when our pilot concluded, we thought that the total resource benefit-to-cost for VVO could be in the range of low end 1.4, the high end's 2.6.

From a -- I don't have the GWH avoided energy figures in the back of my head. But from an energy efficiency savings stand point that's around one and a half percent, 1.9 percent.

It does have a pareto-like distribution of benefits. We wouldn't want to put it everywhere on your system if and when we deploy it, but this represents a deployment to about 15 percent of the system. There's various reasons why the costs vary and the benefits vary feeder to feeder.

So like you're also able to quantify energy reduction. You can also quantify peak demand reduction. If you know the available voltage reduction at a particular loading time, and you say how coincident or noncoincident is that with CAISO peak loading, you can come up with what's my potential peak demand reduction.

With our analysis that's not where the majority of the benefits lie. They really lie

with the energy reduction, rather than the demand reduction.

So overall, from a PG&E stand point, piloted VVO, found out how to make it work on our system. We're presently looking at an advanced DMS deployment which enables VVO. And I think we've got a really good way of figuring out where it can provide benefits on our system going forward.

MS. RAITT: Thank you.

MR. YOUNIS: This is Laith Younis, Energy Commission. So we're going to go through a quick series of a few questions. Russ, I'll open it up to you. Can you expand a little bit more on barriers that slow the large-scale rollout, outside of the DMS portion, just for better education and understanding of what we can do to try to help verbalize it to the public?

MR. GRIFFITH: I'm going to echo one of the earlier barriers that was brought up around people not necessarily believing that CVR could exist. I've found myself wishing many times, when I was trying to evangelize VVO that we had a Khan academy video or course on how CVR works. Everyone understand light bulbs. If you reduce the voltage in, they're a little bit less bright.

But, you know, rotating machines, constant power loads, I think how it works with the physics behind it in the way that a lay person understands is really tough.

There's a lot of buzz around disruption on the grid edge and how Smart Inverters could potentially help control voltage, and VARs, and I think they can. I don't think that we have proven control systems. I don't think that it's only Smart Inverters or only utilities optimizing their own assets, but people understanding it's an all-of-the-above, not a one-or-the-other.

That approach is also, I think, a perception barrier that exists.

MR. YOUNIS: Got it. Michelle, you'd mentioned something about a perception barrier as well. Can you expand on that?

MS. NALL: As I mentioned -- oh. As I mentioned in our presentation, our biggest barrier were the human factor and overcoming of bringing the electric staff along slowly. We had a lot of pushback them, you know, believing in the program that it's not going to damage any of their equipment.

And also, on the construction site for

any safety concerns they had, if we're producing tap changes on their transformers.

We put them in touch with other utilities with similar systems and they were able to talk to people with the experience in operating the same system, which alleviated their maintenance and other concerns.

We also gave them full control over the system operation and worked with staff to develop operating procedures with them.

We continue to have biweekly meetings with -- staff meetings on, you know, rolling out this program to determine -- you know, we do checks on all the transformers to make sure they're safe, the gas levels are fine, and they're comfortable with, you know, implementing it on those transformers.

Then the staffing includes engineers, people from dispatch, IT, and construction.

MR. YOUNIS: Great, thank you for that.

A follow-up question, how were you able to select the various solutions that made up the CVR for your system? There's a lot of different software and hardware options available out there.

MS. NALL: In 2010, 2011 GWP replaced, you know, 100 percent of their electric and water meters with AMI Smart Meters as part of the DOE and CEC-supported Smart Grid Project.

In 2011, after researching various CVR technologies, we concluded that the Dominion Voltage DVI EDGE solution was the best choice to take full advantage of our AMI systems. It did not require additional equipment.

MR. YOUNIS: That's great. Bryan, can you expand on that for your --

MR. PHAM: Yes, Bryan Pham, SCE. So first the decision was actually pretty straight forward. About around 2012 or so, we -- our SCADA system was basically a homegrown system which kind of outgrown itself with the number of device it can -- it's limited to how many devices it can control, and it's sort of getting harder and harder to manage.

So we, in the process of going out and selecting a vendor to replace that with a distribution management system that is more modern, back then. And so part of that is that we're going to have a Smart application and that will be able to do this.

And so now it become at the enterprise level so that the idea is when we're ready to roll out, the cost to rollout has been so low that we can just roll out everywhere. We don't have to look at where we have to roll out. That's what happened right now.

MR. YOUNIS: Great. And this is my last question. Is additional research or demonstration needed to determine whether various CVR technologies are cost effective based on the loading condition or specific feeder conditions. And I'll go to Bryan, first.

MR. PHAM: Yes. So for us the answer is because the outcome that we have is actually pretty smart. It's actually following the load up to substation level. So as the load goes low in the middle of the night, it's going to immediately sense that and adjust to a different level. And the substation, when you have high load lighting, or even during the summer when we have a lot of AC conditioning, it automatically adjusts itself. And it does that automatically, 24/7.

So we do not see the need to basically adjust anymore. And we actually, we demonstrated

again in 2015. We demonstrated again in 2016 when we actually rolled out 8,000 circuits, and we actually looked at the actual AMI data of millions of customers, and also looking at their kWh assumption. We have all that data and we saw the correlation is pretty much about the same as what we did during the pilot in 2015.

MR. YOUNIS: The same question, Russ.

MR. GRIFFITH: Russ Griffith with PG&E. I don't think we need additional R&D for any of the methods that either Glendale, SCE, or PG&E have implemented. I still do think there's going to be ongoing R&D be it EPIC, or other initiatives that look at new technology hitting the grid edge, or just innovation in general.

And I'll say it again, the Smart Inverters are an opportunity, but that's where the R&D is needed to figure out how to reliably figure out when they can help, and securely.

MR. YOUNIS: That's all the questions I have.

COMMISSIONER MCALLISTER: Okay, yeah, I have a couple. So I was interested -- so, Mr. Griffith, I was interested in your kind of characterization of the opportunity being more on

the energy front and not on the peak load front. And I'm wondering if you can dig into that a little bit. Like is it that PG&E's loads, sort of maximum loads just don't correlate or correspond with the ISO's moments of maximum demand or does the load, the characteristic of the load change somehow at the peak that it doesn't lend itself to CVR, or what?

MR. GRIFFITH: That's a really good question. From a -- we just saw there's less opportunity to reduce voltage when we're close to peak load. If the peak load on our system is very coincident with the CAISO peak loading, there's going to be a lot of voltage drop across the distribution circuit and less overall opportunity to bring it closer to the bottom of what we call Electric Rule 2.

COMMISSIONER MCALLISTER: Oh, okay, I got it.

MR. GRIFFITH: Or the lower NC limit.

COMMISSIONER MCALLISTER: Okay, I got it. So that's sort of -- my next question had to do with that lower limit. So, you know, how much opportunity -- or do you think it's feasible to kind of go out there, and I think this is sort of

what Smart Inverters would hope to do, right, but go out there and sort of pick off the problem voltage spots, like on the low end, so that you could sort of bring everybody up to a minimum and then decrease the whole thing.

You know, what sort of an effort -- what might that look like? I mean, is that just a huge, undoable thing for a big utility or is it

-- you know, is the investment too large? Have you guys looked at that sort of approach to really prepare the distribution grid for CVR at scale?

MR. GRIFFITH: Another good question. I don't feel real prepared to answer that right now. I think that what we'd want to do is continue to look at the voltage data and figure out -- and I think we've gotten good at deciding to make investments that we have historically made.

COMMISSIONER MCALLISTER: Uh-hum.

MR. GRIFFITH: Capacitor, putting capacitors on SCADA, putting voltage regulators on SCADA. Putting SCADA inside the substation on the load tap changer. And putting new control

systems inside the distribution control centers.

We've got those costs pretty well tuned in, I think. And then we can quantify the voltage reduction. And I think we've got a good business case there from how we can -- we called it conditioning. We called it primary conditioning and secondary conditioning. What other physical modifications can you make? What other -- where can you leverage Smart Inverters or other solid state power electronics --

COMMISSIONER MCALLISTER: Yeah.

MR. GRIFFITH: -- to nudge up some of the voltage where you want. It depends on do you have sufficient Smart Inverters where you really need them. Is there room on the poles to put the other power electronics, or room in the volts, or on the pads. And that's -- we thought about it and we realized, uh, for the pilot that we had, and the bandwidth that we had, and the risk profile that we had it was more to undertake than we could at the time.

COMMISSIONER MCALLISTER: Yeah, okay.

MR. GRIFFITH: I think in the long run we have to consider all those opportunities and be really thorough in figuring out what -- how do

they enhance the economics.

COMMISSIONER MCALLISTER: I mean I guess, you know, a lot of the conversation of grid reliability is moving to the distribution grid, right, and with the distributed energy world kind of upon us. So I wonder if there are places we can piggy-back investments that may be being made for some other reason, you know, to incorporate lots of remote power, you know, distributed power, or demand response, or whatever else and to do these kinds of things. I mean that's essentially what a Smart Inverter would do, I guess.

Yeah, maybe Edison has a view on this, too. I mean, I guess it sounds like you have it at the sort of substation level you've got it figured out. But I wonder further downstream.

MR. PHAM: Yeah, so we actually kind of looked at that. And one of the things is because we use capacitor already and it's already something that we have to do anyway, and it's kind of spread out over the circuits, so the circuits have already been kind of level. Meaning if you use low tap change and voltage has to be very high at the substation, then the

voltage drop down at the end a lot.

For us it's not like that. We kind of -- it's all over the place so we coordinate. And the voltage doesn't go, slip down from front end to the end, it kind of flows more flat.

And what happens is that there are device out there that we looked at. Let's say you install on a few -- the theory is if you install, like you say, say a few spots to bring the voltage up and then you think you can lower it down that may work well with VC. For us, the problem with levels, it can be anywhere. Because it can be overloaded transformer, it can be right off the sub, and it can do that. And we already flattened the voltage out with the capacitor band, so that doesn't work too well for us.

And the other thing when we're looking at that because we're doing tens of thousands of circuit switching a year. That's just normal operations to move load around when we have an outage. Every time you move that out all the locations, even if you engineer correctly, become a problem. It no longer applies.

So we've looked at that actually over two years and we couldn't find a business case, and

we couldn't find a practical, you know, basically things that move on to the down mainly because of the way we control voltage and VAR in our system, and also what I just described.

COMMISSIONER MCALLISTER: So interesting. So it sounds like some of this has to do with structural differences between PG&E and Edison's systems, like in terms of just how you've got your substations and feeders put together. Is that a fair statement?

MR. GRIFFITH: There are differences in how the systems are built.

COMMISSIONER MCALLISTER: Okay.

MR. GRIFFITH: Can I add one thing?

COMMISSIONER MCALLISTER: Yeah, absolutely.

MR. GRIFFITH: So we are wrapping up an EPIC pilot right now in San Jose, where we worked with SolarCity, now Tesla, to drive the early adoption of Smart Inverters at certain customer premises. And then we installed, we'll call it a minimum viable product, DERMS, which is really an ADMS plus that was looking at how do we leverage a large utility on battery, behind-the-meter batteries, and how can we use the customer-sided

Smart Inverters to help alongside utility capacitors.

COMMISSIONER MCALLISTER: Interesting.

MR. GRIFFITH: So, able to study it in the lab. Able to look at it in the field and drive our own understanding of when you do a -- when you're trying to optimize what's happening in the field, when you want to use the utility capacitor or the utility device relative to a Smart Inverter based on the reliability and a whole host of other factors.

COMMISSIONER MCALLISTER: Yeah.

MR. GRIFFITH: But it's definitely something we're trying to understand more of.

COMMISSIONER MCALLISTER: I mean in Edison there's at least one project that's got a little housing development that's actually looking at -- you're actually looking at these, you know, if we locate a battery in a node of houses, you know, that sort of Edison owns and can operate maybe that's a more proactive way. I mean, capacitors are great, right, but maybe there's a solution there, too.

Any questions, anybody else?

MR. YOUNIS: Let's see. Let me see if I

have one more.

COMMISSIONER MCALLISTER: I think that pretty much does it for me. Anything else? Anybody have a point they wanted to make that they haven't made, yet?

MR. PHAM: I just want to add that, you know, I do appreciate to be able to share the result. I believe CVR is really energy efficiency if you really think about it, and if you encourage people. It's not just CVR, it's really energy efficiency at the real -- that's how we save energy and promote that way. So it's a great thing for, you know, the customer.

COMMISSIONER MCALLISTER: Yeah. So I mean maybe just to back up and put this in a little bit of context. I mean, you know, we're in the electronic age, now, and so it used to be -- CVR came up in the analog era, right, and so it wasn't -- we couldn't do the things that we can do now with power controls, and we couldn't slice up -- you know, slice up individual -- I mean we couldn't manipulate the load shape like we can now.

And so I think since we're already going to be putting a whole bunch of electronics out on

the distribution grid, you know, when you think about integrating this kind of functionality. And, you know, we can do it without blowing up televisions and motors right now, where we couldn't before.

MR. PHAM: Yeah. Now, so you can see that there's many companies right now, like SCE, PG&E and hundreds of other that start going to the more modern technology, you know, the ADMS, and just like us. And it allows you to basically role the CVR program out a lot easier systemwide, in a very short period of time once you got it set up.

COMMISSIONER MCALLISTER: Yeah, that's great. Okay, well thanks very much. Really appreciate all your time and effort to come.

I do have one blue card. I'm going to make one exception because we have a gentleman who needs to catch a flight. And so I'm going to let Michael Jung make a comment so that he can rush to the airport.

And then everybody else, I'm going to still make you wait until the end. Go ahead, sir, thanks.

MR. JUNG: Thank you, Commissioner

McAllister. My name is Michael Jung. I'm from a company called Varentec, a startup in Santa Clara. We do voltage optimization.

Now, my question to the panel, which has now departed, so maybe it's a question at large.

COMMISSIONER MCALLISTER: Sorry.

MR. JUNG: Is that SB 350, all of these pilot results seem to have taken place before SB 350 passed. And one of the little lines in SB 350 explicitly includes CVR in the definition of energy efficiency for the State of California.

My question is how does this change the math? How does this change the way that the utilities now think about or approach CVR? Does this, you know, change the terms of engagement because now it is included in the energy efficiency definition?

Mr. Pham, I thought you made a great point that, you know, we can think about it and now that it's the law of the land I wonder how that changes how the utilities are thinking about it. Thank you.

COMMISSIONER MCALLISTER: Thanks. Anybody from the previous panel want to answer that? I mean I can take a shot, too. Well, let's let the

panel and then we can --

MR. GRIFFITH: Russ Griffith from PG&E. Unfortunately, I don't have a good answer on that, yet. I think we're trying to figure it out. Just some transparency, that's where we are right now.

COMMISSIONER MCALLISTER: I think what SB 350 did was elevate CVR as something that -- they acknowledge that it's important and, you know, ask us to go forward to see what the potential is. But thanks for your question.

So let's move on to the next panel.

MS. RAITT: So we have a series of speakers on Accounting for Greenhouse Savings from Efficiency Programs.

And the first speaker is Shucheng Liu from California Independent System Operator.

MR. LIU: Good afternoon, everyone. My name is Shucheng Liu from California ISO.

My presentation today is about how the ISO, our hourly GHG emission data can be used to support the policy development for energy efficiency.

The California ISO tracks GHG emissions through its market operation and publishes two

reports. The first report is the monthly GHG emission tracking report. This report started in November 2016 and is published on a monthly basis. It has all the monthly aggregated numbers.

And the second report is on the databases, and tracking on the same thing market operation and the GHG emission. Is has the data in the 5 million resolution.

The second report was started April 10th of this year, so we have only about two months of data.

(Buzzer sounds)

MS. RAITT: Sorry.

COMMISSIONER MCALLISTER: Yeah. No, your time is not up.

MS. RAITT: My goodness.

COMMISSIONER MCALLISTER: That's what I get for flouting the rules here.

MS. RAITT: I apologize. Please go on.

MR. LIU: So this about the full report and if you go to the ISO webpage, you can easily find both the reports.

We have to make a statement first that the GHG emission from the California ISO is an

estimate. It's not an official data. The official GHG emission data is always the California Air Resource Board.

We said it's estimation specifically because the GHG emission associated with electricity imported to serve California ISO load is difficult. It's very challenging to track. This is because there are, you know, different types of import. But one type of import we call the system resource, which we don't know which generator generate electricity, but we know which bands of authority gave us the electricity.

For example, we import from BP, and the BP is we gave you this much energy, at this price, at this specific time, but the BP does not let us know it comes from which generator or which generators.

Secondly, because some people call it the secondary kind of impact. If this out-of-state generator does not ship energy to California ISO it can generate to serve its own load. When this generator ships the energy to California ISO, another generator or generators is to be dispatched to serve the load that this generator was supposed to serve.

The other generator dispatched for this specific purpose is not clear to us, so we don't know which one or which ones were dispatched in place to, you know, to support, to meet the load that the energy was shipped to the ISO, to the California ISO.

So based on that, we are using the best information and the methodology available to us at this moment to do the calculation. Therefore, we say it is an estimate. It's not, you know, absolutely accurate. It's not official data.

So anybody can use the ISO data for their purpose. However, this data cannot be cited as the official data.

This is ISO calculation. ISO calculate GHG emission for two type of electricity supplies, using two different type of methodology. The first category we call resource specific, including the in-ISO generators and another type of what we call the dynamic schedule which are outside generators that schedule or participate in the ISO market directly.

So when we dispatch them, we know exactly which generator generating how much at what heat rate. So the calculations are based on the

resources of heat rate, and the fuel content, GHG content of the fuel, and its dispatch level.

So the fuel content we use, for natural gas we use, you know, 111 pound for MMBtu. For coal we use 2018 pound per MMBtu.

So this part is absolutely accurate and we can say that, you know, it can be used very accurately.

The second category, this is what we say is unspecified import. Unspecified import includes, like I said, import from the system resource, which we don't know the generator. And also includes some imports from generators we know in the EIM market.

We put the EIM transfer into this category because, like I said, it's a secondary effect. We don't have accurate kind of capture on that. Therefore, we put the EIM transfer into the secondary category.

In this calculation we use the emission intensity that we obtain from the Air Resource Board times the volume from the specific import. The import and the emission intensity are different for different type of imports.

For the import from a BPA, from PowerEx,

and from Tacoma we use the ARB assets controlling supply system emission factors which, you know, I have a link there and you can go there and find out the exact how -- you know, what the numbers are, which is much, much lower than the default number, which is the second one. Because it's CARB default emission factor, which is at the 0.428 metric ton per megawatt hour for the import from other balancing authorities.

And just to give you a sense, you know, for the -- as a controlling factor, for example from BPA. BPA is at the .012 metric tons per megawatt hour versus a .428, which is much, much lower because BPA has most of generation from the hydro and the renewable wind generation.

This is a one important point we want to make clear because there was a debate about this. California ISO gets GHG emission credit for export electricity. ARB has a rule that say that export energy does not get GHG credit.

But we understand that the ARB rule is talking about export to outside of California. But the ISO export, a large portion of ISO export goes to balancing authority within California. For example, that bank has existed in

transmission contract with ISO, which has power flow through ISO area get into bank area.

For example, they have energy coming from the northwest, getting to the ISO first, and then getting to bank. It counts ISO importer and then counts ISO export, and then counts bank import.

So ISO first get a GHG for importing that energy into the ISO. And then bank get the GHG account for the energy they import from the ISO. And if ISO does not get credit for the exporting to the bank, then this GHG counting for export and import, they're counted twice.

And ISO does have some export to out-of-state balancing authority, but at this time the large portion of ISO export goes to the California balancing authority. Therefore, ISO definitely should get credit for that.

So this is what we are doing differently. For example, like in the CPUC IRP model, that model models the California ISO, but the model does not give credit for the energy exported from the ISO.

So we want to make sure that this is -- you know, everybody understand, everybody's on the same page that the ARB rule for not giving

GHG credit for export energy applies only to the export to the out-of-state balancing authority, not to the in-state balancing authority.

So here are the hourly GHG emission intensity or the average, which we calculate on the daily basis because we have only about, you know, two month data. This is the biggest of every-day data. And this chart is color-coded for everything, not for the whole month.

Because for the whole month some days has higher, some days have lower, and you get the kind of color confused, say. Because what we care here, specifically for the energy efficiency, we want to see which hours within each day you have a high GHG emission intensity or averaging GHG emission. What hours you have low GHG emission.

So that's why we decide to color every day based on its own data. So from here you can see a very clear pattern, especially in the middle day. In the middle day we have a lot of solar generation. We don't need much gas generation. We don't need much import.

Because in the model, besides the import from the northwest, import from other has a

higher GHG content than in-state generation.

So for the middle part of the day the GHG emission content is pretty low.

The highest point, early evening. So when the sun is going down and the solar generation is dropping out quickly, and then the evening load is picking up. That's where we need a lot of generation, intergeneration. We need a lot of imports.

This is one thing we have been talking about, that people are talking about, import. Import, you need import for energy. Actually, ISO get a lot of flexibility. We're talking about flexibility, flexibility. ISO get a lot of flexibility from import. Import is not just for energy. It's for flexibility, too. Because import they have -- for example, BPA, they have aggregated generation resource and they can actually run quite quickly.

That's where we see the highest GHG emission intensity or average. And then as time goes on through the -- you know, later night, across the middle, you know, midnight and through the early morning, the GHG emission goes down because the load is going down. It's going down,

down to the early morning and then runs up again when, you know, the day is starting and before the sun comes up.

So this is for April. For April we know the last column is for all the 24 hours of all April days, which has 20, 21 days. One day we have missing data there.

For the whole April data here the average is about .215. So .215 metric ton per megawatt hour.

This is for May. It's another whole month of May. This is from May 2st to May 24th. And it has exactly the same pattern except, you know, some days you can see the early mornings, you know, in the morning it still has a pretty high GHG content. And you can see that actually it can get translated from the end of the other, previous day.

So that means that maybe some of the long start, or long run time, long minimal run time generators get dispatched. And when they get dispatched, they cannot be shut down so quickly, so they probably keep running and keep running until certain hours that they can be shut down. Those are more likely due to the operational

constraints.

So for the whole May or most part of May the average is .223, slightly higher than April. This is probably because, you know, the load is slightly higher. You know, the hydro conditions are -- you know, run of river, you know hydro generation, SHR.

So based on that here we have some kind of observation, like I said earlier. The highest GHG emission is in the early evening. That's where, probably, if we have energy efficiency that's probably energy efficiency can come in and be used more effectively to reduce the GHG emission.

And in the middle day, in the middle day I can tell you that in the middle day we don't have zero emission, even though we have so much solar, even though we have sometimes more, than not, we have curtailing of the solar generation. But we still have emission. We don't have zero emission, like people thought. Oh, you have so much solar, then you can shut down everything. That's not necessarily true.

Because in order to run, you know, to operate the system you need the resource that you

can use to provide all the reserves. At this time, renewables, in the summer of 2016 ISO, together with NREL and First Solar, we did kind of the test. That to use solar to provide the reserve, including frequency response and other, spending and regulation. And the test shows that it's absolutely capable of doing that. But at this time, the solar don't have that, you know, capability, yet.

And secondly, the battery. Battery certain is one ideal type of resource that can have, you know, emission-free resource and also can provide the reserve. However, at this time we have a small number of battery. I believe up to now we have about 140 megawatts battery storage in the system. But our spinner reserve is probably in the 2,000 megawatt range.

Our regulation requirement is probably between 300 up to 800. It varies from time to time.

And also, pump storage. You know, when we talk about the new pump storage, and the new technology is very, very attractive and exciting. You know, variable speed that you can do everything, you know, they're supposed -- you

know, you want them to do even in the pumping mode.

But for all our existing pump storage we don't have variable speed pump. It can only pump if they are in the pumping mode. They are supposed to be in the pumping mode in the middle day because the price is so low. In pump mode they cannot provide reserve. Therefore, we still need gas generation to provide a reserve.

That's why in the middle of the day we still have an emission. That's where even if you have energy efficiency it come in, the ability to suppress what? The economics of gas generation resource that is actually providing reserve at that time.

So based on this information, based on the data I showed us, the idea time for energy efficiency to come in is in the evening, not in the middle day. In the middle day it does not help. In the middle day we would probably encourage people to use more electricity.

And future improvements. We have been thinking about, you know, the EIM transfer is actually resource, basically generation information we have for them. But we cannot use

it to calculate the GHG emission at this time because of secondary, you know, effect.

We are thinking about it. We have, you know, some idea. We probably, you know, pretty soon we're going to implement methodology.

The rough idea is like this. We're going to run the EIM market twice. We're going to run it once which does allow energy transfer between the ISO and the rest of EIM entities. And then we're going to run again and open up the gate and allow the transfers. So we'll see the difference between the two.

So if the second run has GHG emission increase that is the total GHG emission ISO energy transfer should be responsible for.

And we don't have a timeline, yet, for this improvement, but I expect that should come pretty soon because we are really serious about this.

That's all I have, thank you.

COMMISSIONER MCALLISTER: Thanks very much. Appreciate you being here.

MS. RAITT: Thank you. Next is Gavin McCormick from Watt Time. Is Gavin here? They released Gavin.

COMMISSIONER MCALLISTER: I was assuming he was remote, but is that not the case?

MS. RAITT: Apparently not.

COMMISSIONER MCALLISTER: Oh, okay.

MS. RAITT: I guess we lost him.

All right. Well, we'll go on to Angela Tanghetti and Michael Kenney from the Energy Commission. Angela.

MS. TANGHETTI: Good afternoon. My name's Angela Tanghetti and I work in the Energy Supply Analysis Office. And I work on a team that develops WEC-wide production cost model datasets in support of the IEPR.

Martha Brook, an advisor to Commissioner McAllister, approached me some months back asking if our group could provide assistance on quantifying emission savings from energy efficiency programs that are included in the IEPR 2017 adopted demand forecast.

Our team, in the Supply Analysis Office, agreed to provide a metric for hourly statewide system average emission intensity values for all years in the forecast period, which is 2019 to 2030.

PLEXOS is a production cost model the

Energy Commission has licensed for the past ten years. And using this 2017 IEPR PLEXOS results we developed a method that post-processes results to calculate system average emission intensity projections.

So I'm here today to describe that method and highlight some of the key assumption that directly impact the emission intensity value. Shucheng did a good overview on some struggles that we face in not only the real-time calculation, but in the projections of emission intensity as well.

So the 2017 IEPR PLEXOS results include hourly generation and fuel use on a WEC-wide basis. And also, from a California-only perspective the model provides projections of hourly in-state generation and fuel use, as well as imports to California. Again for the in-state generation, as Shucheng said, you use the fuel use and a conversion factor to calculate emissions and it's a very straight forward calculations.

However, as I emphasize on this slide, and Shucheng did as well, that emissions from imports is complicated since the model

projections are in terms of energy or megawatt hours, and they're not fuel specific.

So what we do know about imports is California's ownership shares of resources located outside of California. So in our model we're able to reserve some space on the import path to account for these ownership shares by their fuel type.

For example, Energy California contracts with their imports from coal, natural gas, hydro, nuclear is assigned an emission factor based on this fuel type.

All other energy flowing into California from paths in the southwest are given what Shucheng described earlier, too, is the ARB default emission factor.

Now, for imports from the northwest portion of the WEC, and also specified imports from all other WEC regions to meet the California RPS we made further assumptions that impact the emission intensity calculation.

Based on some previous studies the Energy Commission conducted, as well as some work by the Northwest Power Planning Council, we understand that exports from the northwest region consist of

about 80 percent hydro and 20 percent are unspecified. Therefore, hourly model projects of imports from the northwest to California are assigned an emission intensity factor of 20 percent of that ARB unspecified rate.

Emissions associated with RPS imports to California currently are a topic in other forums, to be decided later in 2018. But at this time, again, we're making a simplifying assumption regarding RPS imports to California and their emission intensity.

If you have this slide, could you just cross out that 80 percent on the third bullet. This is a little mistake in here.

So by the end of the forecast period these RPS regulations require that only 15 percent of RPS obligation can be met by this portfolio content 2 and 3, also referred to bucket 2 and 3 out-of-state renewable resources.

So bucket 2 and 3, or PCC 2 and 3 don't have a direct connection into a California balancing authority. They get here via various paths, so they're firmed and shaped in other ways.

And there's also legacy out-of-state

resources, referred to as portfolio content category 0 or bucket 0. And again, those are kind of grandfathered RPS resources that, again, don't have to have its first point of interconnection to California, but they do count towards the RPS.

So, therefore, the hourly model projections of imports that are RPS-specific are assigned an emission factor. Again, it's the same as the northwest, it's 20 percent of the ARB unspecified rate. So any imports that are RPS coming into California, again we discount them that only 20 percent come with some GHG associated with them.

So now, based on all those words in the other slide here's a table of numbers, which we actually are using in our projections. So it shows you exactly the projection of the metric tons of energy we're accounting for as when we get simulation results for imported energy from these specific regions into California. So again, this is just a translation of the other words in the slide.

But again, as Shucheng pointed out that exports we're not giving any credit for. And how

the Energy Commission looks at it is from a statewide basis. The ISO looks at it from an ISO basis, and they export to balancing authorities within California. But in the context of California, we're not allowing any credit of exported power, GHG credit on exported power.

Some other key variables that are in our 2017 IEPR assumption simulation modeling and that do impact the emission intensity calculation. Some have contended that our 2017 IEPR out-of-state renewable portfolio is optimistic.

However, over the forecast period WEC-wide utility RRPs and trade press include over 16,000 megawatts of coal retirements, with approximately 8,000 megawatts announced natural gas replacement at those sites.

Our assumption is that some of this excess transmission capability that was previously dedicated to these coal generators will be available for new renewables to meet the California RPS. So again, you know, we're looking at it from a statewide perspective when we look at the imports allowed to count towards the RPS.

So based on the PLEXOS tool, and the

method, and assumptions described in these previous slides we're able to calculate annual and hourly system average emission intensity for in-state generation, as well as the emission intensity of projected imported energy to California.

And the trend of system average emission intensity we observe over the forecast period is declining.

So the next slide basically is based on the method and assumptions, again described on the previous slides, based on our PLEXOS simulation results. In support of the 2017 IEPR, these are the mid-demand case results we calculated annual emission intensity values.

So as not to make the table too busy, I just picked out selected years. So you can see from the beginning of the forecast period, through 2030, what the metric tons of emissions from a statewide perspective look like. Again, that metric tons includes in-state generation as well as imports. And then the energy number is a simple calculation where you just divide these two. Again it's, you know, after the post-processing to calculate the metric tons of CO2

emissions.

We do plan to provide the SB 350 EE team hourly system average emission intensity values for all hours of the forecast period. But for this presentation we calculated similar to what Shucheng did is a value for each month of the forecast period, and an hourly average for each day in that month.

The fall time period is showing the highest late night and early morning emission factors and we attribute this to the decline in hydro generation during the fall time period, combined with the minimum load, local and frequency response obligations that we are meeting with natural gas. So we add that constraint to our simulation tool.

Again, the midday rates are decreasing more than the late night, early morning hours.

So now, for another picture, this is the 2019 simulation results. Again, we discounted the RPS to have 20 percent of it come with GHG. And this is our emission intensity calculation for the year 2019. So again, on the left column, going down it's the hours in the day. And going to the right it's the months of the year.

So again, as Shucheng showed, too, is our late night and early morning hours have some of the highest emission intensity, while our daytime hours are relatively low.

And so, I picked an early year so that we could compare that to what the ISO's calculated, and it's very similar trends to what they're showing in their actual calculation of GHG intensity.

And then for 2030, you can see the same trend, whereas the daytime hours are definitely decreasing over time. Again, we don't see any zeros due to the frequency response and local min gen constraints that we include in the model in order to leave some headroom in our gas generation unit's unique frequency response, and local minimum generation requirements.

So again that's just a contrast of the colors between 2019 and 2030. We do see that the midday hours definitely cleaner in the hours of the year, with more kind of the windier months, the little bit of hydro runoff that you see in the April, May, June time period. Again, some of the windier time periods in our simulations.

Again, that's it so thank you.

COMMISSIONER MCALLISTER: Thanks Angela.

MS. RAITT: Next is Michael Kenney from the Energy Commission.

MR. KENNY: All right, hello again. So I'm Michael Kenny from the Efficiency Division in our Existing Buildings Office. And I guess to kind of tie things back in together we're looking at how these GHG emissions, if we avoid emitting them, how are they connected to our SB 350 targets, our energy efficiency targets.

So using the data that Angela just explained, we're actually using annual averages. So right now, our energy efficiency estimates that we have in our SB 350 report are at the annual, not hourly, or daily, or monthly. So that's definitely a goal for the future to get more granular.

So using these annual GHG emission intensities, and I'm looking at the electricity savings that we reported in SB 350, converting that into avoided GHG emissions. And then taking a similar approach, but using EPA's natural gas emission intensity value to calculate the avoided GHG emissions due to the natural gas savings.

And then with each fuel there's a goal

line that we've reported through SB 350. And using the same method to convert the goal line. So everything's in the same units.

So what do our SB 350 energy efficiency targets actually look like for avoided GHG emissions. So, on the one axis we're dealing with a million metric tons of GHGs avoided. And so the red area, that's due to electricity and green is due to natural gas.

So there's still opportunities to increase our energy efficiency, which would then result in lowering our GHG emissions or avoiding those emissions.

And obviously, as we get to more granular energy efficiency data we might be able to tease out more of those hours of a day that we can actually have a greater impact in reducing the avoided or -- yeah, avoiding GHG emissions. So that's a goal for our team to be working towards.

So kind of tying into the whole data effort as we get into more granular energy efficiency savings, you know, what measures are saving us during the evening hours as opposed to the middle of the day we can start to track those savings and have a more accurate reflection.

But we'll be updating this as we also update our SB 350 report. And I guess this is the end of the workshop.

(Laughter)

COMMISSIONER MCALLISTER: So thanks a lot, Michael. I want to just thank you and all the staff who's been involved today in putting this together. And Angela and the crew for working on, doing all the heavy lifting on figuring out these emission factors. Because I just wanted to prod maybe a minute of context here.

You know, we have a lot of things that reduce energy consumption in the State and, you know, building standards being kind of the most recent example of that.

But, you know, we've never really intentionally and explicitly tied the energy savings to greenhouse gas emissions, or at least in a systemic way. And so mapping those, mapping that over, you know, saving energy and then saying, okay, if we're really looking for emissions what does this strategy get you in terms of carbon reductions.

And so for example, in the modeling

that's associated with the building standards, we're incorporating a tool that allows that to spit out the climate impact or, you know, the carbon dioxide impacts. And so, you know, Mazi, and Bill, and the team in the Building Standards Office are working on that in earnest so that people can know what the -- you know, people, local governments in particular have a goal. They have to do climate planning. You know, so they have to comply with code, but they also want to know the other impacts.

So as we're trying to accommodate a lot of different needs and then sort of push the conversation in a more transparent way over to emissions, and so that will reflect itself in a number of different areas over time, but that's just one example.

So this work to figure out what the hourly emissions factors are is really critical. And it's not easy. It's actually quite difficult, so as you heard from the ISO and our folks.

So anyway, I wanted to just thank everybody for all of that work.

So with that, I guess I'm going to go to

blue cards for public comment. And we have -- we have maybe eight or nine of them. So I'll just start with Chris Warner from CAL SMACNA.

Oh, I'm sorry, I'm sorry, Chris. It sure looks like Warner up here, but I'm sorry.

MR. WALKER: Good afternoon.

COMMISSIONER MCALLISTER: Sorry about that.

MR. WALKER: No worries. Chris Walker. Good afternoon, Commissioner McAllister and Commissioner Hochschild. My name is Chris Walker and I am the Executive Vice President of the California Association of Sheet Metal and Air Conditioning Contractors, CAL SMACNA. We are a nonprofit, statewide trade association representing over 400 contractors in the air conditioning, sheet metal and air conditioning industry representing -- excuse me, employing over 25,000 union employees and administrative personnel throughout the State.

These contractors perform commercial and residential heating, ventilating, and air conditioning, architectural and industry sheet metal, as well as stainless steel equipment, kitchen equipment, manufacturing, and testing and

balancing.

Range of work is from public works to private, commercial, and residential projects. I'm trying to speed this up to get it all under three minutes.

I just want to -- we're here today to really talk about item number two. And it comes down to the subsidies provided by the utilities. And we don't believe that we're going to meet the SB 350 goals by January 1, 2030 if we don't address both the permit compliance, as well as contractor and the skilled workforce, the quality of the workforce.

We need responsible contractor and workforce standards attached to any energy efficiency subsidy programs and need development of an HVAC sales registry to increase permit and code compliance.

It's supply and demand out there. The demand is not changing. The demand by the consumer is we want HVAC equipment at the lowest price possible. We want it installed at the lowest price possible.

The equipment supplier for the San Joaquin Valley supplies the equipment to hundreds

of contractors. He was talking with one of our contractors and said, you know, the name of our biggest purchaser? And he said no. He said, the name of the biggest purchaser is cash. And it shows up on Friday afternoon with a long line of pickup trucks, and these people are buying these units and installing them over the weekend without going through the permit process.

And typically, these are done on rush jobs. They're not properly. And you're not getting the efficiency that you think you're getting under our codes and standards.

In order to meet the SB 350 energy efficiency goals California needs to take concrete steps. Currently, the vast majority of HVAC retrofit work does not comply with permit, inspection, and Title 24 compliance documentation requirements.

Studies have shown repeatedly that permits are -- have found that permits are obtained for residential HVAC replacements as little as 10 percent of the time. And that Title 24 quality installation requirements complied with by contractors as little as 15 percent of the time.

The report estimates that by correcting these problems we could -- the California peak energy demand each year could be decreased by 130 megawatts. That translates to other GHG, but you can see there's a big delta there.

The CPUC recently revisited the estimate of the rate of permitting and concluded that permits are obtained far less than 8 percent of the time for residential HVAC replacements.

The CPUC also found that the number of replacement projects per year now is about one million per year, which is nearly triple what the 2008 report had estimated.

COMMISSIONER MCALLISTER: I'm going to ask you to wrap it up.

MR. WALKER: We need to get an HVAC registry. At the end of the day, we need to use the data that we can get to follow our units. We have units going out and getting installed. And in order to help our permitting and compliance operations, we need to know where those are going. And global change requires bold moves. We need to get there.

COMMISSIONER MCALLISTER: Thanks a lot. I appreciate that.

And I'm going to just ask before, let's see, I've got Manjit Ahuja from NRDC next. But I wanted to ask, just exhort you to work with staff on the SB 1414 work on HVAC, because I think those kinds of recommendations and sort of backup for them is really important for us to have as we move forward. That and the responsible contactor policy, as well.

MR. WALKER: Correct. Thank you very much.

COMMISSIONER MCALLISTER: Thanks.

MS. RAITT: And can I just interject? For the folks on WebEx, if you wanted to make comments after the folks in the room, go ahead and just raise your hand and use the chat function to raise your hand to let our coordinator know that you wanted to make comments.

COMMISSIONER MCALLISTER: Oh, hey. Go ahead.

MR. CHABRA: I'm going to speak on behalf of my colleagues. Thank you for the great program today. It's really a lot of content to absorb. We will submit written comments, but we wanted to comment verbally on the question of

emissions.

I mean this is completely agree this is critical to make sure that our energy efficiency measures, you know, optimize the greenhouse gas savings that we're going to get.

So we appreciate all the work that went into these emissions factors. It wasn't clear to us how we went from the average emissions from PLEXOS to avoided greenhouse gas emissions. One of the speakers who did not -- wasn't here for one time was -- I read his slides, and he has a point, which we agree with that modular emissions are most important to understand avoiding greenhouse gas emissions.

So we'd like to better understand, you know, what's the methodology there to estimate avoided greenhouse gas emissions.

And the key question I think we need to ask when we look at modular emissions is not just, you know, we flip one switch and how is that going to impact the margin, kind of the edge of the margin.

But if we implement SB 350 and the doubling energy efficiency goal which is -- you know, impacts millions of homes throughout the

state, and industry, and agricultural facilities how is that going to impact the margin. And that's not the same response and by and long it makes a big difference. Especially in terms of what the load shape looks like, how much you -- the difference between peak and off peak.

So we're still looking at how do we get to a metric that values both the right energy source for the right efficiency measures, and the load management benefits between peak and off peak.

So we look forward and we'll provide comments, but we look forward to having, to continuing that discussion which we think is critical to maximize our greenhouse gas savings. Thank you.

COMMISSIONER MCALLISTER: Great, thanks very much.

Brett Barrow from NECA.

MR. BARROW: Good afternoon, Commissioners. My name is Brett Barrow, with the National Electrical Contractors Association, representing 2,000 contractors throughout the State, who employ about 30,000 electricians.

And my comments kind of go to this

morning's session, as well, dealing with the commercial buildings and lighting.

The utilities have identified about 40 percent of the State's energy is consumed by nonresidential facilities. And of that, about 35 to 40 percent is used related to lighting.

So the importance of lighting controls and the ability to use those lighting controls in conjunction with demand response becomes very important. As we see it now, there's more than about two-thirds of the existing buildings that still are using manual controls. And of that, if you look at what demand response-capable controls are it's about one percent of those buildings that have that.

So I think that one of the things that's happening, and in the latest code cycle that we just got through controls have been -- are addressed and certainly expanded, but there's still a lot of avenues for simply lighting upgrades, fixture upgrades without having to do the controls.

And I think one of the results of that may be we -- when an owner can go down that pathway we delay the use of controls that can

facilitate demand response. And I know this is going to be a key part of getting to doubling the energy efficiency by 2030. And we want that technology available in there when we're able to move to that, as well.

So just a couple more points I wanted to make, kind of to build on Chris Walker's comments on workforce standards and skilled workforce. You know, as it relates to the lighting controls, even, the training is beyond what it would be for a general electrician to test those controls. And for that the Energy Commission, along with the PUC, and industry stakeholders and others have come together with the utilities and created the CALCTP program. We feel that's very important, especially in verifying the effectiveness of the controls after they're installed.

We found in a couple studies that those that weren't verified afterwards almost completely failed to operate and result in the savings that we would expect to see.

And lastly, I just wanted to mention that we are seeing in some areas, and specifically a review of the acceptance test technician

certification provider annual acceptance report to the CEC that there are certain jurisdictions that are ignoring the requirements for controls. And we are hearing from our contractors in the field that in fact that in some cases they're ignoring those requirements, as well. So we could continue to focus on looking at enforcement in the field, as well.

COMMISSIONER MCALLISTER: Great. Thanks a lot.

MR. BARROW: Thanks.

COMMISSIONER MCALLISTER: I appreciate your being here. And again, written comments will be great to have. You know, this stuff, with that and on the record, so thanks.

Randy Young.

MR. YOUNG: Good evening. I was all prepared this morning so I had good morning, Commissioner McAllister written down. So good evening.

COMMISSIONER MCALLISTER: It's morning somewhere, right.

MR. YOUNG: I am Randy Young. I represent JCEP today, Joint Commission Environmental Energy Policy. We represent over

10,000 sheet metal workers in California. And I'm going to speak today on HVAC workforce quality and training.

In the plan, I believe this is one of the items that was really picked upon because there was some individuals that thought this meant union versus nonunion. This is not union versus nonunion.

I firmly believe that training is the key to reach your goals of the reductions set forth by 2030.

The efficiency of heating and air conditioning equipment is highly dependent on the quality of its installation. Studies show that poor quality installation HVAC systems have been found to result in a 20 to 30 percent increase in energy consumption. It goes against what we're looking for.

The California Energy Commission found up to 85 percent of replacement HVAC systems are installed incorrectly. It does us no good to increase the efficiency standards for HVAC equipment if these systems are not installed correctly.

It also does no good to spend hundreds of

millions of dollars on energy efficient incentives for HVAC retrofits if the equipment, again, is not installed correctly.

The high rate support installation for HVAC equipment can be tied directly to the use of untrained, underpaid workers, who have not gone through a State-approved apprenticeship program.

The utilities have found that the majority of HVAC installers don't have the technical knowledge, skills, or abilities to properly install a system, but you're going to ask these guys to produce 30 percent of savings. It just doesn't make sense.

The recent utility energy efficient business plan stated that less than half of HVAC technicians in California are aware of even basic national standards -- "basic" national standards for work quality and there are high failure rates for job performance even on routine tasks.

So I urge this Commission to make sure that workforce training and standards are something brought back into this slant. Thank you.

COMMISSIONER MCALLISTER: Thanks very much. Thanks for being here.

Dion Abril.

MR. ABRIL: Very good, Commissioner, on the name. My name's Dion Abril. I represent the Western State Council of Sheet Metal workers.

I also agree that lost energy savings from poorly installed energy efficiency measures is a barrier to meeting the SB 350 energy efficiency goals. There are significantly lost energy savings opportunities that are stranded in buildings when energy efficiency construction work is not performed properly.

To address these issues, the California Energy Commission's 2016 Existing Building Energy Efficiency Action Plan adopts a goal to ensure that a certified, highly performed -- or excuse me, high-performing workforce will be used to delivery energy efficiency retrofits, thereby transforming efficiency and sensitive work from a low-cost bidder work frame to a low-cost qualified bidder work frame.

To achieve this goal, the Action Plan recommends adopting contractor and workforce standards into Energy Efficiency Program requirements.

The California Public Utilities

Commission's recent decision approving the Utilities Energy Efficiency Program Business Plan's initially proposed workforce standards to HVAC programs. But, unfortunately, deleted these standards at the last minute.

As a result, our state energy efficiency programs are going to continue their policy of providing subsidies to low-quality work. This is backwards.

In closing, California needs to require contractors that invest in the skilled and trained workforce if it is going to achieve its energy-saving goals. Thank you.

COMMISSIONER MCALLISTER: Thanks very much. Thanks for being here.

Barbara Hernesman.

MS. HERNESMAN: Thank you. I'm here representing Western HVAC Performance Alliance, and it sounds like we've got the table here.

HVAC is a very specific gap barriers, and issues, and problems to be solved.

So one of the things HVAC or WHPA, as we know it, deals with is bringing a collective group of subject matter experts together to try to address the gaps, the barriers, the problems,

and probably move us as close as we can to recommending possible solutions in the market.

So I agree with everything that's been said so far. We are all very concerned about the contractor and very concerned about the workforce standards. It has to be kept in here as much as possible and we need to reassess how we're going to get this fixed and how we can get this back into the market in an applicable way so that we can actually gain the energy efficiency savings that we're looking for.

So I was instrumental in an EVEE, on the update plan. And I'd like to see those recommendations at least brought forward one more time.

COMMISSIONER MCALLISTER: Okay.

MS. HERNESMAN: Thank you very much.

COMMISSIONER MCALLISTER: Thanks a lot. Thanks for being here.

Mark Hall.

MR. HALL: Good afternoon, Commissioners, thank you. My name is Mark Hall. I'm on the steering committee for the Local Clean Energy Alliance. It's the Community Choice aggregator in the East Bay. I'm also a project developer

with the Environmental Defense Fund's Confidence Project.

We are working as a pay-for-performance partner to direct install contractors through the PG&E Trade Pro Alliance. We're also working with local schools, community colleges, and workforce development organizations to start the first, what will be the first energy auditor apprenticeship program in California.

Energy efficiency jobs are -- there are more energy efficiency jobs in solar and wind in California, but there's not an apprenticeship program. So we actually just applied for a grant to the California Community College Chancellor's Office.

And so, we just want to support this initiative and definitely bring attention to the fact that job training will definitely be very important to meeting these goals. Thank you.

COMMISSIONER MCALLISTER: Great. Thanks for your comments. And congratulations on the rollout of the East Bay CCA.

MR. HALL: Thank you.

COMMISSIONER MCALLISTER: Todd O'Connor.

MR. O'CONNOR: Good afternoon,

Commissioners. My name is Todd O'Connor. I'm the Senior Policy Advisor for Clear Result.

Clear Result is a leading energy efficiency service implementer in North America, with a significance presence in California.

First of all, we thank you for your leadership in this policy area. It's very important what you're doing here, not only today, but throughout the rollout for SB 350 in doubling energy efficiency goals.

We also thank the staff for their hard work and dedication in putting together this workshop.

And my comments have two points and I'll be very brief. Number one, please include in this IEPR chapter a discussion on identifying the regulatory barriers that currently exist, which impede the State's ability to achieve the goal of doubling energy efficiency savings.

And you can start with taking a look at, a review, or an audit of the existing utility energy efficiency incentive programs that were cited here today.

Number two, related to point one, I'd like to request CEC support or at least be

cognizant of legislation sponsored by the California Energy Demand Management Council, SB 1131. As proposed, this bill would provide transparency and timelines for CPUC post-ante review of custom food processing projects.

If enacted, this bill would optimize the number of food processors in California to participate in the utility energy efficiency incentive program and in the food investment production programs. This will be a tool in the toolbox to meet the SB 350 goals. Thank you.

COMMISSIONER MCALLISTER: Thanks. Thanks for being here.

The last blue card and then we'll go to WebEx. Valerie Winn. You were the last card to come in, by the way.

MS. WINN: Yes, it was. And it was the last panel that intrigued me, so thank you.

I'm Valerie Winn with Pacific Gas & Electric Company. And thank you for the interesting discussion today.

And in particular, I was intrigued by the discussions from Energy Commission staff about the work that they are doing in looking at hourly GHG emission profiles for the avoided emissions

of energy efficiency measures.

And I thought that was a very interesting conversation and really focused on the need to properly align incentives with the programs that are going to best reduce, you know, energy usage at the right times.

We've been having similar conversations with Commissioner Hochschild, actually, on the Power Source Disclosure Report, and about the importance of also properly attributing emissions that occur on the system to the load that is causing them.

So I'm really encouraged by the work that staff is doing and hope that they will collaborate along lines to further that look at hourly emission profiles. Because I think that's what we really need to do both for the energy we're not using, and for the energy that we're using. Thank you.

COMMISSIONER MCALLISTER: Great. Thanks for that comment.

Do we have anybody who wants to chime in on WebEx?

MS. RAITT: So it doesn't seem that we do. But if we could take a moment to open the

phone lines, so if anyone on the phone wanted to make a comment this would be an opportunity. And if you're on the phone and you don't want to make a comment, please put it on mute.

Okay, hearing none.

COMMISSIONER MCALLISTER: Hearing none. Okay, wow.

So I guess just really brief wrap-up comments. It's been a long day. I want to thank everybody for being here. And very substantive and looking forward to everybody's written comments.

Please feel -- please get yourself motivated. You know, drink some coffee after this and get all your thoughts. While your brains are crackling, get them down.

And I just, you know, wanted to reiterate that, you know -- I think it was David Jacot this morning that said, you know, energy efficiency makes all of these other issues smaller and easier to deal with, and that is absolutely tree.

And we need that head room in the distribution grid to put all these EVs, and all this electrification that's going to happen, you know, on the distribution grid so that we can

avoid some serious infrastructure investment. At least optimize that infrastructure investment.

We know we're going to make a lot of it but, you know, we can manage that with just good management all around. And that, first and foremost, includes energy efficiency and just smart controls on the demand response side.

So we didn't talk about rates today, but obviously I think getting a lot of this done depends on getting the right incentives down to the customer. And those incentives need to reflect the grid needs.

And I think, you know, we've been working a lot with ARB. We've been working with the ISO, obviously, on this emissions factor work. And so, and ARB as well on that.

So, you know, the agencies are doing the technical work and I think some of the market-based, you know, the rates and things like that need to sort of complement.

So a lot of trains moving down parallel tracks.

So a little bit more context, I think I am ready to call it a day. Any more comments?

Any comments, Michael?

Okay. All right, I think people are tired of hearing me talk. So thanks everybody, again, for coming, and we are done.

(Off the record at 4:35 p.m.)

REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 23rd day of July, 2018.

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CER-915

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I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

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I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

July 23, 2018