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STATE OF CALIFORNIA

ENERGY COMMISSION

In the matter of:

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	)	RE: Building Decarbonization - Grid-Interactive Efficient Buildings

IEPR COMMISSIONER WORKSHOP ON

GRID-INTERACTIVE EFFICIENT BUILDINGS

REMOTE VIA ZOOM

TUESDAY, OCTOBER 5, 2021

Session 2 of 2: Load Flexibility

2:00 P.M.

Reported by:

Martha Nelson

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P R O C E E D I N G S

2:00 P.M.

TUESDAY, OCTOBER 5, 2021

MS. RAITT: Well, good afternoon and welcome back, for those who were here this morning, for today's 2021 IEPR Commissioner Workshop on Grid-Interactive Efficient Buildings. I'm Heather Raitt, the Program Manager for the Integrated Energy Policy Report, which we refer to as the IEPR.

This workshop is being held remotely consistent with Assembly 361, to improve and enhance public access to state meetings during the COVID-19 pandemic. The public can participate with the workshop, consistent with the direction provided in the notice.

This is the afternoon and final session of this workshop. You can follow along schedule, the workshop schedule, and presentations are available on the CEC's website. All IEPR workshops are recorded and the recording will be linked with CEC's website shortly following the workshop. And the written transcript will be available in about a month.

Attendees have the opportunity to

participate today by asking questions or up-voting questions submitted by others through the Zoom Q&A feature or making comments during the public comment period at the end of the afternoon, or by submitting written comments following the instructions in the meeting notice. And written comments are due on October 19th.

And with that, I'm happy to turn this over to Commissioner Andrew McAllister, who is the Lead for the 2021 IEPR.

Go ahead and thank you, Commissioner.

COMMISSIONER MCALLISTER: Thank you, Heather. And thank you for another stellar day, well organized, and really full of content. And thanks for all you do and the whole IEPR team. And also, today in particular, the Efficiency Division has worked really hard to create I think, really, an amazing couple of half-day workshops, really, that is going to help us build the record in a very substantive way.

So this morning we had a, really, very substantive group of presentations on grid-interactive efficient buildings. And we see that as a key instrument, really, for achieving a lot of different things in the state, certainly

decarbonization and reliability, but also cost containment and grid management support, and equity. And, I think, the equity theme is just one that we need to continually do better to really lead with that and organize our program offerings around that. Certainly, there's a will to do that across the agencies. And it is, I think, a really meaningful shift in the way the state is approaching energy policy in this time of transition over to a clean energy paradigm.

So we have a lot of tools is what we learned this morning. And we have, I think, a lot of urgency as well. So it's really great to have on the dais with me, Vice Chair Gunda from the Energy Commission, and Commissioners Shiroma and Houck from the PUC. Thank you all for joining us, I really appreciate it, and for being with us this morning as well.

I don't want to take up too much time here because I want to get right to the presentations so that we have time for interaction at the end. But, please, I would welcome some opening comments, if you have any, from Vice Chair Gunda, or Commissioner Shiroma or Houck.

COMMISSIONER GUNDA: Good afternoon, Commissioner McAllister, Commissioner Houck, and Commissioner Shiroma. Just want to extend our thanks to the IEPR Team and the Efficiency Division. I just want to note and reiterate how wonderful a panel this morning we had, very substantive, a lot of information to think through, a lot of opportunities. But I think, as Commissioner Shiroma noted, it's also a very daunting that we have in front of us to really incorporate all that we've heard this morning into the programs and processes we have, so I'm looking forward to the afternoon session.

With that, I'll pass it on to Commissioner Shiroma.

COMMISSIONER SHIROMA: Thank you. Thank you, Vice Chair Gunda and Commissioner McAllister, and to my colleague, Commissioner Houck. We're pleased to join everyone on the dais and to hear the presentations. This morning was very interesting, insightful and, indeed, daunting. But I'm excited about the work ahead, the opportunities.

I think the reminder, the view that equity is first and foremost. If we can solve

what we need to do with this very sophisticated, you know, this very daunting software challenge ahead, the behavioral attributes that we need to listen to and to really include what we hear from the communities, if we can solve this for our low-income communities, we'll solve it for all.

And so as we're going through these workshops, thinking through what it means for the CARE/FERA/ESA Low Income Energy Discount Programs, I'm the assigned to Commissioner to that proceeding, we adopted out a $2 billion budget for the Energy Savings Assessment Program, the ESA Program, for 2021 through 2026. And we'll hear more about, I think, what's happening with the summer reliability, and also to energy efficiency, which I'm also assigned to.

So in the back of my mind is we're hearing all these very informative and important discussions and looking for ways to make sure that we are meshing these programs and really advancing what we need to do for the future for our buildings, residential and commercial.

Thank you.

COMMISSIONER MCALLISTER: Thank you for being with us.

Commissioner Houck?

COMMISSIONER HOUCK: Yes. And as I said this morning, I'm very pleased to be here and sharing the dais with you, Commissioner McAllister, Vice Chair Gunda, and Commissioner Shiroma. I, also, I guess I'm very inspired by the presentations this morning and looking forward to the ones this afternoon. There's a lot of challenges, as has been noted, but there's tremendous opportunity here. And I think we've got a lot of opportunities to see some of these programs and processes that have been out there for a long time actually becoming reality. So I'm really looking forward to the presentations this afternoon.

And with that, will turn it back over to Commissioner McAllister to get us started.

COMMISSIONER MCALLISTER: Thank you, Commissioners, and for your engagement on this.

I think it's evident to everybody that the two Commissions are working really closely together on any number of issues. And that's largely due to your leadership as Commissioners and your sort of willingness to engage on these difficult issues. And I think together we're

going to stand a much better chance of solving them with our various processes and programs aligned and really holding ourselves to account for, you know, the accounting of what's happening, and the modeling and the forecasting and everything, you know, all the resource acquisition and mobilization. And, really, that has to be done together. Really, at every level of our two organizations, we just have to be passing the baton back and forth in a very facile way.

And I really appreciate your volunteerism to help make that happen, so thank you, again, for being here this afternoon.

And with that, I'll pass over to Heather to get us started for Maryam Mozafari and Gabe Taylor from the PUC and the CEC, respectively.

MS. RAITT: Great. Well, thanks, Commissioner.

So, as you mentioned, we're starting with two Staff presentations, one from the CPUC and one from the Energy Commission. And these are snapshots of the current state-level programs and policies relevant to the efficient, connected, and smart building construction, and with load

flexibility in general. So the aim here is to provide some foundational context for our final panel discussion of the day, which will be followed -- which will be focused on how to scale up load flexibility in California.

So as you mentioned, our first presenter is Maryam Mozafari. And she is a Senior Analyst with CPUC's Energy Division. And she's currently the Staff Lead on the supply-side DR and works on bringing in more clean, reliable, and cost-effective behind-the-meter resources into California's energy landscape.

So please go ahead, Maryam. Thanks for being here.

MS. MOZAFARI: Good afternoon everyone. Pleased to be here. I hope everyone's had their afternoon dose of caffeine and ready for another round of presentations.

My name is Maryam Mozafari and I'll be going over the California Public Utilities and the Commissions policies and initiatives as they pertain to load flexibility, and most in the context of demand response.

And I also apologize for a semi-clear voice and potential coughing as I'm recovering

from a cold.

Next slide, please.

And so as I mentioned, we'll be going over a very, very brief introduction to DR and its history at the PUC. Then I'll be covering the current and future initiatives at the PUC that either directly deal with load flexibility or indirectly has an impact on it.

Next slide, please.

So this presentation includes an overview of the CPUC's role in setting policies, programs, and initiatives that enable demand flex in response to price signals, grid conditions, or other incentives. It also only includes demand response policies and programs under CPUC jurisdiction and, hence, does not include any DR policies or programs administered or overseen by local publicly-owned utilities, other state agencies, or non investor-owned utility that serve as entities, so ESPs (phonetic) and CCAs.

Next slide, please.

I want to do a quick level setting. As we've been going in and out of EE and DR frequently, through the morning session, I just want to make sure that we all understand that

we're talking about demand response.

In specific, as this slide says, energy efficiency, we usually refer to as a permanent one-time change of energy consumption using less energy to deliver the same or equivalent function, think of energy efficiency appliances, weatherization, as opposed to demand response which is a temporary yet recurring change in demand in response to various signals or triggers. It also could lead to some or no loss of function if your AC is being cycled through you might feel a difference in the temperature, or if you're doing precooling you might feel no loss of service or function.

Next slide, please.

This slide shows a brief history of demand response in California. I apologize, there are some acronyms which are not spelled out on this slide, merely for the lack of space. I will be spelling out as I go through them. And they will be spelled out throughout these slides.

So as you see, demand response in California started in the 1980s, very basic emergency-only DR, mainly in large industrial and commercial facilities in the forms of dropping

load, closing shop, helping the grid in case of emergency.

In 2004, California established a loading order which set a priority list for energy resources in California and stated that California must first meet its demand by energy efficiency demand response, renewables, and then go to conventional generation. We also did some experiments with DR pilots for residential and small and medium business.

In 2007, California adopted smart meters. It also integrated its demand response into the RA framework, which meant that it will be counted for -- the demand response programs will be accounted for in the grid planning, and they are now eligible for capacity payments. California also started having economic DR, meaning DR that could be triggered by price signals, and not only under emergency conditions.

In 2010, we rolled out the residential time of use. The California ISO established its DR market products, it's PDR and RDRR products.

Later on 2012, CPUC adopted the Electric Rule 24/32 which enabled DR load and DR customers to feed directly into the CAISO markets using

those two products.

In 2014, California did a major policy adoption of bifurcation. I will go through bifurcation a little bit more in a later slide. We also launched the early version of the Demand Response Auction Mechanism Pilot for procuring third-party demand response for the first time as an option. And California also rolled out residential time of use.

And in recent years, we've been doing evaluations on DRAM, doing redesigns and modifications. We've also seen more procurement of DR as an RA product by the CCAs, by the community choice aggregators. And recently, something that's missing from this slide, we updated the DR Action Plan 2.0 for 2021 onward.

Next slide, please.

So this is the bifurcation that I mentioned on the earlier slide. Basically, in 2014 and 2015, the Commission divided the two -- the IOU programs -- at the time, we mainly had IOU programs -- into two, essentially, buckets, into two categories, one, event-based, dispatchable resources that were put into the supply-side DR, and the other one, the time

variant rates under the load modifying DR.

The supply-side DR had an obligation to be integrated into the ISO markets to offer its capacity into the market. And then the market would dispatch. The how and when would be decided by the grid needs of the ISO market. The resource will be compensated for capacity by the load serving entity that it was prepared by. And it would be compensated for energy by the California ISO if dispatched.

On the load modifying DR which, again, were driven mostly by time variant rates, the compensation mechanism is mostly through bill reduction for the customers.

Next slide, please.

This is a list of the current and the -- the current proceedings and the new initiatives that are dealing with load flexibility/demand response. This is not necessarily a complete list. There are -- I know that there other. One of the things that happening in other proceedings, pilots that are happening in other proceedings like energy efficiency in the microgrid in the IDR proceedings. But typically these proceedings, this list, is where most of

the DR topics are housed and addressed. And I'll be going through them very quickly.

Next slide, please.

So the first one, the demand response proceeding, is where everything started. It was a proceeding that established most of the IOU's programs and the procurement mechanisms. This is a current snapshot of the DR portfolio as it stands today, again, adopted by the DR proceeding. There are supply-side resources and load-modifying resources. There are resources that are purely managed by the investor-owned utilities and their resources that are managed by the third-party DRPs.

There's an example of each of these resources. In the interest of time, I will not go through each and every program here.

Next slide, please.

This slide goes through the -- gives a brief overview of the DRAM, the demand response auction mechanism that we established in California. It is, typically, an annual reverse capacity auction held by the IOUs for procurement of the next year, or sometimes multiple years. The IOUs pay the DRPs for the aggregated

capacity. And they get to count those megawatts toward their RA obligation. The DR providers are required to bid that capacity into the ISO energy markets. And the ISO compensates the DRPs for the energy when resources are triggered.

The chart/table on the right side also shows that the DRPs -- the IOUs buy the RA capacity from DRPs and, in return, pay them capacity payments. DRPs offer that energy into the CAISO and, if used, CAISO will compensate the DRPs for the energy use.

Next slide, please.

This slide has too many numbers, not to distract you. All I meant to show by this is that the DRAM Pilot has grown since its inception, both in terms of the megawatts procured and the budgets allocated. There are some anomalies which are mainly because one year was a half-year or some years were -- there were two-year procurements. But, in general, it has grown, both in terms of budgets and megawatts procured. And these are, obviously, megawatts.

Next slide, please.

The next rulemaking on the list was the Summer Reliability rulemaking. This is a recent

rulemaking that was established in response to last year's August heatwave within which the Commission intends to ensure that we have sufficient resources for the upcoming summer to prevent any blackouts.

The Phase 1 decision adopted changes to existing DR programs for incremental RA capacity. It changed some parameters within the existing programs. It also established an Emergency Load Reduction Program, the ELRP program, which is basically a non-RA voluntary pay-for-performance program with no CAISO market obligations. The program is compensated for its incremental load reduction at $1.00 per kilowatt hour. And these megawatts are excluded from RA and CEC's load forecasting framework, so these are energy-only products.

Next slide, please.

I wanted to highlight one of the many flavors of the ELRP program. And I chose the virtual power plants because of one aspect that I'll go through. But it's, basically, the products within this program are aggregated managed behind-the-meter hybrid resources, mostly a combination of storage plus net-metered solar,

net-energy-metered solar. These cannot be part of any other market integrated DR program or at critical peak pricing or retail real-time pricing rate. There's a minimum size of 500 kilowatts. And then the highlight is that these resources will be compensated for the net export at the customer site.

And the reason I wanted to highlight this is the Commission has been contemplating about ways to efficiently integrate exporting DR resources into the CPUC's resource planning and into the California grid. And this is the first time we're experimenting with allowing the export to be compensated on the DR side in the behind-the-meter resources.

Next slide, please.

The other two proceedings that deal with load flexibility/demand response policies, one is the 2023 to 2027 IOU DR Applications. This is where the IOUs will come in with budgets and program modifications for '23 to '27 program years. The Commission will review and update these programs based on the new grid needs.

The Resource Adequacy rulemaking is also dealing with a lot of topics that affect demand

response, mainly the QC methodology for demand response. This is actually a CEC-led stakeholder process. And in response to CPUC's request, CEC is doing a lot of heavy lifting on this workshop. And, hopefully, we'll have one standard or a set of standard QC methodologies for demand response at the end of the workshop.

There's also other DR-related topics in the Resource Adequacy rulemaking, there is the MCC buckets, the Slice of the day proposal. Each of these are a whole day or whole week topics. But what I mean is there are a lot of things that impact demand response in the Resource Adequacy proceeding as well.

And then lastly, the Load Flexibility rulemaking. This is an upcoming rulemaking out of -- I'm sorry, next slide, please -- this is an upcoming rulemaking out of the distributed -- the DER Action Plan, the Distributed Energy Resources Action Plan 2.0 Update that we did, I believe, July of this year -- last year. Sorry, years are mixing now. But, basically, it has four different tracks. And two of those tracks directly deal with load flexibility and demand response.

The first track addresses load flexibility and rate in terms of rates, though, mostly.

And then track three addresses market integration, efficient use of behind-the-meter and front-of-meter DR's integration into the wholesale markets in support of renewables and our GHG -- renewables integration and our GHG reduction goals.

And then the last one is the General Rate Case, the GRC Phase 2 proceedings that also include several potential dynamic rate pilots. These are also in the works.

But, again, this shows you that there are many things happening in many different venues at the CPUC that will touch on load flexibility.

And with that, next slide, please.

Thank you for having me. On behalf of the California Public Utilities Commission, we look very much forward to working with all the stakeholders in driving California towards its GHG emission goals.

MS. RAITT: Thank you so much, Maryam. Appreciate that.

So next, we'll move on to Gabriel Taylor.

And he's a Senior Engineer with the Energy Commission's Energy Division. And he was the main orchestrator for bringing this workshop together.

So thank you, Gabe. Go ahead.

MR. TAYLOR: Thank you so much, Heather.

And thank you, Maryam.

Good afternoon, Commissioners. As Heather mentioned, Maryam and my presentations are intended as context for the following panel discussion. And mine will be a very brief summary of major Energy Commission authority and programs that are relevant to grid-interactive efficient buildings and load flexibility.

Next slide, please.

The Energy Commission has four regulatory authorities and three major programs that are relevant here. Setting a statewide minimum Building Energy Efficiency Standard is one of the Energy Commission's core regulatory responsibilities. As the state works toward widespread decarbonization of buildings the goal for the Building Standards is to ensure permitted construction and empowers consumers to efficiently flex their load automatically in a

way that generates value for both households and business.

The current Energy Code, which went into effect on January 1, 2020, requires residential distributed solar generation where it makes sense, or solar readiness, that includes Demand Management Standards, options for all-electric construction, and compliance options for heat-pump water heaters. It also includes consideration of distributed grid impacts from solar and battery storage.

The next code, which was just adopted in August and will go into effect in 2023, includes additional compliance pathways for all-electric construction and robust requirements for electric readiness when buildings are not all-electric, consideration for connected electric heat-pump water heaters and space heaters, and some requirements for controlled receptacles.

Next slide, please.

Another core authority for the Energy Commission is to develop and update Efficiency Standards for appliances sold or offered for sale in California. These standards include minimum levels of operating efficiency and other cost-

effective measures to promote the use of energy- and water-efficient appliances to protect consumers from costly inefficient products.

Current Appliances Efficiency Standards apply to a wide range of appliances. And our staff continually works with stakeholders to identify new opportunity for such standards.

Next slide, please.

While we've had the previous two authorities since the 1970s, in 2019 the CEC was given new authority to regulate the load flexibility and greenhouse gas emissions of appliances sold within the state.

In December 2020, CEC Staff held our first workshop to seek input on how to best use this new authority, which appliances to regulate, and whether to focus on specific design requirements or general performance targets. Based on info gathered, CEC has outlined a phased approach for the planned rulemaking, though these phases may overlap.

The work is progressing rapidly. And on September 1st, CEC Staff released a Request for Information that asks industry and interested stakeholders to respond to a range of targeted

questions. Please note that the due date for responses to that RFI was recently extended to November 1st. Our goal over the next few years is to use this new regulatory authority to accelerate innovation in flexible demand appliances and to protect consumers from appliances that deny them the opportunity to easily and cost effectively automate load shift.

Next slide, please.

The fourth regulatory authority and one that we have had since the 1970s, as well, is the Load Management Standards. This authority focuses on utility programs for electric load management in three areas, energy storage, automation, and rates. Our standards aim to empower consumers to voluntarily automate their flexible loads to save money, improve grid reliability, and reduce environmental impact from new fossil fuel power plants, and to reduce GHG emissions.

Since 2019, CEC Staff have been developing new load management regulations for California utilities and aim to release a revised Staff Report by the end of the year. Staff is currently engaged in the pre-rulemaking phase,

coordinating closely with utilities and stakeholders, but we are nearly ready to open our formal rulemaking.

I'm actually the Project Manager for this one, so I'm going to take the opportunity to acknowledge our team, Gavin Situ, Tiffany Matero, Morgan Shepherd, David Cuffee, Jim Nelson, and of course, Karen Herter. Thank you so much for all your hard work.

Next slide, please.

As part of the Load Management Standards work, CEC has developed and completed initial testing of a publicly-accessible database that stores time-of-use electricity rates, Flex Alerts, and greenhouse gas emission signals.

The Market Informed Demand Automation Server, or MIDAS, provides a platform for load-serving entities to securely upload and store time varying electrical data in a machine readable and accessible format. Automation service providers and load automation technology can access the data, allowing customers to automate the load flexibility that they choose to. The MIDAS database has been designed to support time varying data at intervals as small

as one second with extremely flexible locational specificity, and uses an internationally-applicable format.

Next slide, please.

The CEC's new Vehicle Grid Integration Unit within our Transportation Division coordinates analysis and modeling work to support California's transition to electric transportation and to ensure that electric transportation will be an integrated part of our carbon-neutral reliable and resilient energy system. This work includes development of an updated California Vehicle Grid Integration Roadmap, as well as grid impact analysis tools. Our VGI staff coordinate with other CEC programs, state agencies, utilities, manufacturers, and all other relevant stakeholders on EV Charger Standards, communications, and interoperability.

Next slide, please.

In support of all this and to accelerate development of our next programs and policies, the CEC recently founded the California Load Flexibility Research and Development Hub, or FlexHub, that you've heard a little bit about earlier today. It runs until March 2025, and for

$16 million. The CalFlexHub brings together all relevant stakeholders to collaborate on a long-term research and development effort and will support the CEC Load Management Standards and MIDAS.

The goals of the FlexHub are to identify and support promising pre-commercial load flexibility technologies and facilitate standardization in the signals used to communicate dynamic energy and GHG value.

Next slide, please.

Thank you very much, Commissioners. I'm happy to report, we're a little bit ahead of schedule, so there's plenty of time if you'd like to either ask questions of Maryam or I before the next panel or to make some comments of your own.

COMMISSIONER MCALLISTER: Well, I just want to thank you, Gabe and Maryam, for the overviews of what our respective agencies are doing, and it's a lot. And I think that all the efforts we can make, I know that that's happening at multiple staff levels and at the Commissioner level, that we can make to sort of weave our efforts together and use standardized approaches another way, you know, wherever it makes sense,

for example, with the MIDAS and with load management standards and sort of aiming at helping the marketplace take advantage of those resources and to lower transaction costs, for example.

So really excited by all of the joint work and don't have any questions for either of you but want to invite my colleagues on the dais to make any comments or questions that they might have.

COMMISSIONER SHIROMA: I'll just make a comment that, you know, I've worked for the State of California for over 40 years, and there's always that challenge of how do you take very complicated, very technical information, material, and processes and communicate about those efforts to take the mystery out of it and to provide for, you know, a lay audience to at least understand, what the heck are we doing?

And so I want to complement both -- Gabriel and Maryam on going a long ways to accomplish that. I know that the audience today is, perhaps, one that is more keenly working in these arenas and what have you. But even so, even with my over 40 years of service, I have to

have -- you know, please connect the dots for me on what all this stuff means and what our roles are.

So just wanted to express appreciation for both of your presentations. Thank you.

COMMISSIONER HOUCK: And I just want to say that I share Commissioner Shiroma's sentiments. And I appreciate all of the great work that is being done by Staff at both the PUC and the Energy Commission on these important topics.

COMMISSIONER MCALLISTER: Thanks to you both. I agree. I mean, if you sort of envision what this really has to look like, it has to be super simple for the customer, it has to be managed in a way that's completely seamless and just works; right? And it has to provide clear value to the customer, otherwise they won't choose to do it; right? Why would they?

So I think that's kind of our challenge at this end is to package up, as you said, Commissioner Shiroma, complex -- a complex array of offerings and make them just appear completely seamless to the customer, and that's where we need to head.

So, Vice Chair Gunda, if you have any comments? I don't think so. But I think we'll just move on then to the next.

Thanks to both of you for the presentations. And that's really great context for our next panel, Scaling Up building Flexibility.

So, Heather, you can introduce this panel and its moderator, Haile Bucaneg from the CEC.

MS. RAITT: Great. Thanks. As you just said, so, Haile Bucaneg, you're the -- going to go ahead and moderate from the Energy Commission. Go ahead. Thanks.

MR. BUCANEG: Thank you, Heather, and thank you, Commissioner, and thank you to everyone for joining us on this panel. During this panel, we will be discussing some of the considerations needed while moving towards more widespread adoption of grid-interactive efficient buildings. We have a number of great speakers giving us their insights on this topic. And I want to give them as much time as possible, so we'll go ahead and jump right in.

First up we have Angela Amos, the Director of Market Development and Regulatory

Innovation at Uplight.

Angela?

MS. AMOS: Thank you. First, thank you, Commissioner McAllister, for your leadership on the IEPR. And also, of course, thanks to Vice Chair Gunda, Commissioners Shiroma and Houck, as well as the rest of the Commission and Staff at the Energy Commission and the CPUC for the opportunity to join today's workshop on grid-interactive efficient buildings and load flexibility. The issue is important and timely, not just for California which, as we know, is experiencing firsthand the dramatic effects of climate change, but also for everyone interested in creating a sustainable future.

Next slide, please.

As we heard, I'm Angela Amos, and my title at Uplight is Director of Market Development and Regulatory Innovation. I began my career in the energy industry over 16 years ago. And prior to joining Uplight, I've held roles at independent power producers, service providers, and at the Federal Energy Regulatory Commission, or FERC.

Next slide, please.

A bit about Uplight. Uplight is the technology partner for energy providers and the clean energy ecosystem. We're a certified B Corporation, which means that creating a sustainable future and using business as a force for good is a part of our mission and purpose.

Next slide, please.

As I implied, Uplight is the leading provider of end-to-end customer-centric technology solutions dedicated fully to serving the energy ecosystem. We help streamline the transition to this clean energy ecosystem for more than 90 electric and gas utilities. Specifically, Uplight provides several core solutions, including home energy reports, engagement portals for residential and nonresidential customers, energy alerts, marketplaces, and business intelligence tools to name a few. We also offer innovative new solutions through our Incubation Group of which I'm a part.

Next slide, please.

So let's get into the meat.

What we've learned in our partnerships and across our deployment is that customer

engagement and customer experience are essential to a program's success. As Commissioner McAllister just said, the process needs to be seamless for customers or else they may not adopt the technology.

As we know, California's climate targets are ambitious and include cutting statewide greenhouse gas emissions by 40 percent below 1990 levels by 2030 and reaching 100 percent carbon-free electricity by 2045. Uplight and our partners see several steps of this process, including implementing efficient building standards, installing smart devices designed to be flexible and, again, fully empowering and engaging customers. On the ground, our experience is that actual end users want insight into their energy experience and value certainty, comfort, and control.

Next slide, please. Next slide. Oh, there you go. Thank you.

Now let's dive into a little bit about what Uplight has seen.

In a survey of 1,000 residential customers, as part of Uplight's primary research programs in partnership with the SEA Change

Institute, we found that personalization is correlated with higher satisfaction, engagement, and energy savings actions. As listed here, results show that personalization led to 28 percent higher utility satisfaction ratings, increased the likelihood by 24 percent that customers would take action on tips received, and it made them more likely, 11 percent more likely, to utilize rebates.

An aside, Uplight also recently released an eBook addressing customer segmentation in the nonresidential space. And we find that customization is equally important there. For more information, and to download that document, you can visit Uplight's website or email me and I can send you the link.

Next slide, please.

So I wanted to spend most of my time today addressing several of the opportunities and challenges related to load flexibility and implementing distributed energy resources at scale. In my group's work on this issue, we tend to group these considerations into a few categories. First are the system or the market factors that have momentum and may be developing

on their own. Next are opportunities for regulatory and provider leadership.

Under the first category, we're seeing that energy providers are increasingly investing in technology and DERMS integrations are on the rise. We see that technology costs are declining, which makes demand-side resources ever more competitive when compared to other energy sources.

In terms of rate design, time-of-use plans are growing in popularity. And there are more opportunities for customers to adjust their usage and, by extension, their bills to take system conditions and cost into account. This is a great opportunity for customers and for the expansion of flexible load.

But we have some challenges, too, in part because the concept of flexible load is relatively new compared to the decades of focus on traditional supply. Regulators might need to consider incentives to encourage investment in the flexible load. Additionally, demand-side resources should be included in the planning processes.

Obviously, there's been interest in

energy efficiency and load management since the '80s but there's still room to scale.

FERC Order 2222, as well as federal action in Congress, has provided a catalyst for continued discussion around energy efficiency, demand-side resources and market participation, in addition to the state effort, but federal and state policies are not yet aligned. California, of course, has been a leader among states for many of these issues. But as many providers and technologies operate across regions, disparate market structures can still be a barrier to scaling.

Ensuring equity is also a challenge. Uplight believes that all customers should have access to technology and enjoy the financial benefits related to innovation. We've seen, though, that programs may need to target underserved customers specifically, and that regulators and providers shouldn't just assume that all customers have the same access or the same needs.

Of course, there are also consideration around customer data use and we must respect customer privacy, security, and confidentiality.

We must also treat customer data carefully.

In the provider leadership category, we see challenges and opportunities related to dispatch architecture. There is, rightfully, lots of effort to get smart and flexible devices installed in buildings. But once that happens, those devices need to be enabled, operated, and controlled in a way that maximizes system and customer benefits.

Modeling these flexible resources is also important. The grid operators, regulators, and others tasked with maintaining power balance and reliability are concerned about whether or not they can rely on flexible resources, then there could be significant resistance to scaling them. Improved modeling increases trust for planning and for operating. And of course, as I discussed earlier, a positive customer experience is essential and can lead to faster growth.

With my remaining time, I'll highlight a few specific recommendations related to the topics we've been discussing today.

First, industry stakeholders, including regulators and providers, should prioritize customer engagement and customer experience. As

has been discussed throughout this workshop today, there are several technical and operational considerations related to equipping and enabling grid-interactive buildings. But if end users aren't engaged, if customers feel as though they're being acted upon rather than partnered with, if customer experience is not considered from the beginning when programs are designed, then customers will opt out. They'll resist adopting the technology and the effort falls flat.

Sure, regulators can mandate directives for new bills. And California, as we know, as already done some of that. But Uplight's research shows, and our experience has reinforced, that demand-side approaches are far more expensive when customers actually want to participate on their own.

Second, we recommend increasing and, perhaps, formalizing opportunities for customer education. This could mean authorizing funding for tools that serve as programs, offers, and information to customers, particularly through technology and digital engagement.

Another cheaper solution, additional

solution, could be adding a module on the Commission's website, similar to or in addition to the Appliance Efficiency Program Outreach and Education page that highlights things, such as a customer bill of rights, or explains to customers how they can understand energy efficiency.

It is also important to specifically provide education and resources for low- to moderate-income customers, and to make sure that opportunities are available in the channels that are most relevant to those customers.

Big picture, if we think back to the headlines earlier this year related to demand response programs this summer, it was clear that just because a customer installed or enabled a smart thermostat didn't mean that they fully understood the terms and conditions of their participation. Earlier, Commissioner Shiroma highlighted the importance or taking the mystery out of this process of these programs. So at Uplight we're developing solutions that recognize that customers should be equipped with a full agency to participate in addressing climate change.

Which brings me to my last point. We

should reduce barriers to data transfer, updating accounts, customer enrollment, and program switching. We observe that there may be unintended consequences related to meter ownership structure that limit the tools available to providers to meet reliability needs. For example, a utility can't recruit a household for demand response if a third party has already claimed it. We also see that segmented enrollment in pilot programs may prevent customers from fully opting in.

A parallel example of this issue is that not too long ago, if you recall, in the telecom space some companies made it difficult for customers to keep their telephone number when changing providers. This barrier made the market less competitive because customers wouldn't want to switch and lose their number, even if a better rate or service was offered elsewhere. But SEC rules now require simple phone number porting under certain circumstances, making it easier for customers to get the best plans available.

There may be similar opportunities for the Commission, many, multiple Commissions, to reduce barriers for customers to participate in

the best programs and with the most appropriate devices for their needs.

As a neutral technology partner, Uplight is committed to helping providers and customers reach their goals and to help secure a sustainable future.

So thanks again for your time.

MR. BUCANEG: Thank you, Angela. Do you want to move to the next slide?

MS. AMOS: Sure. Thank you.

MR. BUCANEG: Thank you, Angela.

Next, we have Clay Nesler, the Global Lead for Building and Energy for World Resources Institute Law Center for Sustainable Cities.

Clay?

MR. NESLER: Thank you. And thank you to the Commissioners for inviting me to speak today. The earlier session this morning was, indeed, really, really informational, lots of great data, and inspiring. And it's my pleasure to present in this afternoon's set. I'm going to talk about how to scale up building flexibility, the topic of this workshop, through energy savings performance contracts.

A little bit about my background. After

four decades at a building technologies and energy services company, I've recently joined the World Resources Institute, leading up their global buildings practice. And I also sit on the GSA's Green Building Advisory Committee. The Green Building Advisory Committee, in two years, focused on GEBs and focused on demand flexibility and how to increase adoption in the federal government. Yes, PCs are a primary procurement method for investing in energy efficiency and, increasingly, in distributed energy resources, microgrids, and other resilience measures.

Performance contracting goes back to 1985, actually, in the state of Ohio where schools realized that by upgrading their lighting and implementing building controls and updating HVAC equipment, they could significantly reduce their energy use and their costs. However, they were precluded from entering into long-term contracts.

So performance contracting was invented as a vehicle to allow public entities, typically what we call the MUSH market, municipalities, universities, schools, and healthcare facilities, as well as the federal government, to basically

enter into a long-term contract to make infrastructure improvements that are paid over time through energy and operational savings. A prime contractor makes the improvements, installs the equipment, commissions it, measures and verifies the performance, and then guarantees it over the course of the contract. They also provide services to maintain and assure that the savings are achieved over the term.

The average term of one of these contracts in the United States is 13 years. The U.S. Federal Government can extend that contract to 25 years. The benefit of it to public institutions is they don't very often get a chance to completely update and modernize their infrastructure. A performance contract allows them to do that. But we identified a number of barriers and opportunities to using this procurement vehicle.

By the way, the performance contracting market is about $7 billion a year in the U.S. It's about equivalent to the utility investment in energy efficiency. California's share of that is somewhere between $400 million and $450 million a year. And we believe that the total

market opportunity is between $100 billion and $300 billion which would flex a lot of demand.

Next slide.

So the Green Building Advisory Committee findings were that demand reductions can generally be included in ESPC or the utility energy service contracts and counted toward the energy savings goals. That's the good news because a lot of a bill is, in fact, due to demand charges, and that's just energy use. But the cost savings due to the adoption of time of use or real-time pricing can be included in the savings guarantees but the business case changes over time. As those rates are adjusted and vary over time, that adds uncertainty in the process.

Guaranteeing energy and economic performance over an extended period of time requires a bit of certainty. So guaranteed energy demand reductions are generally factored by up to 50 percent. Engineers analyze, using simulations and other tools, and come up with their best estimate. And then they reduce the estimate by 50 percent in order to minimize risk. The problem with reducing the estimated savings is those savings are what pays for

infrastructure. You can invest in more solar, more energy efficiency, heat pumps to electrify heating in buildings, if we can really maximize the investment.

Next slide, please.

The expertise required to analyze buildings or groups of buildings for demand reduction is different and more complex than just estimating energy savings. Looking a lightbulb, knowing that is uses 60 watts and you're going to replace it with an LED lightbulb that uses 16 watts, is pretty easy math.

Estimating something that changes over time is much, much more complex. There are very few engineers that are actually experienced at this. A lot of them work for the larger ESCOs because these ESCO projects are more complex. They're bundled. They include envelope improvements. They include heating and air conditioning. They include more heating and air conditioning. They include more sophisticated controls. They include distributed energy resources, EV charging. Those are the types of companies that can really completely engineer at a system's level.

The energy demand reduction savings are, generally, only guaranteed for a few years, again, not knowing what's going to happen to a demand response program, not knowing if a special tariff is part of a pilot program, not knowing where anything could change. So, typically, the results are guaranteed for three years, again, minimizing the potential positive impact that that cash flow could provide in investments. But the ESCOs, they track and report the savings every year. Yeah, part of it is showing off. But even more important, that's a buffer for shortfalls in other areas. And one of the ideas that came up was to use those additional savings to make additional infrastructure investments over time.

Next slide, please.

Demand response programs that provide a fixed monthly payment, like part of a capacity program, for a commitment to shed a certain amount are the easiest to incorporate into these ESPCs because, essentially, the cash flow is constant, and the level of automation that is included in these projects really assures that those reductions will be made. They are highly

automated and monitored.

Hourly solar PV generation and energy use data is very helpful in also minimizing risk and estimating what the time-based reduction capacity is. Data is so important in every aspect of this, from designing new projects to actually implementing the strategies, and then being able to be compensated for them.

And finally, energy demand reduction from energy storage, both thermal, such as the UC Merced Case Study that Mary Ann Piette mentioned earlier, both hot water/cold water at like Stanford Universities new Central Energy Facility, and combined heat and power plants are also included in ESP business cases.

Next slide.

So we made a couple recommendations to FEM (phonetic) and to the U.S. Federal Government that we thought could increase investment and adoption of GEBs technologies in these types of projects. One is that ESPC projects actually don't guarantee the cost, per se. The price of the energy consumption is stipulated, in other words, it's a contract value. And there's an annual escalation factor determined by NIST

which is their best estimate of what is going to happen with prices. It is one thing for engineers to estimate the energy savings over a long period of time. It's another thing to guess tariffs and rates and prices and things such as that.

Something similar, on demand flexibility and demand management, would be very, very helpful in growing the market. And, also, special tariffs that were fixed over a longer period of time or, in fact, just had a maximum change from year to year would also help drive this.

What I'd like to do now is share a couple case studies to show you what the impact of projects like this can be. First, we're going to go to the Hawaiian Islands.

Next slide.

This is Maui College. Maui College is one of the seven higher education institutes in the Hawaiian Islands. And it's the first campus in the United States to be 100 percent renewable zero-carbon campus. The university system there made a commitment to be 100 percent renewable as part of their state's commitment to decarbonize

well before the 2050 most states are talking about.

It followed the classic GEBs play book. First, there was a 45 percent reduction in energy efficiency for HVAC, controls, lighting. Then 2.8 megawatts of PV was installed on roofs, parking canopies, and other things. Then they added 13.2 megawatt hours of storage and configured it as a microgrid. That's a lot of storage. But there's no net metering in Hawaii, so you either use it or you lose it from an economic standpoint. It was implemented as an ESPC with a PPA. And no tax dollars and no ratepayer dollars were used in the $79 million investment.

The next slide is about Georgia Tech. I'll bet you were expecting a photograph of the football stadium. No, this is my favorite part of Georgia Tech. This is the Central Heating and Cooling Plant. Their 39 buildings are networked together as part of the control system that controls 8,000 pieces of equipment, turning them on or turning them down based on the real-time price of electricity. Twenty-eight more buildings are being added. The demand flexibility

at that campus reduces 1,000 tons of cooling, think of that as a megawatt, and 500 tons in another cooling plant.

Curtailment is done when the price exceeds ten cents a kilowatt hour, which is about 30 to 40 days in the summer. The price hit $1.00 per kilowatt hour a while back in August. The reductions are significant and they last about four hours. So that is like turning a campus into a huge battery.

My last case study is Kent State University. This is a system that uses software very similar to what Mary Ann Piette talked about at UC Merced, model-predictive control, 90 buildings there, 7 central plants, 3 thermal district loops in CHP. A thousand sensors and datapoints go into the control system that include schedules, rates, demand response signals. One hundred and fifty control decisions are made every 15 minutes and seven days ahead, very sophisticated, $1 million in energy cost savings, and significant demand flexibility benefits to PJM.

My last slide. What we hear from organizations that are involved in energy savings

performance contracts in California are basically agreeing with the kind of observations and recommendations that the Green Building Advisory Council [sic] made but identified a few other points.

Permitting for ESPC and PPA projects with distributed energy resources, energy storage, and microgrids can be pretty complex. I'm sure the Commissioners haven't heard that for the first time during this workshop.

Building controls that are integrated with behind-the-meter DER, there are challenges in connecting to the grid and challenging -- or in challenges connecting to aggregators and other service providers. I think the MIDAS program we heard about earlier is really exciting. That could go a long way towards driving some of these more complex applications and providing the data really needed to make these applications practical.

And then, finally, frequent changes in either the demand response programs, solar net-metering policies, tariffs, things like that, I know they're inevitable. But to the extent we could minimize those changes, this is a business

model that can help finance the improvements that we need.

There was a lot of discussion this morning about where are we going to find the money? What are the business models? This is at least one of a number of ways that we can really drive adoption and investment in demand flexibility.

Thank you very much for allowing me to speak and address this workshop today.

MR. BUCANEG: Thank you, Clay.

So now we will have Rois Langner, who is a Senior Research Engineer with the National Renewable Energy Laboratory. She will be providing a brief introduction for Margot Everett, the Director for Energy Sustainability and Infrastructure at Guidehouse.

Rois?

MS. LANGNER: Great. Thank you so much and hi everyone. We really appreciate the opportunity to speak to you today during this workshop. As we just mentioned, I want to briefly introduce the next speaker and topic to bring a little more context to the report that we will be highlighting.

Again, I'm Rois Langner. I'm a Senior Research Engineer at NREL. I'm an architectural engineer by training. I also lead the Department of Energy's Better Buildings Alliance Renewables Integration Team that works to bring resources to building owners and facility managers on topics related to the strategic integration of renewables. But we're really shifted to focus more on GEBs, building load flexibility, and grid coordination.

So this work, funded by DOE, NREL worked with Guidehouse to better understand what utility incentive mechanisms are available that could really drive the adoption of grid-interactive efficient building practices in operation.

Margot Everett was a lead author on our new report that was published earlier this year, Incentive Mechanisms for Leveraging Demand Flexibility as a Grid Asset. And Margot comes from a wide breadth of expertise in this area. She works as a Director at Guidehouse's energy practice, providing strategic and analytic regulatory consulting services to investor- and publicly-owned utilities, market participants, and regulators in electricity and gas. Margot

has nearly 35 years of experience in the energy and utilities sector, leading rate to regulatory analytics, risk management, and wholesale contract structuring organization.

So we're really excited to share the outcomes of this report with you. And with that, just a quick introduction from me, and I'll hand it over to Margot.

MS. EVERETT: Thank you, Rois.

It's a pleasure to be here. Good afternoon, Commissioners.

Next slide, please.

So there is a fairly lengthy report that is available on the DOE website. And we're just going to be touching on some highlights of that paper. The first is we want to talk a little bit about the overall ecosystem and the stakeholders that are involved, most of who -- a lot of you are on the phone here today.

So, first, the regulators policy leaders that are helping shape the future of our electric grid and helping to decarbonize the utility sector. There's grid operators, ISOs, RTOs, balancing authorities. There's, of course, utilities and energy providers, so energy

suppliers and distribution utilities. An emerging group of folks that are becoming more and more involved in the marketplace are aggregators. These are entities that bring together customers and work with them collectively. Of course, there's customers.

And I want to comment on this a little bit because I've been listening to the presentation, and I've been in this industry, as Rois said, for about thirty-five years, and it's really nice to hear people use the term customers versus ratepayers. Maybe someday we'll be talking about pricing rather than rates because I think that this is where we have to be thinking our mindset has to be going forward. Customers are key.

And then, of course, there's the third-party contractors. Those folks that are both installing the equipment, helping customers make these investments, and then helping them operate those investments efficiently, all these stakeholders need to be considered as utilities, policymakers, and others start thinking about incentive structures for GEB buildings.

Moving on to the next slide, so the DOE

defines GEB demand-side management strategies among five different strategies. We graphically show four.

There's the first, which is energy efficiency, let's just reduce our overall energy use.

Load shedding, we're going to cut the peak off and use this energy during critically high-load periods. We're going to move that load from high periods to load periods and get better utilization, a flatter curve, over the course of the day.

And then there's just modulating, which is the ability to balance power supply and reactive power.

Lastly, there's the ability to generate. This is, basically, customers are able, more and more able to self-generate and self-supply.

So all of these characteristics and capabilities are seen in a GEB program.

Next slide, please.

So when we start thinking about GEB buildings and the types of incentive structures that can be put in place for them, we really think about in the context of demand response.

And there's a tax on three of those.

The first we really divided into dispatchable versus non dispatchable. So when we think about non dispatchable, it's that -- it the fact that a customer is changing their load shape, modifying their load shape over time. And it's usually in response to direct price signals, in other words, utility rates. Examples of these are volumetric rates, time of use, and some other emerging rate designs.

We also, then, have dispatchable. And these are DRs where the customer is actually changing their load shapes that the grid sees, or even contributing to supply to the grid, and it's based off -- it's market-informed, meaning it's based off of what the marketplace needs, what the grid needs at that moment. And it tends to be incentive based. In other words, you can have sort of your traditional utility programs that we've seen for many, many years around DSM and demand response, things like load controls. One of my first jobs was evaluating the implications of an air conditioner shedding program, so those types of programs.

And then there's the RTOs which is kind

of the integration with actual wholesale market. You heard Maryam talk a little bit about this as one of the things that they've been emphasizing at the Commission. And this is in order to be able to provide the marketplace with alternative sources of critical grid needs, such as capacity, ancillary services, and even energy, and having that come from not just utilities but, also, customers.

Next slide, please.

So when we talk about utility rates or price-based demand response, we really can think about traditional versus alternative. And so the traditional rates are things that we commonly hear about which are volumetric charges and demand charges. And I want to caveat this because demand charges are a form of volumetric charge. But we typically use the word volumetric, the term volumetric charge, to refer to a per-kilowatt-hour charge.

And then there's demand charges. And if you were to look at traditional rate designs throughout the state of California, or even across the globe, you will mostly see the preponderance of rate designs will be on a per-

kilowatt-hour basis. We, in California, are migrating to time-based volumetric rates for all customers as a default. But there still are many utilities out there that still embrace flat volumetric rates, meaning I pay X cents a kilowatt hour no matter when I use it.

On demand charges, you can have demand charges related to coincident peak, which is the peak when the system is peaking, versus non-coincident peak which is when the customer peaks. There are different types of demand charges that you might implement, depending upon the cost that you're trying to recover. So demand charges are usually linked directly to whether or not the demand charge -- the demand cost is driven by system peak versus demand cost that's driven by the individual customer's peak.

This is very traditional. I'm probably giving you all a chance to take a nap and catch a cup of coffee because this all should be very common for you.

Moving to alternative rates, though, we start to see two emerging structures happening. And what's really interesting is they're kind of at opposite ends of the spectrum.

So you have dynamic rates which, again, are still per-kWh charge but they are very -- they vary. And they are meant to send customers signal, like day-ahead or week-ahead. These pricing schemes, typically, are based off of either real-time pricing where you're actually sending a price signal to the customer that the market is sending out, or they can be event based which means it says, oh, today is going to be a particularly hot and high-load day, so we're going to try to incent customers to conserve. We're going to increase their rates by a certain predesignated amount. Critical peak pricing is a good example of that.

On the opposite side of the spectrum are subscription rates. These are per-monthly charges where the customer sees a flat bill for the month but the incentive structure is different. So you can have the customers subscribe to a certain level of service and they try to manage their load to that certain level of service, typically demand level. So what this does it is empowers the customer to choose what their energy consumption targets will be and then they will manage to that as best as they can,

much like you would do with, say, a data plan on your phone bill.

Similarly, though, there's technology subscriptions which are another interesting avenue where you're actually using pricing to incent customers to make energy-efficient investments. And the customer reaps the benefit by having a flat bill, a non-volatile bill, but you still end up with the energy efficiency capabilities that you would get with some of the other pricing options.

Next slide, please.

So how do these line up with GEB buildings? And we kind of list all these rate options. You can see at the bottom, not aligned, basically, means was not at all helpful to a GEB building or to the grid, for that matter, are these flat volumetric rates. If a customer is not incented to change their behavior by moving electricity or reducing -- and maybe only just reducing electricity, you really lose all the capabilities that a GEB building brings to the grid.

At the top of the list is real-time. So here you're basically saying I'm going to give

you a price signal a day ahead and you can make that signal clear to the customer and they can change things within the building, even just for a day or two, to save money and also help with the grid.

Moving on to the next slide, I want to talk about some of the barriers to rate design and grid enablers. We talked about this already a little bit, simple and clear. Muddled market signals are part of the problem we have. It's just a lack of transparency and clarity on rate designs. There's disconnects between rate design and markets.

Also, we talked through -- I think you all talked this morning about state regulations. We need to make sure that you're creating the right incentive structures for utilities to, one, to enable some of these incentive structures and still be able to continue to be a going interest.

And then inconsistency. We see this a lot across and this is a lot across, and this is a theme across all things, where customers in different jurisdictions that may have similar operations but then they're facing all this variety. And moving towards more standardization

could be helpful.

The next slide describes a framework for talking about this which -- can you go to the next slide, please? -- which is the modern rate architecture. The idea very simply here is that you start thinking about pricing as a tool for incenting customer behavior and achieving certain goals. It's not a strategy itself, it's a tool for achieving strategy. To be able to do it, you need to understand what your products are? Well, what are you actually creating for your customer and delivering to them? What is the cost of that? What's the cost allocation? What is it costing the utilities or the service providers to put that in place?

Customer segmentation. We as an industry think about customers by who they are, residential, commercial, industrial, as opposed to how they use the products. They're just a straight consumer. They put electricity onto the grid and they take electricity off the grid. They are actively involved in their energy management. They're not involved. They utilize certain technologies. We need to start thinking about customer segmentation differently.

And then you go into pricing design, pricing design specifically addressing what your customer segmentation, cost allocation, and products are.

And then the last piece is incentive design. We should be explicitly talking about incentive design, not embedding incentives into pricing but rather having it layered on, things like discounts, incentives, things that are transparent to the customers but also allow for changing of incentive structures over time that allow building, like GEB buildings, to be able to advance adoption but not create perpetual subsidies.

Moving on to the next slide, we have programs, utility-operated programs. This is really the conventional programs. They're performance-based, participation-based, and voluntary-based.

Next slide, please.

Performance-based basically means that the customer gets an incentive based off of what they did. Participation-based means they get an incentive for participating in the program and you may or may not get the savings that you're

anticipating. And then voluntary behavior is, really, you're trying to communicate to customers to change their behavior but you may or may not get that behavior change. A good example of that are the notices that you send out in California when you're having a critical heat day. You're just asking customers to please reduce electricity.

Next slide, please.

How do these line up with GEB? Barriers, I'm going to skip this slide because they're similar to the other ones and I only have a couple minutes left. So, oh, there was a slide missed in there. I thought there was one on prioritization relative to GEB. I'll move on.

So the last one are these market integrated options. So, basically, GEB buildings have the ability to provide three types of products back to the grid, capacity, ancillary services, and energy markets.

So capacity, emergency services, it's like I'm giving -- I'm either going to turn my load down and not put load on the grid, or I'm actually going to dispatch a battery for the benefit of the grid.

Ancillary services are really being able to provide faster response to some of the needs of the grid, such as some reserves. Again, buildings can provide some types of reserves.

And then, lastly, energy markets which are the, basically, the real-time and day-ahead per-kilowatt energy costs.

Next slide, please.

So alignment with GEB here, you can see capacity and emergency services are the most aligned, and energy markets the least. This is because GEB buildings have that ability to act like an asset to the grid, not just an energy supply to the grid. And so that's very important, that creating some incentive structures that recognize that capability of a GEB over other types of technologies, because it's sort of a collective group of technologies and actively managed.

Next slide, please.

Again, the barriers, and this is not so much true for California but as a nation, we need to start getting better at creating consistent market structures and creating that inertia to get utilities to support these types of buildings

by addressing some of the barriers that they see, which are things like, for instance, the business model. How do you get to a balanced place where utilities, third-party providers, and so on are all collectively working together to decarbonize and meet customer needs?

Next slide.

When we look across the stakeholders that we talked about earlier we can see where we get the greatest amount of goal alignment, if you will, on the types of incentive mechanisms is predictability. We get the most alignment there. But what's interesting, when you look at this chart, it's either you're on the left or you're on the right. And it's sort of due to the continued pressure we have as an industry between what the grid needs, what the utility needs, versus what customers need. And so this is a continued -- we need to continue to be thinking about how do we get alignment across all of these? And how do we create programs and incentives that leverage and help all stakeholders achieve their goals?

Next slide, please.

Expanded use, again, I've talked about

some of these. We can use really creating consistency across the programs. I dare say that you don't want to necessarily have the same rate design across all utilities within a state but, at least, some consistency in the approach. I think the CPUC does a really good job at trying to achieve that but it still can get disjointed. And really kind of embracing the idea of the modern rate design concepts that we have out there. And then, you know, let's not underestimate the benefits of things like standardized treatments and regulatory changes and standardization policies.

So with that, I will hand it back to you, Haile.

MR. BUCANEG: Thank you, Margot, and thank you, Rois. That was a lot of information. And as you guys know, the slides will be available, so Margot, actually, went through those quite quickly, but those can be referenced.

Next, we have Liz Reichart, who is a Senior Energy Policy Specialist with Washington State Department of Commerce.

Liz?

MS. REICHART: Great. Thank you so much.

And thank you to all the Commissioners and Staff for the opportunity to join this workshop and share a little bit about what we're up to up north.

My name is Liz Reichart. I'm the Energy Efficiency Lead at Washington State Department of Commerce in the Energy Policy Office. I'm going to take the next ten minutes or so to give you a very brief overview of where the State of Washington is at on thinking about flexibility, particularly around grid-efficient/grid-interactive buildings.

The state's journey on this path to thinking about buildings is grid assets and where we're headed next as we think about scaling these GEB efforts.

Next slide.

So at the Washington State Department of Commerce, we administer around 100 programs ranging from housing and rental assistance programs to some of the more energy-focused work in the State Energy Office where I work. And Commerce has such a broad purview over so many crosscutting areas, which is really exciting for energy work, energy being something that

intersects with everything.

Next slide.

So before we talk about buildings, I want to talk a little bit about a first-in-nation law we passed in 2019. HB 1444 was a bill that included appliances rules for 17 different products, including a design requirement for electric-storage water heaters. And it requires CTA-2045, this communication port or an equivalent technology. And I'm sure most of you are familiar with this bill and with CTA-2045. It's a standard communications protocol that appliance makers can include on their products to enable them to be grid interactive and shift electric usage, like that which typically occurs with battery storage.

Typically, we like to be a fast follower and do a lot of our standards adopted by reference to ENERGY STAR or California. However, Washington chose to lead on this issue for a number of reasons, many of which have to do with modernizing our grid and investing in the value that flexibility provides.

There was the technical and behavioral data that we received. There were a number of

important pilots that provided critical pieces of the puzzle in giving us the data that we needed to move forward with CTA-2045.

When we think about regulatory barriers around emerging technologies related to demand response and storage, having pilot data really makes an impact. And we even spoke to this impact in a CEC docket on load management.

And, of course, grid-interactive water heaters were bolstered by this broader trajectory of energy and clean buildings legislation passed in the last couple years in Washington. 2019 and 2020 were banner years for clean energy in Washington with the Building Performance Standard, the Clean Energy Transformation Act, the HEAL Act, and the Climate Commitment Act which includes cap and invest and many more.

There's a 100 percent Clean Energy Standard in CETA. But there's also a lot more thinking to be done on what a statewide demand response target looks like too. But this kind of water heater technology supports this broader policy vision.

Next slide, please.

I wanted to give you the background of

our work on water heaters as a building block to this grid -- to these grid-interactive buildings arc that we, as a state, have been on. But there were also other components working simultaneously on this arc. And the journey of getting to flexibility was fed through standalone storage, then incorporating storage with other renewable energy assets, to then thinking about a building as one of those assets.

I offer some questions that we have been asking through our pilots and studies of the region. How to site storage? Where do we put it? What does the grid need? And when? How to right-size storage and how to value the full value stream of storage, not just the value of storing clean electrons but, also, as a voltage regulator and as a source of flexible capacity? And then, how do you upgrade to a large battery that can now be represented by the building which can then contribute to flexible capacity?

The other side from which we're coming at it is what's in the building? We've been thinking about going beyond water heaters to demand responsive appliances, but watching closely what California is doing on expanding the

scope of what flexible appliances can add, and asking, how is a building both a whole-grid asset but, also, how do the things within that building allow it more flexibility as well?

If you could have a toolbelt encompassing the entire capacity of a building down to the distributed potential of the many small appliances, when you have a lot of options on the table from residential to commercial, that building capacity availability becomes more tunable.

Then from there, it's also about wholistic planning to make sure we're thinking about electrification, but also we're thinking about efficiency as the foundation for GEBs and grid-interactive buildings. It's important to highlight, also, the equity pieces that are interconnected with our efforts to update standards. Standards help ensure that it's not just wealthy folks getting all these flexible appliances, particularly as the state expands at such a high rate.

There's a joke I like, that the city bird of Seattle is the crane because there's so much construction. We're expanding so rapidly as a

state.

So standards ensure that as we build everywhere in the state, we also ensure the possibility of using these things in a demand-responsive way.

Some additional fuel to the flexible future of the region, we're gotten really good at the energy efficiency part. Even as Seattle has grown in size, load growth has stayed pretty flat for Seattle City Light. As things get more efficient we'll need to aggregate more of them together to represent a meaningful load. But buildings themselves, particularly larger buildings, we recognize will already have that potential.

Building envelopes the footprint of buildings are getting better and better in terms of energy efficiency. But now there's an opportunity to add, you know, another layer to what they can do.

Next slide, please.

So now we've got an idea of what our buildings need to be efficient, connected, smart and flexible. Where do we go from here?

We want to decrease barriers to GEB

pilots in the state. We recently worked with Pacific Northwest National Lab on technical assistance to identify barriers in a region to GEB pilots. The Washington Clean Energy Fund has an Energy Grid Modernization Program that, to date, has awarded about $39 million in grants to utility companies. And beginning in the 2021-2023 Capital Budget, we have $10 million appropriated solely for the purpose of building electrification projects that demonstrate grid-enabled high-efficiency all-electric buildings.

One of the best examples of a pilot that has benefitted from Commerce funding is the Spokane Catalyst Building. This building was a joint collaboration between Avista, McKinstry, Katerra, and Eastern Washington University. And it allows for granular load control. The exciting part is that these buildings that are part of the campus have the potential to support their own transactive energy systems but can also interact with a microgrid, for instance, on a campus grid and with other buildings, to create a lot of flexibility and, thus, integrate renewables more effectively.

We're hoping the Catalyst Building and

projects like it will provide insights into how we integrate DER into some of these flexible GEB projects and allow us to explore the pros and cons of integrated DERs at individual buildings versus larger-scale DERs.

The next step, once we get data from state pilots, is going to be considering policies that align incentives to scale GEB and grid flexibility more generally.

Next slide.

So a lot to look forward to as we see what our utilities need, what our building owners need in order to bring more flexibility to the grid, in addition to looking at what others are doing and learn more about what we need to fund and implement the future of flexibility.

And I will leave it there. Thanks for your time.

MR. BUCANEG: Thank you, Liz.

Finally, we have Tamara Dzubay, a Senior Manager for Regulatory Affairs and Emerging Markets at ecobee.

Tamara?

MS. DZUBAY: Thank you so much. I'm really looking forward to walking everybody

through some really interesting insights that ecobee has learned over the past two years, specifically as it relates to this topic of what's needed to scale grid-interactive efficient buildings.

Ecobee was founded in 2007 and, actually, developed the first wi-fi connected smart thermostat. Today, ecobee is a leading developer of smart thermostat technology with devices being used in over 90 utility programs across North America.

Most recently, in 2020, ecobee introduced a free thermostat optimization platform to all of its customers through a software upgrade that offered integrated demand-side management through personalized energy efficiency, time of use, and demand response optimization. And so we have gathered a lot of information because of that experience on what are some of the existing barriers that exist to really scale what we are trying to offer all of ecobee customers at scale.

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Scaling grid-interactive efficient buildings will require the right policy frameworks to enable market mechanisms that fully

leverage existing and future technological capabilities.

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So what are some of the existing barriers? Through rolling out an integrated demand-side management platform that offers energy efficiency, time of use, and demand response optimization, we've learned that some of the barriers include siloed policies which then create siloed utility programs, which are then evaluated on cost effectiveness in a way that does not wholistically value resources.

We see this right now in California where smart thermostats are not currently part of energy efficiency programs, yet there are many devices in customer homes today that are receiving optimization around the rate schedule, as well as additional energy efficiency optimization that has recently been rolled out from leading manufacturers that are not being accounted for in a way that is wholistically valuing their contributions to the grid.

And this leads to another barrier which is a lack of aligned incentives between utilities, technology providers, and customers to

minimize costs and emissions across the country. As we've seen through some of the program silos, right now programs across the country are looking at energy efficiency as total energy reduction, and demand response as peak demand reduction. And so what happens when you're trying to create daily optimization through really flexible load is that doesn't fit in either of those program silos because actual GHG emissions are not being accounted for in cost-effectiveness tests.

And I think what's challenging is that, for technology providers, it's really difficult to create state-specific solutions. And so having alignment around these incentives between utilities, technology providers, and customers to minimize cost and emissions across the country is really needed to provide that scale. And from the utilities' perspective, having the incentive to invest in these resources in the same way that they're able to invest in other grid modernization resources is important to enable technology providers to really reach as many customers as possible with solutions that provide daily bill savings, as well as daily peak demand reduction.

And the last existing barrier that we've recognized is that high friction enrollment and authorization processes that create significant drop-off for residential customers significantly, also, reduce grid visibility of where flexible load resources are in homes.

So, specifically, we have seen that, in utility programs that require customers to enter their utility account number to enroll, that there's a significant drop-off, as much as reducing participation to only three percent of customers.

And what is also an issue is that in the market-integrated programs there are customer authorizations required to access AMI data, which also require customers to enter information that they don't know by memory, such as their utility account number.

And so these frictions for residential customers are something that is significant. Because unlike commercial or industrial customers that may have third parties that are managing their energy use and can go through higher friction processes, for residential customers it really creates a disincentive to enroll because

it creates that level of friction that makes it difficult.

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So ecobee, today, is harnessing the power of homes for a clean, resilient, and flexible grid of the future through personalized automation. And as I mentioned earlier, in 2020, ecobee broadly released a thermostat optimization platform that was delivered to all of its devices in the form of a free software upgrade, which is called eco+. And eco+ is a suite of five features that lets customers actually personalize their comfort and savings preferences for maximum efficiency with minimal effort.

And from the standpoint of energy efficiency, there's features that enable customers to save without actually impacting their comfort, so adjusting for indoor humidity levels that doesn't affect customer comfort but provides savings, adjusting for vacancy faster than ever before, as well as providing customers recommendations to update their schedule when it doesn't match their actual occupancy patterns.

Time-of-use optimization is something that is also offered through this upgrade. And

it pre-cools homes at times when electricity prices are lower, and actually provides thermostat setbacks during the peak period. And for customers who are on these rates there's a significant incentive for them to enroll because they save on their bill.

And we, additionally, offer demand response optimization through a feature called Community Energy Savings which lets customers know that if peak demand is creating strain on the grid, that their device will make automated adjustments to help prevent outages in their community.

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So this is the Mobile Enrollment Wizard, some of the prompts that customers receive when they're enrolling in this platform, which we call eco+. So customers are prompted to select their utility provider. And they are also prompted to enroll or not enroll in features that I discussed earlier, such as Community Energy Savings which provides personalized demand response optimization. Time of use, which provides personalized time-of-use optimization, and for time of use they are then prompted to select the

rate structure that they are on.

So this is a very, very simple process for customers. All they need to do is toggle a feature on and off to enroll. And as it relates to rate optimization, then select the rate that they are on if they are able to identify the name of that rate structure.

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So ecobee contracted third-party measurement and verification experts to measure the impacts of this platform, eco+, during Summers 2019 and 2020 using their Randomized Encouragement Design involving nearly a quarter-million devices. This is actually the largest third-party thermostat optimization study that's ever been conducted for smart thermostat optimization.

This study was designed to measure impacts across five U.S. climate zones, as well as Canada. And the impacts are measured against a control group of ecobee customers who did not receive the eco+ offer. The results are available on ecobee's website at ecobee.com/ecoplusemv.

There were a lot of really interesting

insights that we gained through this study, especially because it was conducted pre-COVID and during COVID. I won't be able to walk through all of them because I have limited time today. But what some of these insights provided is really interesting as it relates, also, to rate design.

I know there's a lot of discussion around the need for certain on-peak to off-peak price ratios to motivate customers to make manual changes to their energy usage. And what's very interesting is that when you involve technology that's responding to a signal, that's going to automate a response even if that ratio may not be as large as one that might be required to elicit a manual response to a rate structure.

We also learned that in California, specifically, we looked at time-of-use optimization on the SMUD time-of-use rate in 2019 and 2020, and that during COVID there were nearly similar impacts than there were pre-COVID, which really told us some interesting insights around the platforms ability to maintain customer comfort when customers are home. So we saw time-of-use impacts that were similar to what we would

call mini DR events on a continuous basis. In California, in SMUD, it was about, per device, 0.25 kW, and up to bill savings of eight to nine percent, as well as total energy savings on the rate of three to four percent.

What we were able to do is actually look at rate structures across the entire country and able to see what the effect is of technology on these different rate designs as it relates to automating response for customers. And what was really encouraging is that in each evaluated rate there was bill savings, overall energy savings, and significant peak demand reduction through daily rate optimization.

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I think the key lesson from this study, though, as it relates to this topic of what is needed to scale grid-interactive efficient buildings is that scale is achievable today through simple vendor enrollment. And as we look at programs that exist today in California, we see, through data, that the customer enrollment process and the level of friction that is required in that enrollment process for customers to complete enrollment is directly correlated to

the program enrollment rate.

And so as we've seen in third-party evaluations of DRAM, participation rates can be as low as three percent. And bring your own thermostat programs, which do not require utility account numbers to complete enrollment, you can see enrollment rates around 20 percent. And through our study, where enrolling customers was as simple as them toggling on a feature on and off and them getting notifications on their thermostat when optimizations were happening, we were able to achieve up to 53 percent enrollment and, actually, similar load reductions that we see in utility programs, as well as similar opt-outs.

And so ecobee's vision is really that through making smart thermostats smarter and allowing customers to provide input on their level of comfort and savings, that there's a significant opportunity to scale grid-interactive efficient buildings through innovation that increases participation and, ultimately, leads to significant emissions reductions.

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So really the key takeaways that I would

like to leave you with today is that, first, creating visibility of flexible load resources is critical. Today, the large majority of smart thermostats are not formally enrolled in a utility demand response program, and they are not integrated into the wholesale market, so that means that the majority of flexible load resources in customer homes today is not visible to grid operators.

Ecobee has about 20 percent of its California customers today receiving daily time-of-use optimization. But because that is not part of a utility program, grid operators do not have visibility into what those impacts are. And so there is megawatts of load shifting happening on the California grid that is not being accounted for and is not able to assist in system planning, create efficiencies, and be used, also, for distribution-level applications.

Another reason why creating this visibility is critical is because it provides vendors the incentive to further invest in maximizing participation. So while customers have that incentive to enable that feature because they receive those bill savings every

day, and the large majority of customers that have turned it on do not turn it off, ecobee has recognized there are, certainly, ways that we could further engage customers to significantly increase that percentage of customers that are receiving that daily rate optimization which, if scaled across all homes with smart thermostats today, could be very significant, especially as it comes to grid reliability and grid resiliency.

The second key takeaway is to consider policies that create aligned incentives between all parties, which includes utilities, technology providers, as well as customers, to reduce costs and emissions. And being able to wholistically value resources, such as connected devices which improve over time through software upgrades, which is very different than, I think, traditional energy efficiency measures which cannot change over time, and so being able to wholistically value resources on this basis would certainly help to the extent that it's something that could scale across states.

And third, to consider mechanisms that really enable scale through simple vendor enrollments. And some ideas on what that could

look like would be to engage in emergency agreements or load management agreements where vendors can really enable a much higher participation rate in things like emergency demand response or rate optimization by removing those high friction processes that are currently deterring customers, residential customers, from completing enrollment because it's something that would require them to take action and is not as simple as something they can click a feature on or off and know any information through memory.

And lastly is to continue to include technology providers in policy and planning discussions.

We really appreciate being invited to speak here today. And we hope that the learnings that ecobee has achieved over the past two years through its third-party evaluation of this platform is valuable to California and to the rest of the country as it relates to what's needed to really scale grid-interactive efficient buildings throughout the country.

Thank you so much.

MR. BUCANEG: Thank you, Tamara.

And, again, thank you to all of our

panelists. There was a lot of good input ranging from customer prioritization, utility rate options, funding program options and incentive strategies, policy strategies, program enrollment strategies, and just so much more.

But now I will go ahead and turn things back over to you, Commissioner McAllister, for your discussion.

Thank you.

COMMISSIONER MCALLISTER: Thank you so much, Haile.

And thank you, Angela, Clay, Margot, Rois, Liz, and Tamara, all six of you did a great job, so thank you very much.

And, Haile, nice job sort of putting everybody in the broad categories because this was a wide-ranging panel but, I think, really around proactive solutions, focusing on, you know, proactive and readily doable-in-the-marketplace solutions to harness load flexibility.

So thank you all for all your, you know, sleeves rolled up in the trenches, mobilization of customers and devices and equipment, to really be part of the solution. And it's great to hear

that -- well, it's certainly great and distressing to hear that you're standing by, waiting for us to get it right, so you can jump into the marketplace even more. And, ecobee, really appreciate all your innovation on this front. And we want to give you more robust and direct and meaningful signals so that you can help your customers take advantage of that.

I do have a question directed, I guess, at Clay, if he's still on?

MR. NESLER: I'm here, Commissioner.

COMMISSIONER MCALLISTER: Oh, hey, Clay. Good to see you. Really, really nice presentation, very clear and, you know, I think it presents tremendous opportunity to amp up the EPC marketplace.

I guess if you could give us -- and I think Mary Ann actually asked the question here for you, as well, that's related to mine, trying to get a sense of where the performance contracting industry is today? Obviously, it's mature. You described some great projects. Could you give us a flavor of the kind of capital that's coming to these off-balance-sheet projects, you know, some of which you described?

You know, what kind of rates? What does it look like to the customer? You know, is it third-party? Is it in-house? I mean, I imagine it's pretty diverse. But could you just describe kind of where the capital is on these projects?

MR. NESLER: Yeah. Glad to.

So the U.S. Federal Government, this is one of the primary ways in which Department of Defense, Department of Energy, other agencies, they invest in deep energy retrofits. The funding comes from private sources. So, actually, one of the things that an ESCO does is bring forward private capital.

Now the way these projects are structured, they're generally cash-flow positive, even in the first year. So, yes, a lot of the energy savings goes towards paying for the capital improvements, the debt, right, service. But, generally, the customers are actually benefitting. And then, of course, over the term of the contract all the energy savings goes to those public institutions.

So it's always private finance, usually from specialty finance organizations for the federal government. But municipalities, for

instance, have the option to use municipal finance, which is generally at a lower rate of interest. The Hawaii project, which I described, issued a Green Bond, and it was oversubscribed by a factor of two or three.

COMMISSIONER MCALLISTER: Wow.

MR. NESLER: So no lack of capital in the world. We just need to find a way to get the capital to these positive impacts.

And so that's one of the services that an ESCO provides is finding the money for these kind of things. But, again, with everything paid through savings there's no ratepayer impact on this, and there's no taxpayer impact on it either. So you know, this is fairly budget-neutral. And depending on the model, whether it's efficiency as a service or traditional performance contracting, it can be off credit or it can be off balance sheet. So you know, we see a lot of interest in like private universities being able to finance their projects that way. There are a lot of innovative models that we can use.

Mary Ann also asked one other interesting question. She said, "Clay, can you do a whole

bunch of homes with a structure like this?" And, in general, ESPCs, the reason they work is there's one customer, so it's been very successfully used in affordable public housing. It's been very successful in condominiums and multifamily where there's a single organization that is responsible for the payment of the utilities and has a credit rating.

So aggregation of lots of disparate things is a little more challenging. But certainly as we talk about public housing, affordable housing, this is an effective model that's been used for years.

COMMISSIONER MCALLISTER: Okay. Sorry. My connection froze up there for a minute, so I'm just back. Thanks for that.

I want to give, well, anybody else the opportunity, let's see, to comment on, sort of, on that question. I'm not sure it's really up others' alley hear. But also open it up to my colleagues on the dais.

Commissioner Shiroma or Commissioner Houck? Vice Chair Gunda?

COMMISSIONER HOUCK: I apologize for having to step out for part of it, so I didn't

get to see all of the presentations. I know that there's a question in the Q&A that I think Gabe said he wanted to answer in the live session. And I'd be interested to hear his response to that question.

MR. TAYLOR: Commissioner, I'm managing the Q&A. I will pose those questions to the panel after you're done with your dialogue.

COMMISSIONER HOUCK: Okay.

MR. TAYLOR: I could pose that question now, if you'd like?

COMMISSIONER HOUCK: I can wait until later. I don't have any additional questions, other than I appreciated all of the information. And the examples from Clay were very impressive and I hope we can get more of those examples out there here in California.

COMMISSIONER SHIROMA: Here's my question, and forgive me if some of you covered this and I simply missed it, so anecdotally, I live in SMUD territory. I served for 20 years as elected on the SMUD Board. But I still have the box on my air conditioning unit outside. It's radio controlled. And these things are still used by SMUD and PG&E and others. And I received

a letter from them recently that if I continue to let SMUD have access to it, that there may be times when they will shut off my air conditioner or, I think it was, for no more than two hours, and they would give me a $5.00 credit on my bill. Okay.

My question is this, that I'm the kind of person that, indeed, will just, will live with it. If SMUD needs to turn off my air conditioner for a couple hours, okay. It hasn't happening, actually, for all the time that I had that on there. Back in 2006 it happened. If this is the melding of the technology, the uptake, the opting in, and then the customer reaction, I know, at what point, as we have heat storms, has anybody done any studies or work if we have heat storms? Is there kind of a breaking point where customers say, I'm opting out, I'm going to override this thing, and then the grid, you know, ends up garnering as much benefit as we were counting on?

So, really, this has to do with the more recent type of heat storms we've been experiencing in California, which have been extraordinary, and whether that is factoring into customer behavior, more residential than

commercial, where there is a breaking point where they reach for that override?

MS. DZUBAY: So we know that during the rolling blackouts in 2020, we were actually in the midst of completing our third-party measurement and verification study. And we sent Community Energy Savings events to our California customers in that study. And so we have the evaluated impacts during one of those heat storms. Of course, you see the greatest impacts in the first two hours because, ultimately, when you're pre-cooling homes before the peak period you're trying to use the home as a battery to ride out that peak. And so, you know, it can work in increments of a few hours until then you are starting to see customers opt out from discomfort.

But I think if you have scale of the devices and you can pull customers into and out of those events in a way that tries to maintain their comfort, that, you know, you can really help mitigate some of those negative customer experiences. But it's also really about scale and enabling scale to do that, both from trying to leverage existing resources, all the existing

resources in homes today, but also trying to deploy more resources that are flexible loads to customers' homes that don't have them.

And so it certainly is something where, you know, customers are probably not -- like at ecobee, we don't like to have more than four hours of a demand response event because customer experience is first and foremost. And we know that if you're exceeding a four-hour period for an event, that is going to be negatively impacting customer comfort and the customer experience. And so it's really the ability to create scale and strategies around how to pool and aggregate resources, which is why having that visibility for grid operators is so important.

MS. LANGNER: I was going to add --

COMMISSIONER SHIROMA: Thank you.

MS. LANGNER: -- onto that --

COMMISSIONER SHIROMA: Go ahead.

MS. LANGNER: -- just a little bit. You know, staging equipment more, so two hours -- and you know, I'm coming from the research, more theoretical background here, but being able to stage two hours seems like it could be a long time to be without air conditioning if it's

extreme heat. But what if you reduce that time and spread that, as Tamara was just saying, in aggregate, so it's only 15 minutes per home but you're doing more increments across a larger portfolio of buildings?

So I definitely think there's capability to parse it out a little bit more.

COMMISSIONER MCALLISTER: I want to actually throw on Commission comment and just --

COMMISSIONER SHIROMA: I think Angela was trying to speak but I think --

COMMISSIONER MCALLISTER: Oh, sorry.

COMMISSIONER SHIROMA: -- you're on mute.

COMMISSIONER MCALLISTER: Oh, sorry.

MS. RAITT: I think you're muted, Angela, maybe double muted.

COMMISSIONER MCALLISTER: Yeah. Go ahead, Angela. Sorry.

MS. AMOS: There we are. I am double muted. Thank you.

I will second what others have said, that Uplight's observation is that when we perfect our algorithms we're able to pre-cool customers' homes such that they are comfortable enough not to opt out. And what we observe over time is

that when we have effective communication with a customer in advance of something, of extreme events happening, and when the terms and conditions of our partnership are super clear, customers understand that they always have the ability to make sure that they're comfortable, and if they need to opt out, they can. But if they do that a lot over time, then they may not be suitable for enrollment in a program in the first place.

So our primary goal, as, you know, others have said is to prioritize customer comfort, and customer awareness, and customers willingness to participate fully in the programs but understand that they, too, have a responsibility to not abide by the terms and conditions but be aware that there can't be a pattern, that opting out can't be a habit.

COMMISSIONER MCALLISTER: I wanted to jump in here, Commissioner Shiroma, as well. I think there's an opportunity to work with some of our panelists here to understand how we might target weatherization services in this realm, too, because, you know, we need to find ways to get into disadvantaged community housing, single-

family, you know, low-income housing. And there's just lots of deferred maintenance, a lot. You know, the air districts are working on this for air quality reasons, so there is a fair amount of money that could be going into low-income in new ways. And insulation and air sealing of a home actually allows it to ride out along the period of time after pre-cooling as well. And so there's quite a good synergy there for the programs that we have and that we could layer more activity and funding into already to sort of meet multiple goals.

COMMISSIONER SHIROMA: Yeah. And you and I have talked about those synergies before. Very, very important-important points, yes.

COMMISSIONER MCALLISTER: Some of the extreme heat resources that, you know, we're going to have to mobilize, as well, could actually layer really nicely into this. So we need to work with folks, like ecobee and others, who have looked at -- who have, you know, an understanding of where and how those resources can be most effective.

Anyone? Do you have any other questions, either Commissioner Shiroma or Houck? Okay.

Great.

Let's see, we're doing okay on time. Let's see. I think, why don't -- we do have a number of questions over here on the Zoom chat, so --

MR. TAYLOR: If --

COMMISSIONER MCALLISTER: -- or the Q&A, rather.

So, Gabe, why don't you moderate?

MR. TAYLOR: Sure. Thank you, Commissioner.

We have two questions, primarily two questions, on the Zoom chat. I'm going to do them in order. I'm paraphrasing as best I can to make them clear.

Steven McDonald with TMX (phonetic) has a question for Margot Everett. "Do you think legislation is needed before regulators will have the authority to adjust the legacy rate recovery mechanism to a GEB-focused rate recovery mechanism, or do you think they have the authority to reform those rate recovery mechanisms now?

MS. EVERETT: So I would say in the state of California, you're probably in better shape.

While rate design, certain aspects of rate design in California, are legislated, it is a state that has, for decades, embraced the concept of cost-based rates, avoided cost-based rates, and so to introduce rate mechanisms that continue to embrace that is something that, I think, is at the core of how California approaches rate design, and what the regulators thing about rate design.

So I don't think it's a stretch. I think the fact that, you know, as Mary Ann pointed out, the fact that California is exploring things like real-time pricing options and other dynamic pricing, really does speak to the fact that there is this flexibility in rate design within our state.

There are some -- when it gets to the residential customer, however, I will say that there are some legislated mandates around default rate structures, meaning that they have to be tiered. So there are some possible limitations there that get complicated. Tier rates are a more complicated rate structure for customers to understand and gets even more complicated when you try to introduce things like real-time

pricing. It can be option to not be tiered but it can't be the default as I understand the law. I'm not a lawyer, so I'm not going to say too much there, but that's my understanding of the legislation.

So I do think there's a lot of flexibility in California. You see a lot of innovation rates in California, a lot of different types of rate design, anything from, as I mentioned, the dynamic real-time pricing. You see subscription rates, particularly in the EV space. You see time-of-use rates. You see all sorts of different types of rate structures and creativity. So I don't think it's a real problem for California directly, although it might be more so in other states.

And I open -- you know, I welcome comments from others here to add to that or whatnot.

MR. TAYLOR: Commissioner Shiroma, I see you've answered the question -- the response from SkyCentrics concerning water heaters. And I'd also reference back to our Flexible Demand Appliances Standards. Here at the Energy Commission, our staff is aggressively looking at

the opportunities for load flexibility where there is minimal or no impact on the customer quality of service.

COMMISSIONER SHIROMA: Yeah.

COMMISSIONER MCALLISTER: So I --

COMMISSIONER SHIROMA: And water heater versus HVAC, very, very good distinction, yeah. Thank you.

MR. TAYLOR: And I would add, and Commissioner McAllister certainly can attest to this, very much the discomfort to the occupant when you're load shifting HVAC very much depends on the envelope. If you have a high-quality envelope, then there can be minimal to no impact on a customer for fairly long periods of time. I know my house can ride through six to ten hours of high temperature with very little discomfort.

COMMISSIONER MCALLISTER: Yeah. Good point.

I wanted to just send some kudos to Washington. Liz, thank you very much for being here, and for your input on the Flexible Demand Appliances Standards front, and the water heaters, you know, water heater initiative that Washington has done. I think we need to look to

your leadership and help move this market.

I mean, fundamentally, our programs move markets if we, you know, get the whole West Coast to do similar things, then the market has to take notice. They just can't not take notice. And so I think we're on the cusp of being able to do important things with water heaters, HVAC, and other end-use devices.

Did anybody else want to ask a question?

MR. TAYLOR: Commissioner, that tees up --

COMMISSIONER MCALLISTER: Commissioner Houck?

MR. TAYLOR: -- that, actually, tees up the next question on the Zoom chat, if we're ready for that one?

COMMISSIONER MCALLISTER: I wanted to make sure Commissioner Houck did not have any questions.

MR. TAYLOR: Sure.

COMMISSIONER MCALLISTER: Oh, great. Okay. Perfect. Thank you.

All right, yeah, go to the next question then, please, Gabe. Thanks.

MR. TAYLOR: From SkyCentrics, this is a

question directed at Liz Reichart. "Are you familiar with the ENERGY STAR connected water heater specification that was, apparently, released today? I'm not. But if so, are you concerned with how the cloud-based OpenADR is allowed as an alternative to CTA-2045?"

MS. REICHART: Thanks for that question.

And thank you, Commissioner, for your kind words about Washington. I know Washington, equally, we're tracking what's going on in California with your own Flexible Appliance Standard's work.

In response to question, you know, I think it will always be tough to get all stakeholders aligned. And you rightfully point to the potential for some kind of federal standard. But we really like the fact that CTA-2045, that port allows multiple utilities or programs to include that water heater in their demand response program. I'm not sure if that's possible with the ENERGY STAR specification. But we in Washington at least really hope to preserve the open character of our standard.

Thanks for your question.

MR. TAYLOR: That's all the comments from

the Q&A, Commissioner.

COMMISSIONER MCALLISTER: Well, great. Okay. Well, thanks.

Again, I think this afternoon had a lot of substance for us to chew on. And we'll definitely be following up with all of you for some reason or another. A lot of creativity in the room. And I think we're living in a moment that -- and it's largely because of the urgency that we all feel, where it's just unleashing a lot of creativity. And as you said, Clay, there's a lot of capital floating around there and looking for somewhere to go, and we need to give it some place to go. So a lot of great discussion today.

I think with that, we'll move on to any public comment that we might have.

MS. AVALOS: Thank you, Commissioner.

COMMISSIONER MCALLISTER: Is the Public Advisor's Office -- great.

MS. AVALOS: Thank you, Commissioner McAllister.

I'm going to read off -- please, allow one person per organization make a comment, and comments are limited to three minutes per

speaker. I'm going to start, first, with the folks using the raise-hand feature on Zoom. And let's take a look here. I don't see any raised hands on Zoom.

So I'd just like to remind -- and I don't see anyone on the phone, either, so I'll just give it a few seconds to see if anybody would like to raise their hand and make a comment.

Okay, seeing that there are no raised hands, then that concludes comments. And I turn to Commissioner McAllister now.

MR. TAYLOR: Commissioner?

COMMISSIONER MCALLISTER: Thank you. Thank you, Rosemary.

Yes, Gabe?

MR. TAYLOR: Sorry. We had one more comment come in on the Q&A. It's a bit of a longer comment. I was hoping the commenter would speak during the public comment period. But I'd like to, just for completeness, read off a little bit of it, if you don't mind?

COMMISSIONER MCALLISTER: Yeah. Yeah, please. That's fine.

MR. TAYLOR: This is from Kirk Oatman, commenting on smaller commercial buildings. He

comments that, "Few programs are actually effective for this buildings because projects are small but paperwork is excessive." The commenter says that "They consistently achieve 20 percent energy efficiency savings with a small building management system. And DR is fully integrated into whole-building AI calculations." Just a little bit more to the comment here. I'm hoping the commenter will comment on the record.

Thank you.

COMMISSIONER MCALLISTER: Great. Thanks for that, Gabe.

Well, with that, I think we're going to wrap up. I think a few announcements. Our next IEPR workshop is Monday, October 25th, on energy efficiency, on the energy efficiency doubling goal, SB 350 goal, to go out there and get more energy savings, so thanks for that.

There you go, Raquel.

Here's what we ask folks to do to get public comments in, due on October the 9th -- oh, I'm sorry, to get their written comments in. And there, yes, there's the upcoming workshops.

And then if you could put up the slide for public comments? That would be great.

So by the 19th from today. And there's the information on the docket.

I wanted to invite our dais members here, perhaps beginning with our friends at the PUC, Commissioner Shiroma and Houck, to make any wrap-up comments you might want to make.

COMMISSIONER SHIROMA: I'll simply say thank you, Commissioner McAllister, Vice Chair Gunda, to all of the panelists and the attendees, very, very important effort. And I look forward to problem solving together.

Thank you.

COMMISSIONER MCALLISTER: Great. Thank you.

Commissioner Houck, did you want to make any comments?

COMMISSIONER HOUCK: Yes. I also wanted to thank you, Commissioner, Vice Chair Gunda, Commissioner Shiroma, and all of the staff and presenters today. It was a great workshop, lots of information, very inspiring. And I'm really excited about the opportunities that we have.

I think, as you said earlier, Commissioner McAllister, we're living in a really pivotal time right now where we have so much

potential to make these changes that are going make such a difference in how and when we use energy and give people choices, as well as being able to crosscut with disadvantaged communities. And I am really looking forward to working with my fellow Commissioners at the PUC and with the Commissioners at the CEC on moving these efforts forward.

And so I want to thank you, again, for this wonderful workshop, it was great, so thank you.

COMMISSIONER MCALLISTER: Of course. You made it much, much better by your presence and collaboration, so thank you both for being here.

Vice Chair Gunda, did you want to make any comments? I think I saw --

COMMISSIONER GUNDA: Yeah.

COMMISSIONER MCALLISTER: There he is.

COMMISSIONER GUNDA: I'm sorry.

COMMISSIONER MCALLISTER: Okay.

COMMISSIONER GUNDA: Yeah. I'm sorry, Commissioner McAllister, I'm going to keep the video off. I'm just having a spotty signal.

COMMISSIONER MCALLISTER: Okay.

COMMISSIONER GUNDA: Yeah. I just want

to echo Commissioner Houck and Commissioner Shiroma's comments.

And I think I just want to, first of all, you know, recognize your continued leadership in this area. You know, I think you -- you know, this year has been a huge kind of forward steps in the building arena and, more broadly, the code and then, you know, the codes and standards earlier this year, the 3232 Report, the broader building decarbonization dialogue that's happening. And this is really a wonderful day of conversation around the DERs and the integrated nature of the buildings and how to bring it all together. So just really appreciate your leadership on this.

And you know, I want to recognize Commissioner Houck's proceeding, the DER proceeding, at CPUC. I think it's just coming. It's such a pivotal time for the broader conversation and really look forward to engaging there as a Commission but, also, you know, just encouraging the stakeholders to really provide robust participation in that proceeding because I think it's going to unlock a lot of value for the state as a whole, and Commissioner Shiroma's, you

know, kind of leadership on both equity an the broader affordability discussion, and just appreciate the three of you and your leadership on various aspects.

And thanks to Heather and her team, as usual, and the Efficiency Division for putting together such a wonderful day today.

And it's, obviously, not feasible without the speakers and their time and their generosity in coming here and talking to us, so thanks to all the speakers for their time today.

And I think, you know, I just want to just close on reiterating what I mentioned earlier in the day today. You know, the SB 100 goal, you know, kind of necessitates the state to move towards doubling or tripling or quadrupling our system level, you know, grid capacity. And that, obviously, that view doesn't take into account the optimal of the taking advantage of the DERs as a whole. And as Commissioner McAllister pointed out, we haven't really looked at load flexibility in SB 100. But the few sensitivities we looked at, you know, really points to an incredible value on the grid overall for load flexibility.

And then I just want to then bring it back to the 2025-2030 time frame, you know, with the recent decision at CPUC with 11,500 MQC (phonetic) procurement, which almost translates to 25,000 megawatts of new capacity additions in the next five years, we are looking at, you know, unprecedented levels of kind of development and steel in the ground. And I think one thing that we absolutely have to take advantage of is the load side and demand side and how do we integrate that flexibility? And I really appreciated Carl's point earlier around the resiliency centers or the hubs in the state and how do we expand the local resiliency using the DERS?

So it's a very robust conversation, and love to move this forward. It's an important time for all of us. And I really appreciate the public dialogue and helping move this conversation forward.

Thanks to everybody.

Thanks, Commissioner McAllister.

COMMISSIONER MCALLISTER: Thank you very much, Vice Chair Gunda. That was great. And I couldn't agree with you more. I think, you know, what we're trying to do at both Commissions,

really, is create tools, certainly at the Energy Commission, trying to create tools and expand the toolbox for actually linking up all these resources and coordinating them in real time. And you know, that's -- it takes a village to do that in terms of our regulatory regime in the state. And again, just really appreciate all the activity that's going on at the CPUC that complements, you know, all of our efforts and really helps facilitate this transition.

And you know, we're going to get to 100 percent renewables. The question is what path we take. And our buildings can help with that, you know, help the decarbonization pathway by, you know, modulating load and using low-carbon resources and being able to flex, as we've talked about all day today. But even once we get there and we're 100 percent, you know, load flex will be a key resource for keeping costs reasonable and managing the grid, you know, for all time. And I think we're really building a platform that has that kind of resonance and that kind of long-term tenure. It's really a new vision for how the grid is going to operate and these resources, and having them automated.

And we've heard a bunch of leaders today, from David Nemtzow throughout the day after, that play really key parts in that overall ecosystem. And so, you know, I think that it's really not possible to silo these issues anymore and we really just have to make sure that, from top to bottom, the system is well coordinated, you know, at each moment, and that buildings really can help be a part of that overall grid management solution.

So we have the technologies to do it. And you know, there's more creativity. I think Carmen Best said it, there's just a lot of creativity out there in the marketplace that's looking, that has solutions and needs a place in the marketplace to apply them.

And we didn't talk much about data today but, certainly, you know, the data environment and access to data in ways that make sense, secured access to data that helps facilitate this market activism here in the market role is another thing we have to make progress on.

So working together on all that, I really appreciate everyone attending today. Those 71 of you that are still on, thanks for duking it out

until the bitter end here.

And Commissioner Shiroma and Houck, thank you so much for being with us all day, and Vice Chair Gunda, you as well. Really appreciate all of your leadership in all the various areas across both Commissions. And looking forward to lots of good follow up and, certainly, want to get -- as we develop the IEPR document, want to make sure that it's as clear and relevant and, I think, impactful as we can, so certainly going to be working, will continue, with the staff over at the PUC to help that happen as well.

So thanks to all of our speakers, our moderators. It was a super diverse day with lots of different perspectives that all complemented one another, so thanks again for all the time and energy that went into all the presentations, and thanks very much.

I think, with that, I'll pass it back to you, Heather, to wrap us up.

MS. RAITT: Oh, I thank you. Great. Thank you. Just a reminder, again, that comments are due on October 19th. And I hope to see everybody again on October 25th for a workshop again on energy efficiency and SB 350.

COMMISSIONER MCALLISTER: Great. Well, thanks everyone, again. And we are adjourned for the day. Take care.

(The meeting adjourned at 4:24 p.m.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of December, 2021.

MARTHA L. NELSON, CERT**367

CERTIFICATE OF TRANSCRIBER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

December 27, 2021